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Trade in Climate Smart Goods

and Other Specialized Products of Ecuador

Somesh K Mathur, PhD

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Trade in Climate Smart Goods
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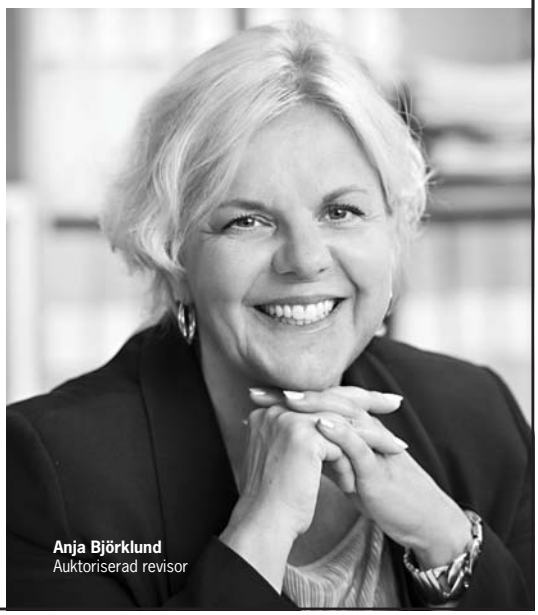

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Introduction

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Short Abstract: This book is on trade in Climate Smart Goods and Other Specialized Products of Ecuador. The interest in the subject of Trade in Climate Smart Goods was fuelled by Ecuador's positive trade balance with the rest of the Andean Community and MERCOSUR region in 2010. This may be a reflection of Ecuador's maturity in dealing with environmental issues since the early 1980s.The study is also able to identify some specialized industries and identify markets for the two digit and 6 digit industries for Ecuador using RCA and Export Specialization indices. There are 20 such products at the two digit level and 238 products/ industrial codes at 6 digit level disaggregation in 2010 where in Ecuador has a comparative advantage in production. These industrial sectors are potential for inviting FDI into Ecuador. The study further identifies CSG goods in which Ecuador has advantage in production and its trade. The study then uses simulations done through SMART analysis(within WITS) for evaluating the relative benefits of tariff liberalization of CSG and specialized goods(both for 20 and 238 products) with MERCOSUR, China, Japan and the US, and EU27 separately by giving numbers to trade creation, trade diversion, revenue, welfare and consumer surplus effects of liberalizing trade in 2010. The study at the end then uses a variant of Baier and Bergstrand (2001) gravity formulation for working out the basis of trade and export potential in CSG and trade in 20 products of Ecuador in 2010. National and International Policies are recommended for promoting CSG goods at country and regional level.

Long abstract

The book works out different trade indices based on trade data of Ecuador from 2002 through 2010.The study calculates RCA and Export Specialization Index, among others, to identify 20(at 2 digit level disaggregation) and 238 products(at 6 digit level disaggregation)and their markets of Ecuador in 2010. The paper also used 64 goods list of Climate Smart Goods used in APTIR, UNESCAP (2011,a,b). The Trade in CSG will help Ecuador to promote alternative industries in the face of Global Economic Downturn. Also, it will help countries to look for safe, alternative and reliable energy source rather than believing in trade of crude and Petroleum Oil only or investing a great deal in nuclear energy. Nuclear energy was in the brink of being affected in Japan due to recent Earthquake in Japan. Ecuador can direct its social spending in promoting small industries which can provide CSG goods (low carbon emanating goods) at low cost. Identification of goods for diversifying Ecuadorian economy is also done using different trade indices. The study then uses simulations done through SMART analysis(within WITS) for evaluating the relative benefits of tariff liberalization of CSG and specialized goods(both for 20 and 238 products) with MERCOSUR, China, Japan and the US, and EU27 separately by giving numbers to trade creation, trade diversion, revenue, welfare and consumer surplus effects of liberalizing trade in 2010. One finds that for Ecuador it is beneficial to trade in 20(2digit level) and 238 products(at 6 digit level) with the MERCOSUR trading partners while for trade in CSG it is better to liberalize trade with the Japan, the US and the China, the main suppliers (exporters)of CSG products.

1 Associate Professor, HSS, IIT Kanpur(www.iitk.ac.in). The author likes to extend his appreciation to the staff of the ITT, UTE and Head ITT for hosting me as the Prometeo Researcher,2012 and also providing very relaxed admosphere for pursuing the research work in Quito, Ecuador. SENESCYT for hosting me here in Ecuador. Professor Zavalo, former Minister of Economy and Trade, Ecuador and the Indian Embassy in Columbia for their helpful advice.

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The study at the end then uses Baier and Bergstrand (2001) gravity formulation for working out the basis of trade and export potential in CSG and trade in 20 products of Ecuador in 2010. National and International Policies are recommended for promoting CSG goods at country and regional level.

One finds that there is export potential of 34 million US $ in CSG to four Latin American trading partners of Ecuador. The four Latin American Countries are Bolivia, Chile, Columbia and Peru. This is less than the export potential when Ecuador liberalizes its trade of CSG with China, Japan and the US. Theoretical justification of the Gravity formulation used is given along with equations of Trade Creation and Trade Diversion. The latter will depend on the import demand elasticity, substitution elasticity and supply elasticity. Small country assumption is made while pursuing SMART analysis in WITS.

The study has **three main specific objectives.** The **three main specific objectives** of the book are the following

1. Work out different trade indices based on trade data from 2002 through 2010 for Ecuador. Understand the trade relations of Ecuador with its trading partners for total trade, some selected products and trade in CSG(Climate Smart Goods[2]) using some of the trade indices and trade and tariff data from the World Integrated Trade Solution(WITS) software. The indices include Export share of Ecuador in World Exports, Product Concentration and Market Concentration of Ecuadorian Exports, Revealed Comparative Analysis, Export Specialization Index, Trade Complementarity and Trade Intensity Indices, Export Diversification and Herfindahl- Hirschman indices of trade concentration .The above indices will help us to examine the role of international trade of Ecuador over the years(Export share in World Exports) and perform comparative analysis with other nations and regional groups over the years, identify the specialized products of Ecuador and their markets over the years by examining the changing comparative advantage in production of some products (RCA and Export Specialization Indices), also identify the extent of matching of Ecuadorian products with its trading partners (Trade Complementarity index), its intensity of trade relations with its trading partners

2 CSG are defined as components, products and technologies which tend to have relatively less adverse impact on the environment. CSGs constitute low carbon technologies such as solar photovoltaic systems, wind power generation, clean coal technologies and energy-efficient lighting. Trade and investment in CSGs and climate-smart services have recently received much attention as a triple win scenario where trade, climate and environment, and development all benefit (UNESCAP,2011,a,b).The study is able to define 64 such goods under 6 digit HS code(2002) by putting together various lists that have been defined by various international organizations recently. The list is arrived by defining concordance series from series of list given by the World Bank, ICTSD, WTO, APEC and the OECD. The study consider these 64 CSG as one category and calculates the below mentioned trade indicators for this category. This list builds on the 43-product list amalgamated by the World Bank, which was tabled as an initial starting point for discussions. The list at UNESCAP proposes an additional 21 products that appeared on one of the recent ICTSD lists (Renewables and Buildings) and also on the APEC, OECD or WTO list. In total, the list comprises of 64 climate smart goods classified by H.S. 2002 codes at the 6-digit level. The 64 goods list is attached below in the appendix I. The term "climate smart" was chosen over the previously used classification of "climate friendly" owing mainly to the fact that many goods/technologies contained within the UNESCAP list are not only "friendly" to the climate (i.e. assist in mitigation efforts by reducing GHG emissions), but also contribute to fostering "climate-smart" development by improving adaptive capacity such as by conserving water or by improving access to energy.

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(Trade Intensity Index) , share of specialized and CSG products in exports of Ecuador(Product Concentration), share of markets in total exports of Ecuador(Market Concentration) and diversification and concentration of products in exports of Ecuador(Export Diversification and Herfindahl-Hirchman indices). The study will further suggest measures to develop trade relations with India by examining the trade statistics and indices for India and Ecuador. The study will Use World Integrated Trade Solution (WITS) for the above analysis. WITS gives 2 digit, 4 digits and 6 digit disaggregated trade and tariff data from Commodity trade statistics of the UN and UNCTAD TRAINS data base.

2. Use SMART analysis (within WITS) to do simulations for trade liberalization effects for specialized and CSG products of Ecuador with MERCOSUR countries and the US, China, Japan and the EU27. Examine and analyze the trade creation, trade diversion, total trade effects along with revenue, welfare and consumer surplus effects of tariff liberalization for defining policy on the differential gains of such trade and tariff liberalization efforts with host of other trading partners/ regional trading partners of Ecuador mentioned above.
3. Use Gravity analysis to explain Ecuadorian trade of specialized and CSG products by identifying the host of determinants explaining such trade. These factors may include absolute size in terms of GDP of the trading partners; inter country dispersion of incomes, trade costs, prices of products prevailing in the two trading partners, dummies for common border, common trading arrangement, common language and common colony, among others. Use Gravity model to work out 'export potential' of Ecuador and its trading partners for CSG and specialized products

The book will be divided into **three main chapters** based on three main specific objectives. These will be (a) Use of Trade Indices to Understand Trade Relations of Ecuador for Climate Smart Goods, Total Trade and Specialized Products. The second chapter will be (b) Trade Liberalization of CSG and Other Specialized Products: Comparative Analysis Using SMART (c) Export Potential and Basis of Trade of Climate Smart Goods and Specialized Products of Ecuador Using Gravity Analysis. The research study besides these three main chapters will have sections on the identified research problem, Definition of Research, Justification of taking up such study, Limitations, General and Specific Objectives, Environmental Sustainability in Ecuador, Conclusions and Policy Recommendations, Future Research and the Experience Gained.

The **justification** of taking up such research is to (a) develop capabilities to create products friendly to the environment and other products for diversification of economy at the country and at the regional level. (b)Mapping the capabilities of trade to environmentally friendly countries and working out the export potential of Ecuador in CSG and Specialized Products at different levels of disaggregation (c)Establishment of regional indicators and indices related to export and import of CSG and total trade, competitiveness, comparative advantage and export specialization indices, among others, for specialized goods and CSG alike (d)Definition of CSG-commerce capabilities at Country, Regional and its sub-regional level, (e) Learning of new developments in the field of Gravity Analysis including literature on linking volume of trade with equality of incomes across countries (f) Proposal for designing economic policy to boost competitiveness, trade patterns, and changes by development of trade relations, economic growth and environmental stewardship through the implementation of policies, for which it seeks to develop capabilities to create products friendly to the environment, or CSG, at country and at the regional level of the MERCOSUR and ANDEAN member countries.(g) Enhance the skills of negotiators in understanding the relative benefits of trade liberalization with host of countries and regions by working on trade software WITS (h) Identifying Policies at the National and International Level for enhancing production of CSG goods.(k) The research work will be useful for all policy makers and negotiators designing and evaluating economic agreements, students, teachers and researchers in the field of international trade and environmental economics

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The following are some of the **main conclusions of the research study**.

Trade Indices research indicates the factual position of country. The following can be derived from the research

Ecuador needs to rethink its trade policy by diversifying its trade into manufactured products and more diversified production structure. Information Technology services, Tourism, Manufacturing of Automobiles, Education and Training Services, Bio combustibles, Housing materials, Pharmaceutical industries, Health Products and Hospital services, Hardware production, Industrial and Textile Goods and Chemicals are some areas where Ecuador can think of developing niche in the coming future and cater to European markets. Production and Trade in Climate Smart Goods is another area of focus. In particular, the study identifies the following industries for further diversifying industrial structure of Ecuador for its gain in future. These are Industrial Codes- 61(Articles of apparel and clothing accessories, knitted or crocheted), 62(Articles of apparel and clothing accessories, not knitted or crocheted),42(Articles of leather; saddlery and harness; travel goods, handbags and similar containers; articles of animal), 90(Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof), 84(Electronic appliances), 85(Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles),87 (Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof), 83 (Miscellaneous articles of base metal), 73 (Articles of iron or Steel), 69 (Ceramic products), 30 (Pharmaceutical products),29(Organic chemicals), Climate Smart Goods- 840510(Clean Coal Technologies), 850720,853710 and 854140(Solar Photovoltaic systems), 848340 and 848360(Wind Power Technologies), 853931(Energy Efficient Lighting), among others. In services sector, Tourism, IT and ITES, Hospital services, Education and Training Services(training of English), Cultural Services, Knowledge Processing Outsourcing and Financial Analytics, Infrastructure services have lot of potential of bring the necessary foreign exchange and stability into the system .Ecuador need to diversify into the following industries and services for higher and more stable export earnings, job creation and learning effects, and the development of new skills and infrastructure that would facilitate the development of even newer export products.

SMART Analysis results shows that It is beneficial to trade in 20(2digit level) and 238 products(at 6 digit level) with the MERCOSUR trading partners while for trade in CSG it is better to liberalize trade with the Japan, the US and the China, the main suppliers (exporters)of CSG products.

Gravity Analysis has been used in this study to explain the basis of trade of CSG goods of Ecuador and Trade of 20(at 2 Digit level) specialized products in 2010. Further, the variant of the Baier and Bergstrand (2001) gravity model has been used to work out the export potential of CSG and specialized products to and from Ecuador. The theoretical justification of extending the most simple Gravity model, as used in this study, is done using extensions of the work done by Helpman and Krugman (1985). The Export potential of Ecuador is worth 34.79 million US $ with the four Latin American countries (Bolivia, Chile, Columbia, and Peru in CSG products). However, SMART analysis had shown that for Ecuador it is better to liberalize trade of CSG products with the Japan, US and the China for overall gains.

Research Problem

The basic thrust of this study came after looking at some Gross Exports and Gross Imports figures of Ecuador to and

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fro from other MERCOSUR[3] and ANDEAN communities[4] for Climate Smart Goods for the year 2010. The figures are reproduced below in Table I

Table I: Gross Exports and Gross Imports of CSG by Ecuador to and from the ANDEAN and MERCOSUR Regions /Countries, the EU, Japan, the USA, China and All Countries of the World in 2010

Product Code	Partner Name	Trade FlowName	ECU in 1000 USD
CSG2002	All countries	GrossExp.	91319.906
CSG2002	Al lCountries	Gross Imp.	487572.047
CSG2002	andeancustomsunionwithoutecuador --	GrossExp.	49834.952
CSG2002	andeancustomsunionwithoutecuador --	Gross Imp.	46908.311
CSG2002	Argentina	GrossExp.	119.609
CSG2002	Argentina	Gross Imp.	3312.600
CSG2002	Bolivia	GrossExp.	573.611
CSG2002	Bolivia	Gross Imp.	13.377
CSG2002	Brazil	GrossExp.	3.201
CSG2002	Brazil	Gross Imp.	16427.403
CSG2002	Chile	GrossExp.	7283.650
CSG2002	Chile	Gross Imp.	7755.537
CSG2002	China	GrossExp.	3.685
CSG2002	China	Gross Imp.	61667.021
CSG2002	Colombia	GrossExp.	17937.610
CSG2002	Colombia	Gross Imp.	22124.861
CSG2002	EU27 --- EU27 members --- EU27	GrossExp.	375.621
CSG2002	EU27 --- EU27 members --- EU27	Gross Imp.	61096.945
CSG2002	Japan	GrossExp.	0.122
CSG2002	Japan	Gross Imp.	2054.675
CSG2002	latinamericancommonmarket --- merco	GrossExp.	71477.799
CSG2002	latinamericancommonmarket --- merco	Gross Imp.	55834.663
CSG2002	Peru	GrossExp.	31200.921
CSG2002	Peru	Gross Imp.	4850.125
CSG2002	Paraguay	Gross Imp.	0.099
CSG2002	Uruguay	Gross Imp.	179.846

3 MERCOSUR, a common market, has the following core members-Argentina, Brazil, Paraguay, Uruguay and Venezuela. Associate members are Bolivia, Chile, Columbia, Ecuador and Peru. We consider all core and associate members of the MERCOSUR excluding Ecuador in our study because we consider Ecuadorian trade relations with other members.

4 ANDEAN Region, a customs union, has the following core members-Columbia, Ecuador, Peru and Bolivia. The Associate members are Argentina, Brazil, Paraguay and Uruguay. We consider all core and associate members except Ecuador as we need to consider trade relations of Ecuador with all its trading partners.

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CSG2002	Venezuela	GrossExp.	14359.197
CSG2002	Venezuela	Gross Imp.	1170.815
CSG2002	UnitedStates	GrossExp.	1183.914
CSG2002	UnitedStates	Gross Imp.	273645.369

Source: WITS data base. 64 goods CSG list is based on HS 2002 but 2010 data.

After carefully looking at the figures for Ecuador one finds that Ecuador has a positive trade balance for CSG with the other ANDEAN and MERCOSUR countries. One would have least expected the same after finding that Ecuador is a net importer of Climate Smart Goods(basically components to cleaner technologies) from China, Japan, the US ,the EU27 and World at large. Then why would it have a positive trade balance with its Latin American Trading Partners? Does this reflect the matured response of Ecuador on having growth with environment policies since early 1980s, reflected by its early ratification of Kyoto Protocol, CBT and protection of its Amazon jungles? Would it also mean that that Ecuador has realized the benefits of CSG goods early to have positive trade balance with its neighbouring countries? .We will outline the national and international policies adopted by Ecuador as far as cleaner and environment friendly policies are concerned to answer the above. Would it mean then that by further liberalizing trade by MERCOSUR and ANDEAN Countries including Ecuador and other Latin American Countries would bring some further gains to Ecuador[5]? Would Ecuador gain more by liberalizing Ecuador's trade with the suppliers of the CSG- the Japan, the Hong Kong, China, EU and the US. One needs to do simulations with SMART analysis (within WITS) to answer the same (second part of study). Would it further mean that Ecuador will have the same trend (positive trade balance) with all its Latin American in all other products and some identified specialized products? If yes will it be beneficial to liberalize its trade with MERCOSUR or countries like the Japan, the US, China, and the Hong Kong for other products than CSG. The last two questions will entail use of various trade indices to identify the integration of Ecuador with the outside world and also help in identifying specialized products for Ecuador along with its markets. In particular, the above indices will help us to examine the role of international trade of Ecuador over the years(Export share in World Exports) and have comparative analysis with other nations and regional groups over the years, identify the specialized products of Ecuador and their markets over the years by examining the changing comparative advantage in production of some products (RCA and Export Specialization Indices), also identify the extent of matching of Ecuadorian products with its trading partners(Trade Complementarity index), its intensity of trade relations with its trading partners (Trade Intensity Index) , share of specialized and CSG products in exports of Ecuador(Product Concentration), share of markets in total exports of Ecuador(Market Concentration) and diversification and concentration of products in exports of Ecuador(Export Diversification and Herfindahl-Hirchman indices).Continuing, the study will suggest measures to develop trade relations with India by examining the trade statistics

5 Liberalizing trade in this study would mean a scenario of zero tariffs for imported products. This would have total trade effects as sum of price or terms of trade effect and quantity effects as sum of trade creation and trade diversion effects. These effects along with consumer surplus, revenue effects and welfare effects will accrue to the importer. Such effects are estimated by SMART (partial analysis). In addition, the export potential of exporters is also worked out. In this study we have done liberalization simulation for Ecuador (importer) country only. Therefore, any export potential effects of Ecuador for imports coming into MERCOSUR or EU, the Japan, The China and the US is examined by not working on the liberalization efforts of its trading partners but by Gravity Analysis (Third Objective). Liberalization in general would mean that zero tariffs for products emanating out of the importing country into the partner country and zero tariffs for products coming into importing country from partner country. Multilateral liberalization will always bring larger welfare than regional liberalization. The study discusses the various strategies related to regional liberalization as global trade talks are not succeeding as expected.

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and indices for India and Ecuador. Thereafter, SMART analysis will be done to make judgments of liberalizing trade of specialized products with MERCOSUR and the developed nations. At the end Gravity Analysis is done to explain Ecuadorian trade of specialized and CSG products by identifying the host of determinants explaining such trade. The study uses Gravity model to work out export potential of Ecuador and its trading partners for CSG and specialized products.

The study will be divided into three main chapters, based on three main specific objectives. These will be (a) Use of Trade Indices to Understand Trade Relations of Ecuador for Climate Smart Goods, Total Trade and Specialized Products. The second chapter will be (b) Trade Liberalization of CSG and Other Specialized Products: Comparative Analysis Using SMART (c) Export Potential and Basis of Trade of Climate Smart Goods and Specialized Products of Ecuador Using Gravity Analysis. The research study besides these three main chapters will have sections on Background and Importance of the Climate Smart Goods, sections on Definition of Research, Justification of taking up such study, Limitations, General and Specific Objectives, Conclusions and Policy Recommendations, Future Research and the Experience Gained.

Background and Importance of the Climate Smart Goods

The CSG forms part of the broader group named 'environmental goods and services (EGS). The Environmental goods and services industry consists of activities which produce goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco systems. This includes cleaner technologies, products and services which reduce environmental risk and minimize pollution and resource use.

An Environmental good can be understood as equipment, material or technology used to address a particular environmental problem or as a product that is itself 'environmentally preferable' to other similar products because of its relatively benign

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impact on environment. Environmental services are services provided by eco systems or human activities to address environmental problems. EGS can be also classified as Environmental Goods comprising of pollution management products, cleaner technologies and products, resource management products and environmentally preferable products. EGS also has Environmental services comprising of sewage services, refuse services, sanitation and similar services and others. The EGS were first discussed as part of the liberalizing agenda in the DOHA round of the multilateral trading round in 2001. The countries had wanted the tariff and non-tariff barriers to go down for trade of such EGS as this may lead to adoption of cleaner and cost effective technologies by firms and country at large and possibly mitigate climate change and improve energy efficiency. Liberalization has followed three routes namely the list approach, project/integrated approach and request for offer approach. Environmental Goods were always part of trade agenda but were subsumed within industrial or agricultural negotiations.

CSGs constitute low carbon technologies such as solar photovoltaic systems (Industry Codes 850720, 853710, 854140), wind power generation (industry codes 848340 and 848360), clean coal technologies (840510) and energy-efficient lighting (853931)[6], among others. Trade and investment in CSGs and climate-smart services have recently received much attention as a triple win scenario where trade, climate and environment, and development all benefit (UNESCAP, 2011,a,b). Climate Smart Goods and technologies allows for production processes that have no or minimum Green House Gas(GHG) emissions and negative impact on environment and which are atleast economically efficient and acceptable. Climate Smart Technologies consists of technology that improve efficiency and conservation of conventional fossil energy and enable the commercial and efficient use of renewable energy sources.

Promoting CSG trade has become important because of the need of such goods by countries in the wake of recent financial crisis in Europe and after events in Japan recently. Countries want to concentrate on low energy consumption and save themselves from relying entirely on nuclear energy which may be prone and be affected by natural disasters like what happened in Japan. Our Gravity analysis has shown that there is potential for trade in CSG by Ecuador and trading nations alike.

Countries need to design sustainable and climate smart growth that entails sharply reduced GHG emissions to a level of 450 ppm(or may be lower) and that limits the global temperature rise to not more than 2 degrees Celsius by the end of the century. The study below lists such policies and is not confined to trade policies alone. Trade policies related to CSG though are the main

6 Climate Smart Goods list of 64 goods(UNESCAP,2011,a,b) include, among 'Other Industries', Industry Codes, Solar Photovoltaic systems(850720-Other Lead Acid Accumulators,853710-For a voltage not exceeding 1000V and 854140-Photosensitive semiconductor devices ,including photovoltaic cells whether or not assembled in modules or made up into panels, light emitting diodes),Wind Power(848340-Gears and Gearing, Other Than Toothed Wheels ,Chain Sprockets and other transmission elements presented separately, ball or rollers screws ,gear boxes and other speed changers, including torque converters, 848360-Clutches and Shaft Couplings(Including Universal Joints),Clean Coal Technologies-(840510-Producer Gas or Water Gas Generators, With or Without Their Purifiers, Acetylene Gas Generators and Similar Water Process Gas Generators With or Without Their Purifiers), Energy Efficient Lighting-(853931-Fluorescent Hot Cathode).

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focus of this study. The entire set of policies which can reduce GHG emissions and limit climate change can be structured into regulatory measures(including regulations, standards and labeling), economic incentives(including taxes, tradable permits and subsidies conforming to WTO laws and provisions), trade and investment policies and financial, energy and enterprise development policies, among others. Appendix Table XII lists the various efforts made by international community to tackle the Climate Change. These include the Rio Meet in 1992,Kyoto Protocol of 1997, Copenhagen accord in 2009, the COP 16 meeting, the Bali Action Plan of 2007 and the very ambitious, the Durban meeting of 2011. These meetings are besides the DOHA agenda on liberalizing trade in environmental goods and services. This study believes that economic growth, higher trade and environment sustainability, all three are possible at the same time and there is limited trade off between them. The debate on trade, growth and environment sustainability have arisen as trade and environment sustainability are not always positively related. Grossman and Krueger(1994) argues that trade affects environment through scale effects, technique effect and composition effect. With the rapid increase of trade and investment in recent decades as a result of sustained liberalization, the ecological footprint – including GHG emissions – has also risen sharply. This is called the "scale effect". When renewable energy replaces traditional fossil fuels, trade and investment are no longer associated with Green House Gas(GHG) emissions. Instead trade and investment become principal components of efforts to mitigate climate change. The other two identified effects are the composition and technique effects. The composition effect refers to the way trade liberalization changes countries' comparative advantages towards emission-intensive or emission-friendly industries. For example, a changing comparative advantage as a result of trade liberalization may lead carbon-intensive industries to relocate from countries with strict regulations to countries (often developing countries) with less stringent regulations, which are known as "pollution havens" (and, thus, provide a large comparative advantage), leading to "carbon leakage". The net global composition effect of trade opening on GHG emissions is therefore not necessarily positive. The technique effect refers to the manner in which technological improvements may be adopted to increase production efficiency and reduce emission intensity as a result of trade and trade liberalization. This may happen in two ways: (a) trade liberalization increases the availability of climate-smart technology; and (b) trade income increases incomes and wealth – people with more wealth tend to be more concerned about other aspects of well-being, including a clean environment (Grossmann and Krueger, 1994).

The value of World CSG exports were worth 410 billion US $ in 2008. Ecuador's export share in World exports of CSG has remained less than 0.02 % in 2002 through 2010. The Leading Exporters Japan, US, Countries in the EU, China and Hong Kong´s export share is more than 3 % in World Exports of CSG.

World Trade Organization (WTO) has recognized 153 environmental goods which have been broadly classified under the following headings:

- Air pollution control
- Management of solid and hazardous waste and recycling systems
- Clean up or remediation of soil and water
- Renewable energy plants
- Heat and energy management
- Waste water management and potable water treatment
- Environmentally preferable products (based on end use or disposal charactersitics)
- Natural risks management
- Natural resources protection
- Noise and vibration abatement

World Bank has identified 43 products out of the '153' products list proposed by proponents of Environmental Goods liberalization in the WTO. These 43 products comprise diverse products from wind turbines to solar panels to water saving

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shower. Also there has been a rapid growth in their imports and exports. What is common in all the lists floating around is that they consist of goods which tend to have benign impact on environment and lead to low carbon emanating processes.

Trade and investment in CSG offers opportunities to export international standards, promote the rule of law and good governance, and close the gap between the rich and poor. Trade in CSG will help Ecuador to promote alternative industries in the face of Global Economic Downturn. Also, it will help country to look for safe, alternative and reliable energy source rather than believing in trade of crude and Petroleum Oil only or investing a great deal in nuclear energy. Nuclear energy was in the brink of being affected in Japan due to recent Earthquake in Japan. Ecuador can direct its social spending in promoting small industries which can provide CSG goods at low cost. Countries can gain in terms of their comparative advantage and establish new industries. Positions keep changing in terms of the advantage of producing goods and services. Based on our analysis and review of studies done on CSG(UNESCAP,2011,a,b, ICTSD, WTO and World Bank) one may conclude that various national and international policies can be followed by Ecuador and its trading partners to promote trade of CSG goods for increasing welfare, diversification and promoting alternative sources of energy .

Definition of Research:

a) The Research will focus on Ecuadorian Trade Relations in CSG and Other Specialized Products and its liberalization efforts with all its trading partners but focusing more on MERCOSUR and ANDEAN Community, India, EU27, China, Japan and the US
b) The time period for research is 2002 through 2010. SMART and Gravity analysis is done for 2010.
c) Trade and Tariff Data will come from the WITS data base. SMART analysis is in WITS. The url is http://wits.worldbank.org/wits/
d) Gravity analysis for working out the basis of trade of CSG and specialized products. The data will come from various sources.

   Import data to and from Ecuador of CSG goods-one category made of the list of 64 goods (under 6 Digit HS Combined) is taken from WITS data base for 2010

   GDP data of trading partners is expressed in billions of US dollars and the basic source of data is the IMF, World Economic Outlook (April 2011 edition)

   Distance data is taken from the dist_cepii.xls file of CEPII data base (www.cepii.fr)

   Tariff data is applied weighted tariff (%) on CSG goods for each country available from the TRAINS data (within WITS data base)

   Intercountry dispersion is product of two terms si*sj where si=GDPi/(GDPi+GDPj) and sj=GDPj/(GDPi+GDPj). Si and Sj are constructed from GDP data of trading partners. The product has an inverse relationship with variance of country's share of income in total group income. Variance of country's share of income in total group income is inversely related to volume of trade between countries

   Prices data of reporter (importer) and partner (exporter) from the GDP deflators available from the World Bank World Development Indicators available at the World Bank website for 2010(Index Numbers)

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I Use of Trade Indices to Understand Trade Relations of Ecuador for Climate Smart Goods, Total Trade and Specialized Products

The following trade indices (along with their definition) have been used in this study for objective analysis of Ecuador's trade relations with its trading partners.

- **Country's Share of World Exports** It is the share of a country's total exports in the world's total exports. This ratio can be used to assess changing world market share of a country over time.
- **Share of Product in Total Exports** It is the share of each export product (at a chosen level of disaggregation) in the country's total exports.
- **Share of Market in Total Exports** It is the share of exports sold in each foreign country in the home country's total exports.

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- **Hirschman Herfindahl Index** It is the sum of squared shares of each product in total export. A country with a perfectly diversified export portfolio will have an index close to zero, whereas a country which exports only one export will have a value of 1 (least diversified).

- **Revealed Comparative Advantage Index** Measures of revealed comparative advantage (RCA) have been used to help assess a country's export potential. The RCA indicates whether a country is in the process of extending the products in which it has a trade potential, as opposed to situations in which the number of products that can be competitively exported is static. It can also provide useful information about potential trade prospects with new partners. Countries with similar RCA profiles are unlikely to have high bilateral trade intensities unless intra-industry trade is involved. RCA measures, if estimated at high levels of product disaggregation, can focus attention on other nontraditional products that might be successfully exported. The RCA index of country I for product j is often measured by the product's share in the country's exports in relation to its share in world trade: $RCA_{ij} = (x_{ij}/X_{it}) / (x_{wj}/X_{wt})$ Where x_{ij} and x_{wj} are the values of country i's exports of product j and world exports of product j and where X_{it} and X_{wt} refer to the country's total exports and world total exports. A value of less than unity implies that the country has a revealed comparative disadvantage in the product. Similarly, if the index exceeds unity, the country is said to have a revealed comparative advantage in the product. country's exports.

- **Trade IntensityIndex**
  The trade intensity index (T) is used to determine whether the value of trade between two countries is greater or smaller than would be expected on the basis of their importance in world trade. It is defined as the share of one country's exports going to a partner divided by the share of world exports going to the partner. It is calculated as:

  $$T_{ij} = (x_{ij}/X_{it})/(x_{wj}/X_{wt})$$

  Where x_{ij} and x_{wj} are the values of country i's exports and of world exports to country j and where X_{it} and X_{wt} are country i's total exports and total world exports respectively. An index of more (less) than one indicates a bilateral trade flow that is larger (smaller) than expected, given the partner country's importance in world trade.

- **Trade ComplementarityIndex**
  The trade complementarity (TC) index can provide useful information on prospects for intraregional trade in that it shows how well the structures of a country's imports and exports match. It also has the attraction that its values for countries considering the formation of a regional trade agreement can be compared with others that have formed or tried to form similar arrangements. The TC between countries k and j is defined as:

  $$TC_{kj} = 100(1 - \text{sum}(|m_{ik} - x_{ij}| / 2))$$

  Where x_{ij} is the share of good i in global exports of country j and m_{ik} is the share of good i in all imports of country k . The index is zero when no goods are exported by one country or imported by the other and 100 when the export and import shares exactly match.

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- **Export Diversification (or Concentration) Index** Export diversification is held to be important for developing countries because many developing countries are often highly dependent on relatively few primary commodities for their export earnings. Unstable prices for these commodities may subject a developing country exporter to serious terms of trade shocks. Since the covariation in individual commodity prices is less than perfect, diversification into new primary export products is generally viewed as a positive development. The strongest positive effects are normally associated with diversification into manufactured goods, and its benefits include higher and more stable export earnings, job creation and learning effects, and the development of new skills and infrastructure that would facilitate the development of even newer export products. The export diversification (DX) index for a country is defined as: DX_j = (sum $|h_{ij} - x_i|$) / 2 Where h_{ij} is the share of commodity i in the total exports of country j and xi is the share of the commodity in world exports. The related measure used by UNCTAD is the concentration index or Hirschman (H) index, which is calculated using the shares of all three-digit products in a country's exports: H_j = sqrt [sum $(x_i/X_t)^2$]Where x_i is country j's exports of product i (at the three-digit classification) and X_t is country j's total exports. The index has been normalized to account for the number of actual three-digit products that could be exported. Thus, the maximum value of the index is 239 (the number of individual three-digit products in SITC revision 2), and its minimum (theoretical) value is zero, for a country with no exports. The lower the index, the less concentrated are a country's exports.

- **Export Specialization Index** The export specialization (ES) index is a slightly modified RCA index, in which the denominator is usually measured by specific markets or partners. It provides product information on revealed specialization in the export sector of a country and is calculated as the ratio of the share of a product in a country's total exports to the share of this product in imports to specific markets or partners rather than its share in world exports: ES = (x_{ij}/X_{it}) / (m_{kj}/M_{kt}) Where x_{ij} and X_{it} are export values of country i in product j, respectively, and where m_{kj} and M_{kt} are the import values of product j in market k and total imports in market k. The ES is similar to the RCA in that the value of the index less than unity indicates a comparative disadvantage and a value greater than one indicates advantage of producing and exporting into the identified markets.

I.I Revealed Comparative Advantage, Export Specialization Index and Product Concentration of Climate Smart Goods in Ecuadorian Exports: A Comparative Analysis with India

The Table II reveals that there are two products in which Ecuador has a comparative advantage in production in 2010. These two industrial codes have RCA>1 in 2010 and hence Ecuador has a comparative advantage in the production of such products. These products are

732111

Solar driven stoves, ranges, grates, cookers (including those with subsidiary boilers for central heating), barbecues, braziers, gas-rings, plate warmers and similar non-electric Domestic appliances, and parts thereof, of iron or steel.

732190

Stoves, ranges, grates, cookers (including those with subsidiary boilers for central heating), barbecues, braziers, gas-rings, plate warmers and similar non-electric Domestic appliances, and parts thereof, of iron or steel.

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Table II: Revealed Comparative Analysis for CSG Products for Ecuador in 2009 and 2010.

ReporterName	Year	Productcode	RCA
Ecuador	2009	732111	21.3407
Ecuador	2009	732190	0.9324
Ecuador	2009	841940	0.4864
Ecuador	2009	850163	0.7601
Ecuador	2010	732111	14.9076
Ecuador	2010	732190	4.1008

Source: Author's calculations from WITS data base. Please note that Ecuador has advantage in the production of CSG Products 732111 and 732190 in 2010.

The Export Specialization index helps us to identify markets for the CSG products in which Ecuador has a comparative advantage. Table III identifies the markets for two of the CSG products in which Ecuador has an advantage in production. They are Chile, Columbia and Peru in 2010.The export specialization (ES) index is a slightly modified RCA index, in which the denominator is usually measured by specific markets or partners. It provides product information on revealed specialization in the export sector of a country and is calculated as the ratio of the share of a product in a country's total exports to the share of this product in imports to specific markets or partners. A Value greater than one indicates advantage of producing and exporting into the identified markets.

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Table III: Export Specialization Index for Specialized CSG Products for Ecuador in 2010

Country	Year	ES	Country Code	Country	Ind. Code	ProductDescription
Ecuador	2010	1.1882	CHL	Chile	732111	Solar driven stoves, ranges, grates, cookers (including those with subsidiary boilers for central heating), barbecues, braziers, gas-rings, plate warmers and similar non-electric domestic appliances, and parts thereof, of iron or steel.
Ecuador	2010	1.2300	PER	Peru	732190	Stoves, ranges, grates, cookers (including those with subsidiary boilers for central heating), barbecues, braziers, gas-rings, plate warmers and similar non-electric domestic appliances, and parts thereof, of iron or steel.
Ecuador	2010	1.3135	PER	Peru	732111	Solar driven stoves, ranges, grates, cookers (including those with subsidiary boilers for central heating), barbecues, braziers, gas-rings, plate warmers and similar non-electric domestic appliances, and parts thereof, of iron or steel.
Ecuador	2010	1.9122	COL	Colombia	732111	Stoves, ranges, grates, cookers (including those with subsidiary boilers for central heating), barbecues, braziers, gas-rings, plate warmers and similar non-electric domestic appliances, and parts thereof, of iron or steel.

Source: Author´s work in WITS

One can also see the greatest product concentration in Ecuador's total exports of CSG products lies in product 732111(0.42). See Table IV below

Table IV: Product Concentration(PC) of CSG Products in Ecuador's Exports

COUNTRY	YEAR	IND. CODE	PC
Ecuador	2010	392010	0.0115
Ecuador	2010	392690	0.0124
Ecuador	2010	730820	0.0004
Ecuador	2010	730900	0.0024
Ecuador	2010	732111	0.4214
Ecuador	2010	732190	0.0336
Ecuador	2010	841182	0.0028
Ecuador	2010	841869	0.0029

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Ecuador	2010	841950	0.0007
Ecuador	2010	841989	0.0020
Ecuador	2010	847989	0.0222
Ecuador	2010	848340	0.0003
Ecuador	2010	850161	0.0005
Ecuador	2010	850162	0.0008
Ecuador	2010	850163	0.0003
Ecuador	2010	850300	0.0015
Ecuador	2010	850440	0.0016
Ecuador	2010	853710	0.0018
Ecuador	2010	853931	0.0004
Ecuador	2010	903210	0.0011

Source: Author's work in WITS

A comparative analysis is done with India. India has comparative advantage in eighteen out of the 64 goods list of the Climate Smart Goods in 2010. These range from disaggregated articles of iron and steel, machine and mechanical appliances, chemical products and electric meters. (See the Table V below and appendix list I for details of the 64 products CSG list)

Table V: RCA for CSG Products in India in 2010

Country	Year	Ind. Code	RCA	ProductDescription
India	2010	850300	1.0576	Parts suit. for use solely/princ. with the machines of 85.01/85.02
India	2010	848360	1.1691	Clutches and universal joints (specifically for wind turbines).
India	2010	840490	1.1829	Parts for auxiliary plant for boilers, condensers for steam, vapor power unit.
India	2010	841990	1.2872	Medical, surgical or laboratory stabilizers.
India	2010	850161	1.3221	AC generators not exceeding 75 kVA (specifically for all electricity generating Renewable energy plants).
India	2010	730451	1.3299	Tubes, pipes & hollow profiles (excl. of 7304.10-7304.49), seamless, of circular cross-section, of alloy steel other than stainless steel, cold-drawn/ cold-rolled (cold-reduced)
India	2010	841090	1.4621	Hydraulic turbines and water wheels; parts, including regulators.
India	2010	902830	1.6653	Electricity meters, incl. calibrating meters therefor
India	2010	730900	1.7287	Containers of any material, of any form, for liquid or solid waste, including for municipal Or dangerous waste.
India	2010	850231	1.8146	Electric generating sets and rotary converters; wind-powered.
India	2010	840510	1.8382	Producer gas or water gas generators, with or without purifiers.
India	2010	841940	2.0966	Distilling or rectifying plant.

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India	2010	841012	2.4608	Hydraulic turbines & water wheels, of a power >1000kW but not >10000kW
India	2010	380210	2.6127	Activated carbon
India	2010	850680	2.7838	Fuel cells use hydrogen or hydrogen-containing fuels such as methane to produce an electric current, through an electrochemical process rather than combustion.
India	2010	840219	2.8811	Vapor generating boilers, not elsewhere specified or included hybrid.
India	2010	730820	3.0511	Towers and lattice masts for wind turbine.
India	2010	841989	4.4443	Machinery, plant or laboratory equipment whether or not electrically heated (excluding furnaces, ovens etc.) for treatment of materials by a process involving a change of temperature.

Source: Author´s work Using WITS

Table VI is on Export Specialization Index(>1) helps us to identify markets for the Climate Smart Goods from India. It seems that industrial products-Fuel cells use hydrogen or hydrogen-containing fuels such as methane to produce an electric current, through an electrochemical process rather than combustion is identified for Hong Kong, China. Hydraulic turbines and water wheels of a power not exceeding 1,000 kW for Belgium. Electric generating sets and rotary converters; wind-powered for the United States. Gas turbines of a power not exceeding 5,000 kW for Netherlands. Containers of any material, of any form, for liquid or solid waste, including for municipal or dangerous waste for the United Kingdom and Hydraulic turbines & water wheels, of a power >10000kW for France in 2010.

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Table VI: Export Specialization Index for CSG Products for India in 2010 and Identification of Markets for CSG Products of India

Country	Year	ES	Country	Ind. Code	Product Description
India	2010	1.0490	Hong Kong, China	850680	Fuel cells use hydrogen or hydrogen-containing fuels such as methane to produce an electric current, through an electrochemical process rather than combustion
India	2010	1.2273	Belgium	841011	Hydraulic turbines and water wheels of a power not exceeding 1,000 kW
India	2010	1.2381	UnitedStates	850231	Electric generating sets and rotary converters; wind-powered
India	2010	1.2630	Netherlands	841181	Gas turbines of a power not exceeding 5,000 kW
India	2010	1.3634	UnitedKingdom	730900	Containers of any material, of any form, for liquid or solid waste, including for municipal or dangerous waste
India	2010	2.3500	France	841013	Hydraulic turbines & water wheels, of a power >10000kW

Source: Author´s work using WITS data base

The study works out the product concentration of CSG products in India´s Total Exports (Table not shown): Industrial codes PVC or polyethylene plastic membrane systems to provide an impermeable base for landfill sites and protect soil under gas stations, oil refineries, etc. from infiltration by pollutants and for reinforcement of soil (392690) has O.13 % share in India´s total exports. Machinery, plant or laboratory equipment whether or not electrically heated (excluding furnaces, ovens etc.) for treatment of materials by a process involving a change of temperature (841989) has 0.21% share. Photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light-emitting diodes (854140) has 0.27% share. Parts suit.for use solely/princ. With the machines of 85.01/85.02 (850300) has 0.13% share in total exports of India and 850440(Static Converters) has .16% share.

I.2 Ecuador Trade Relations with Other Countries on Total Trade and Specific Products: A Quantitative Analysis using Trade Indices

The above section were on trade in climate smart goods of Ecuador and its comparative analysis with other trading partners. This section will deal with Ecuadorian total trade and some identified specialized products. Such specialized products and markets will be identified using Revealed Comparative Analysis and Export Specialization index at two digits and at 6 digit HS levels given in the WITS data base. Export share in World Exports, Export Diversification and Hirchman-Herfindahl indices for trade concentration, Trade Intensity Index(intensity of trade relations), Market Concentration index(share of markets in total exports), and Trade Complementarity Index will be worked out for Ecuador on the basis of its total trade. Product Concentration will tells us the share of Products (identified specialized products) in Ecuador's total exports.

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1.2.1 Trade Indices to Understand Ecuador's Integration to World Markets:

We work out export share of Ecuador's total Exports in World Exports from 2002 through 2010. Table VII shows the export share in percentage terms for Ecuador. It has increased from mere 0.0867 % in 2002 to 0.12% in 2010. The positive trend is a healthy sign but is too low to have its substantial presence in the international markets.

Table VII: Export Share of Ecuador in World Exports 2002 through 2008

Year	Export Share(%)
2002	0.0867
2003	0.0864
2004	0.0873
2005	0.0998
2006	0.1095
2007	0.1039
2008	0.1224
2009	0.1158
2010	0.1218

Table VIII shows the export share of some of its trading partners. The table will indicate how other countries have progressed as far as their integration is concerned with the outside world.

Table VIII: Export Share of Some Selected Trading Partners of Ecuador in 2010

Reporter Name	Share in World Exports
Argentina	0.4656
Bolivia	0.0478
Brazil	1.3737
Chile	0.4916
China	10.9722
Colombia	0.2771
Ecuador	0.1217

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European Union	11.9287
India	1.5048
Japan	5.0800
Peru	0.2441
Paraguay	0.0316
United States	8.0979
Venezuela	0.4661

Source: Author´s work in WITS

China's export share has increased over the years and it has reached to 10.97 % in 2010. EU, Japan and the US share's are respectively 11.92%, 5.08% and 8.09% in 2010. It is to be observed that the share of the developed nations is going down from what it were in 2002 to what it is in 2010 while for most of the developing nations including the Latin American countries, the share although not much is moving up(see Table IX below). China´s share has increased at a much faster pace than some of its counterparts (see Table IX below). Mexico share has marginally declined from what it were in 2002 to 2.06% in 2010.

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Table IX: Export Share in 2002,2005 and 2010 of Some Selected Countries and Regional Groups

Year	2002	2005	2010
Argentina	0.4377	0.3993	0.4656
Bolivia	0.0235	0.0283	0.0478
Brazil	1.0213	1.1767	1.3736
Canada	4.0663	3.4825	2.6086
Chile	0.2908	0.4035	0.4916
China	5.5874	7.6901	10.9718
Colombia	0.2046	0.2143	0.2771
Ecuador	0.0867	0.0998	0.1217
European Union	14.1610	13.0957	11.9282
Hong Kong, China	3.4684	2.9516	2.7860
India		1.0036	1.5047
Japan	6.8724	5.7526	5.0798
Korea, Rep.	2.7935	2.8766	3.2552
Mexico	2.7620	2.1613	2.0660
Malaysia	1.5992	1.4129	1.3777
Peru	0.1318	0.1731	0.2441
Paraguay		0.0167	0.0316
Singapore	2.0735	2.2347	2.2756
Thailand	1.1363	1.0977	1.3595
Uruguay	0.0320	0.0344	
United States	11.5305	8.8747	8.0976
Venezuela			0.4661

Source: Author´s work on WITS

Table X works out the market concentration of Ecuador´s exports. US has been the top most importers of Ecuador´s Exports in 2002, 2005 and 2010. However, it is also observed that the share of the US has declined from 40% or more to around 34 % of Ecuador´s exports in 2010. The shares of Ecuador´s Latin American partners have increased in 2010 from what it were in 2002. Peru ranks second in terms of Ecuador´s exports in all years 2002, 2005 and 2010. Venezuela has become the third important importer. The third rank was of Columbia in 2002. Columbia has become the fifth important trading partner in 2010 after Chile. China has gained entry in top 12 importers of Ecuador while Japan´s share in 2010 has increased from what it were in 2002. The table shows the regional orientation of Ecuador´s export.

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Table X: Market Concentration (Share of Each Markets) of Ecuador´s Exports, 2002, 2005 and 2010: Top 12 Importers

PartnerName	MC	Rank	Year	Partners Name	MC	Rank	Year	Partners Name	MC	Rank
Peru	7.4280	2	2005	Peru	8.8040	2	2010	Peru	7.6363	2
Colombia	7.1903	3	2005	United States	50.0689	1	2010	Venezuela	5.5687	3
Korea, Rep.	5.8733	4	2005	Colombia	4.7752	3	2010	Chile	4.8407	4
Italy	5.7441	5	2005	Italy	3.8621	4	2010	Colombia	4.5344	5
United States	40.8605	1	2005	Chile	3.0526	5	2010	United States	34.7486	1
Germany	3.4148	6	2005	Spain	2.1233	6	2010	Italy	3.3300	6
Japan	1.9409	7	2005	Germany	2.0058	7	2010	Japan	2.2983	7
Netherlands	1.7229	8	2005	Netherlands	1.9915	8	2010	Spain	2.0252	8
Chile	1.4764	9	2005	Venezuela	1.2390	9	2010	Netherlands	1.8957	9
Belgium	1.4222	10	2005	France	0.9109	10	2010	China	1.8796	10
Spain	1.3040	11	2005	Brazil	0.9019	11	2010	Germany	1.8311	11
Venezuela	1.2840	12	2005	Belgium	0.7828	12	2010	Belgium	1.3974	12

Source: Author´s work in WITS

The study works out RCA index for all the 2 digit industries (out of total of all 96 industries at two digit level, HS system, given in WITS[7]). Table XI gives the RCA index for industries for which the value of the index is greater than one in 2009. 20 Industries are identified. Ecuador seems to have comparative advantage (produce goods at lower relative costs and prices) in production of 20 industries out of 96 industries. These are potential sector for inviting FDI into Ecuador. Table XII gives the list of industries with their names. Appendix Table III lists the trade of Ecuador of such 20 specialized products with the MERCOSUR and ANDEAN regional group. Ecuador has positive trade balance with the above mentioned regional groups, China, Mexico, United Sates, Japan and India.

Table XI: Identification of Specialized Products: RCA Index for Ecuador in 2009

Industry Code	Revealed Comparative Analysis
2 Digit Industry	RCA
24	1.0263
65	1.1843
17	1.2034

7 See Appendix II for list of all 2 digit industries

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78	1.2807
14	1.4324
07	1.5326
09	1.5355
44	1.5724
23	1.7712
18	10.7363
03	11.9698
16	16.4153
21	2.0354
06	27.5896
08	27.8566
15	3.6040
27	4.0286
20	4.3668
53	4.9427
58	5.2376

Source: author´s work on WITS

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Table XII: Identified 20 Specialized Products (through RCA analysis) of Ecuador, 2009

HS 2002 Product Code	HS 2002 Product Description
03	Fish & crustacean, mollusc & other aquatic invert
06	Live tree & other plant; bulb, root; cut flowers
07	Edible vegetables and certain roots and tubers.
08	Edible fruit and nuts; peel of citrus fruit or me
09	Coffee, tea, matï and spices.
14	Vegetable plaiting materials; vegetable products
15	Animal/veg fats & oils & their cleavage products;
16	Prep of meat, fish or crustaceans, molluscs etc
17	Sugars and sugar confectionery.
18	Cocoa and cocoa preparations.
20	Prep of vegetable, fruit, nuts or other parts of
21	Miscellaneous edible preparations.
23	Residues & waste from the food indust; prepr ani
24	Tobacco and manufactured tobacco substitutes
27	Mineral fuels, oils & product of their distillati
44	Wood and articles of wood; wood charcoal.
53	Other vegetable textile fibres; paper yarn & wove
58	Special woven fab; tufted tex fab; lace; tapestri
65	Headgear and parts thereof.
78	Lead and articles thereof.

Source: Author´s work in WITS

Table XIII below gives the RCA index for Ecuador in 2002 , 2005 and 2010 to indicate whether there is any substantial shift of comparative advantage in production of goods.

Table XIII:RCA Advantage of Ecuador in 2002, 2005 and 2010

Year	Industry Code	RCA	Year	Industry Code	RCA	Year	Industry Code	RCA
2002	12	1.1637	2005	44	1.0141	2010	56	1.0449
2002	14	1.1903	2005	24	1.0381	2010	17	1.0864
2002	44	1.2165	2005	78	1.0458	2010	78	1.1264

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2002	65	1.3479	2005	69	1.1481	2010	07	1.3540
2002	15	1.7219	2005	09	1.5366	2010	65	1.4449
2002	69	1.7308	2005	07	1.9223	2010	44	1.7301
2002	09	1.9534	2005	16	17.8527	2010	09	1.7969
2002	03	11.6883	2005	53	2.1746	2010	23	1.9058
2002	18	13.6834	2005	21	2.3173	2010	03	12.6097
2002	07	2.0565	2005	17	2.3346	2010	16	14.2116
2002	21	2.3609	2005	15	2.4418	2010	21	2.0172
2002	17	2.8140	2005	08	24.1755	2010	14	2.0453
2002	16	24.9969	2005	06	27.5877	2010	15	2.6877
2002	53	3.4165	2005	20	4.1036	2010	08	24.0915
2002	06	36.6455	2005	27	5.0944	2010	06	28.5055
2002	20	4.2868	2005	18	8.5724	2010	59	3.4449
2002	08	43.8400	2005	03	9.8650	2010	53	3.6912
2002	27	5.8441				2010	27	4.2451
						2010	20	4.2816
						2010	18	9.6605

Source: Author´s work in WITS. Please see Appendix III for the entire list of HS2002 Product codes mentioned in the Table above.

It seems that industry code 56(Wadding, Filtered and Non-Woven Yarns) and 59(Impregnated, Coated, Covered, Laminated Textile Fabrics) are added in 2010 while industry code 24(Tobacco and Manufactured Tobacco Substitutes), 69(Ceramic Products), 58(Special Woven Fabrics and Tufted Textile Fabrics) and 12(Oilseeds, Olage, Fruit) were not present in 2010 list. There were 18 industries in which Ecuador had an advantage in 2002, 17 in 2005 and 20 in 2010. There is not much substantial observational shift of comparative advantage from 2002 through 2010.

RCA is worked for industries disaggregated at 6 digit levels. Appendix Table IV and V lists 213 and 238 industries out of more than 5300 industries in which Ecuador has comparative advantage for production of industries disaggregated at 6 digit level in 2009 and 2010 respectively. Appendix Table XI lists the products in which Ecuador has advantage at 6 digit disaggregated level. For the complete list of more than 5300 industries disaggregated one would need to log on to the WITS. It is also available with author on demand.

Table XIV gives the RCA figures for 20 specialized industries in all years from 2002 through 2010. All industries except industries, 23(Residues and Waste from Food Industries), 24(Tobacco and Manufactured Tobacco Substitutes), 58(Special Woven Fabrics, tufted textile fabrics, lace, tapestries, trimmings, embroidery, 65(Headgears and Parts thereof)

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and 78 (Lead and articles thereof) show uniform advantage in all years from 2002 through 2010. The figures show that Ecuador gained advantage in industry code 78 in 2009. Before that year, the value of RCA for industry code 78 was less than one. For industry code 58 one can see that RCA has been greater than one in 2008 and 2009 only. One may conclude that for all other industries, 23, 24 and 65, Ecuador has in some years lost its comparative advantage while in some other years it has gained advantage. Ecuador needs to focus attention on such industries so that they remain in advantage permanently. The study identifies the following industries for further diversifying industrial structure of Ecuador for its gain in future. These are Industrial Codes- 61(Articles of apparel and clothing accessories, knitted or crocheted), 62(Articles of apparel and clothing accessories, not knitted or crocheted),42(Articles of leather; saddlery and harness; travel goods, handbags and similar containers; articles of animal), 90(Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof), 84(Electronic appliances), 85(Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles),87 (Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof), 83 (Miscellaneous articles of base metal), 73 (Articles of iron or Steel), 69 (Ceramic products), 30 (Pharmaceutical products),29(Organic chemicals), Climate Smart Goods- 840510(Clean Coal Technologies), 850720,853710 and 854140(Solar Photovoltaic systems), 848340 and 848360(Wind Power Technologies), 853931(Energy Efficient Lighting), among others. In services sector, Tourism, IT and ITES, Hospital services, Education and Training Services(training of English), Cultural Services, Knowledge Processing Outsourcing and Financial Analytics, Infrastructure services have lot of potential of bring the necessary foreign exchange and stability into the system .Ecuador need to diversify into the following industries and services for higher and more stable export earnings, job creation and learning effects, and the development of new skills and infrastructure that would facilitate the development of even newer export products.

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Table XIV: Revealed Comparative Advantage Index for Ecuador 2002 through 2010 for 20 Specialized Products

Producto	2002	2003	2004	2005	2006	2007	2008	2009	2010
03	11.6883	10.5253	9.3944	9.8650	11.0741	11.1779	11.1140	11.9698	12.6097
06	36.6455	29.8957	31.1715	27.5877	25.9361	22.9925	24.7057	27.5896	28.5055
07	2.0565	1.4151	1.6098	1.9223	1.6855	1.8363	1.5647	1.5326	1.3540
08	43.8400	37.6461	30.4610	24.1755	23.0958	22.6919	20.7115	27.8565	24.0915
09	1.9534	1.5805	1.5842	1.5366	1.5669	1.0087	0.7538	1.5355	1.7969
14	1.1903	1.2500	1.1539	0.9840	1.0566	1.0886	1.2185	1.4324	2.0453
15	1.7219	2.0961	2.1892	2.4418	2.0456	3.0358	2.9578	3.6040	2.6877
16	24.9969	24.5522	17.5857	17.8527	18.3532	17.5232	19.6279	16.4153	14.2116
17	2.8140	3.1505	3.1277	2.3346	2.7964	1.8538	1.9903	1.2034	1.0864
18	13.6834	11.5253	9.2092	8.5724	7.1464	8.4223	7.6239	10.7364	9.6605
20	4.2868	4.7454	4.3384	4.1036	4.4902	4.1451	3.3232	4.3667	4.2816
21	2.3609	2.9730	3.1367	2.3173	2.0185	2.8596	2.1022	2.0354	2.0172
23	0.9489	1.0253	0.9881	0.9134	1.4459	1.7928	1.3661	1.7712	1.9058
24	0.9209	0.8379	0.9702	1.0381	0.9252	1.1001	0.7755	1.0263	0.9833
27	5.8441	5.2890	6.0168	5.0944	4.3479	4.9464	3.9622	4.0286	4.2451
44	1.2165	1.3933	1.1123	1.0141	1.0197	1.2192	1.2865	1.5724	1.7301
53	3.4165	2.8811	2.9209	2.1746	1.9975	2.3160	4.3085	4.9427	3.6912
58	0.0227	0.0257	0.0546	0.0376	0.0667	0.0585	1.5798	5.2376	0.7620
65	1.3479	1.1471	1.2946	0.9764	0.9187	0.8605	0.7522	1.1843	1.4449
78	0.2037	0.3321	0.3734	1.0458	0.2919	0.8428	0.6196	1.2807	1.1264

If one does a similar RCA analysis for India in 2009 to find its specialized products one gets a list of 37 industrial products out of list of 96 industries disaggregated at 2 digit levels in 2009. 40 industries are identified in 2010 using RCA analysis (see Table XV below).

Table XV below lists the industries in which India has comparative advantage in 2009 and 2010.

Serial Number	Country	Year	HS 2 Digit Industrial Code(2002)	RCA	Country	Year	HS 2 Digit Industrial Code(2002)	RCA	Serial Number
1	India	2009	78	1.0026	India	2010	12	1.0708	1
2	India	2009	74	1.0343	India	2010	07	1.1670	2
3	India	2009	08	1.0827	India	2010	72	1.2150	3
4	India	2009	27	1.0898	India	2010	64	1.2222	4
5	India	2009	72	1.1029	India	2010	02	1.2277	5

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6	India	2009	07	1.1615	India	2010	78	1.2621	6
7	India	2009	64	1.2663	India	2010	27	1.3219	7
8	India	2009	58	1.2734	India	2010	36	1.3759	8
9	India	2009	73	1.3178	India	2010	58	1.3861	9
10	India	2009	36	1.4148	India	2010	28	1.4906	10
11	India	2009	32	1.4203	India	2010	32	1.5344	11
12	India	2009	03	1.4665	India	2010	29	1.5960	12
13	India	2009	29	1.6272	India	2010	17	1.6227	13
14	India	2009	68	1.7851	India	2010	89	1.6481	14
15	India	2009	89	1.8117	India	2010	24	1.7216	15
16	India	2009	24	1.8144	India	2010	73	1.7482	16
17	India	2009	41	1.9024	India	2010	68	1.7693	17
18	India	2009	42	2.2586	India	2010	41	1.7829	18
19	India	2009	23	2.3032	India	2010	61	1.8412	19
20	India	2009	25	2.3677	India	2010	42	1.8722	20
21	India	2009	61	2.3716	India	2010	03	1.9796	21
22	India	2009	79	2.5915	India	2010	25	2.0783	22
23	India	2009	10	2.6178	India	2010	74	2.3475	23
24	India	2009	62	2.8483	India	2010	10	2.4140	24
25	India	2009	55	3.3991	India	2010	23	2.4639	25
26	India	2009	67	3.5983	India	2010	26	2.5908	26
27	India	2009	09	3.6304	India	2010	62	2.6105	27
28	India	2009	54	3.6755	India	2010	67	2.9956	28
29	India	2009	26	3.8056	India	2010	79	3.3566	29
30	India	2009	63	3.8076	India	2010	55	3.5829	30
31	India	2009	14	3.9922	India	2010	54	3.6503	31
32	India	2009	53	5.1175	India	2010	63	4.1009	32
33	India	2009	52	5.4369	India	2010	09	4.1532	33
34	India	2009	13	5.5958	India	2010	71	5.1608	34
35	India	2009	57	5.8824	India	2010	14	5.6180	35
36	India	2009	50	6.6331	India	2010	57	6.3270	36
37	India	2009	71	7.0158	India	2010	50	6.8136	37
					India	2010	53	7.7707	38
					India	2010	52	8.3618	39
					India	2010	13	8.5674	40

Source; Author´s work in WITS

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India´s Advantage lies in 37 Products from industries in Agriculture, Industry and Petroleum in 2009. Such Products include Natural/Cultured Pearls, Precious Stones and Metals, Silk, Carpets and other Textile Floor Covering, Articles of Apparel and Clothing, Mineral Fuels, Oils and Products of Distillery, Iron and Steel, Organic Chemicals, Ships, boats and Floating Structures, Zinc and articles there of,Ores, Slag and ash, Cotton, Coffee, Tea and Spices, Articles of Leather; saddlery, Raw hides and Skins, Tobacco and manufactured tobacco products, Fish and Crustacean,, Edible Fruits, vegetables, among others. These are potential sectors for inviting FDI into India.

Common Industries where in Ecuador and India have RCA>1 in 2009 and have potential for trade (may be intra industry trade). These include Lead and articles there of(78),Edible fruit and nuts;peel of citrus fruit or me(08),Mineral fuels; oils and products of distillery(27),Edible vegetables and certain roots and tubers(07),Special woven fabrics; tufted textile fabrics; lace; tapestries(58), Fish and Crustacean; mollusk and other acquatic invertebrates(03), Tobacco and Manufactured tobacco substitute(24), Residues and waste from the food industry(23), Coffee; Tea and Spices(09) and Vegetable plaiting materials; vegetable products(14)[8].

8 Currently, Ecuador's exports include not only petroleum, banana, shrimp, coffee and cacao but also a series of new products, which have won widespread acceptance in international markets. These include *fresh fruits*: strawberries, mango, passion fruit, melon, papaya, pineapple, etc.; *processed fruits*: preserves, dried fruits, juices, concentrates, candied fruits, marmalades and jellies; *flowers*: roses, baby's breath, carnations, chrysanthemums, etc.; *sea food*: shrimp, jumbo shrimp, fresh fish, tuna; *vegetables*: string beans, asparagus, artichokes, peas, cauliflower, palm heart, broccoli, etc.; *herbs and plants*; herbals and medicinal teas: mint, boldo, retania, valerian, etc.; *industrial products*: ceramics ; wood derivatives in bulk, board, sheets and plywood ; textile products etc. ; *craft products*: T-shirts, tagua figurines and buttons, palmetto straw hats, decorative ceramics, balsa wood figures, etc..**Exports to India include** Tropical wood, Newsprint, Crude Oil, Coffee, Tea, Spices, Chocolate & Chocolate products, Waste & Scrap of iron and steel. **Imports from India include** Vehicles and accessories, Organic chemicals, Auto tyres, Misc. chemical products, Plastic products, Iron/steel products, Pharmaceuticals products etc. (Source for this information is Ecuadorian Embassy in New Delhi, India)

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Table XVI works out export specialization index for Ecuador on the basis of 20 specialized products of Ecuador in 2002, 2005 and 2010. The index helps us to identify markets for the 20 specialized products of Ecuador.

Table XVI: Export Specialization Index: Identification of Markets for 20 Specialized Products in 2002, 2005 and 2010.

Year	ES	Country	Ind.	Year	ES	Country	Ind.	Year	ES	Country	Ind.
2002	1.0886	Colombia	18	2005	1.0119	Japan	53	2010	1.0102	Japan	53
2002	1.1415	Germany	18	2005	1.0767	Canada	06	2010	1.0206	Chile	03
2002	1.2038	Japan	18	2005	1.1295	Chile	06	2010	1.0864	United States	20
2002	1.2067	Venezuela	16	2005	1.1824	Brazil	16	2010	1.1345	Argentina	08
2002	1.3463	Netherlands	06	2005	1.2247	Chile	16	2010	1.1418	Italy	16
2002	1.4742	Mexico	17	2005	1.2937	Netherlands	06	2010	1.1808	United States	16
2002	1.5152	Colombia	16	2005	1.2956	Colombia	16	2010	1.1946	Canada	06
2002	1.5397	United States	20	2005	1.3906	Italy	16	2010	1.2617	Chile	06
2002	1.5545	Brazil	17	2005	1.4123	United States	20	2010	1.2782	Germany	08
2002	1.6195	Canada	06	2005	1.4631	Germany	08	2010	1.2917	Brazil	17
2002	1.6952	Chile	16	2005	1.7296	Netherlands	16	2010	1.3809	Venezuela	16
2002	1.7209	Belgium	08	2005	1.7347	Chile	08	2010	1.4493	Colombia	16
2002	1.8491	Japan	08	2005	2.1660	United Kingdom	53	2010	1.4777	Belgium	08
2002	2.3358	Chile	08	2005	3.0202	United States	27	2010	1.5364	Mexico	18
2002	2.5269	United States	27	2005	3.3201	United States	18	2010	1.6469	Chile	08
2002	2.5850	Germany	08	2005	3.3608	Spain	16	2010	1.8541	United States	27
2002	2.6357	Italy	16	2005	3.6682	United States	16	2010	1.8943	Italy	14
2002	2.8243	Spain	16	2005	3.8911	Italy	08	2010	2.1967	Spain	16
2002	3.3827	United Kingdom	53	2005	5.5150	United States	03	2010	2.2576	United States	18
2002	5.7679	United States	18	2005	7.8791	United States	08	2010	2.2747	Brazil	16
2002	7.6142	Italy	08	2005	17.8697	United States	06	2010	2.8907	United Kingdom	53
2002	8.8523	United States	03					2010	3.5259	Italy	08

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2002	12.3736	United States	16					2010	5.3344	United States	03
2002	21.0895	United States	08					2010	6.5370	United States	08
2002	26.7303	United States	06					2010	12.3230	United States	06

Source: Author´s work on WITS. 20 specialized products can be identified from the Appendix List II below or Table XII above.

The table indicates that Ecuador is targeting the US markets in 2010 for exports of Fish, Cut Flowers and Live Trees, Edible Fruits, Preparation of Meat and Fish, Cocoa and Cocoa Preparations and Mineral fuels and products from distilleries, Japan and the United Kingdom for Other Vegetable Textile Fibres, Chile for Fish, Fruits and Live trees and Cut flowers, Germany and Italy for Edible Fruits and Nuts, Spain for Preparation of Meat and Fish, Brazil for Preparation of Meat and Fish and Sugar and Sugar Confectionaries, Italy for Vegetable Plaiting Material and for Preparation of Meat and Fish, Columbia and Venezuela for Preparation of Meat and Fish, Canada for Live trees, Bulb root and Cut flowers, Mexico for Cocoa and Cocoa Preparations, among others. Since 2002, Ecuador has probably lost its competitiveness since 2002 in providing Cocoa and Cocoa Preparations and Preparation of Vegetables and Fruits in the US Markets.

Table XVII given below gives the Trade Complementarity Index for Ecuador based on trade data available at 6 digit disaggregated levels for years 2002, 2005, 2009 and 2010. The index shows how well the structures of a country's imports and exports match. The index is zero when no goods are exported by one country or imported by the other and 100 when the export and import shares exactly match. It is observed that Lao PDR has the highest value of the index for years 2002(61.01), 2009(56.45) and 2010(54.01). Bolivia has the highest value in 2005(56.45). Hence, it seems that both these countries, among all, have the matching of their products with Ecuador. In 2009, Columbia stood second(47.28) after Lao followed by East Asian Country Cambodia, followed by Bolivia, Malta, Lithuania, Netherlands, Italy, India and then Chile. In 2010, Lao tops the list followed by Cyprus, Slovenia, Estonia, Argentina, Paraguay, Cambodia, Netherlands, India, Bulgaria, Finland, Italy and Peru. Bolivia, Chile, Peru, Argentina, Brazil, Paraguay, Venezuela and Colombia figure up in top 15 countries on the list based on decreasing value of the index in at least one of the years- 2002,2005,2009 and 2010. Also, one finds that except for few countries the position of trading partners in terms of the indices is not fixed. There may be a case for aligning Ecuador with the Baltics in Europe and some it's trading partners like Netherlands, Denmark, Spain and Italy and/ Or some of the East Asian Nations like Lao and Cambodia or with the Medditarrean Countries like Malta and Cyprus. In Latin America, Ecuador may have bilateral and regional economic agreements with Bolivia, Peru, Columbia and Chile. The negotiations are generally done at 6 Digit level. One can always work out the Trade Complementarity Index at 2 digit levels which may show entirely different trading partners which have matching of products with Ecuador.

Table XVII: Trade Complementarity Index based on trade data at 6 Digit Industry Level Disaggregation in 2002, 2005, 2009 and 2010

Year	Partner Name	TC	Year	Partner Name	TC	Year	Partner Name	TC	Year	Partner Name	TC
2002	Lao PDR	61.0134	2005	Bolivia	56.4540	2010	Lao PDR	54.0195	2009	Lao PDR	50.3504
2002	Cambodia	51.4937	2005	Lao PDR	54.7768	2010	Cyprus	52.9170	2009	Colombia	47.2810

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2002	Venezuela	48.1497	2005	Cambodia	51.7356	2010	Slovenia	49.9911	2009	Cambodia	44.2188
2002	Cyprus	46.2069	2005	Lithuania	42.6484	2010	Estonia	49.7902	2009	Bolivia	42.4711
2002	Bolivia	44.6476	2005	Japan	39.3796	2010	Argentina	48.0829	2009	Malta	35.5169
2002	Paraguay	44.6113	2005	Cyprus	39.2230	2010	Paraguay	47.3708	2009	Lithuania	33.3916
2002	Brazil	44.1044	2005	India	36.4010	2010	Cambodia	47.3468	2009	Nether lands	33.1510
2002	Lithuania	41.7279	2005	Italy	35.5024	2010	Netherlands	34.3455	2009	Italy	31.5086
2002	Chile	39.5744	2005	Peru	34.5452	2010	India	33.3082	2009	India	31.0422
2002	Malta	37.7396	2005	Netherlands	34.5101	2010	Bulgaria	32.8666	2009	Chile	31.0134
2002	Estonia	37.6796	2005	Chile	33.4700	2010	Finland	31.4221	2009	Bulgaria	30.9006
2002	Italy	37.4275	2005	Bulgaria	32.7020	2010	Italy	30.9372	2009	Peru	29.6508
2002	Netherlands	37.1014	2005	Korea, Rep.	32.4110	2010	Peru	30.1552	2009	Cyprus	29.1569
2002	Peru	37.0375	2005	Romania	30.9658	2010	Malta	30.0624	2009	Finland	28.9188
2002	India	36.0716	2005	Slovak Republic	30.8191	2010	Lithuania	29.8489	2009	Greece	28.3108
2002	Portugal	35.3516	2005	France	30.5101	2010	Chile	29.8122	2009	Poland	28.0446
2002	Slovak Republic	35.3347	2005	Poland	30.1079	2010	Venezuela	29.4319	2009	France	27.5868
2002	Romania	35.2127	2005	Belgium	29.8745	2010	Greece	29.2401	2009	Korea, Rep.	27.1422
2002	Luxembourg	35.2058	2005	Spain	29.7165	2010	Poland	29.0683	2009	United Kingdom	27.1411
2002	France	35.0698	2005	Greece	29.6118	2010	United Kingdom	28.7446	2009	Belgium	27.0256
2002	Vietnam	35.0163	2005	Thailand	29.4536	2010	Belgium	27.8698	2009	Sweden	26.6918
2002	Finland	34.9237	2005	Portugal	29.3838	2010	Sweden	27.5862	2009	Vietnam	26.5145
2002	Japan	34.8780	2005	Malta	28.8375	2010	United States	26.6851	2009	Luxem bourg	25.8696
2002	Korea, Rep.	34.8741	2005	United Kingdom	28.6780	2010	Vietnam	26.6692	2009	Denmark	25.7351
2002	Belgium	34.8726	2005	Sweden	27.8344	2010	Portugal	26.6562	2009	Spain	25.6851
2002	Uruguay	34.2956	2005	Singapore	27.7067	2010	Korea, Rep.	26.5278	2009	Japan	25.3574
2002	Spain	34.2752	2005	Slovenia	27.6523	2010	France	26.3763	2009	Portugal	25.3443
2002	Poland	34.2405	2005	Indonesia	27.6208	2010	Luxembourg	26.3489	2009	United States	25.3161
2002	Indonesia	34.1628	2005	Finland	27.4686	2010	Spain	26.1393	2009	Brazil	25.3120
2002	Bulgaria	33.9150	2005	Venezuela	27.3782	2010	Denmark	26.0023	2009	Austria	25.1122
2002	Malaysia	33.8085	2005	Germany	26.9713	2010	Slovak Republic	25.9055	2009	Estonia	24.9582
2002	Slovenia	33.6927	2005	Brazil	26.9361	2010	Japan	25.3885	2009	Thailand	24.3163
2002	Singapore	33.5490	2005	United States	26.8516	2010	Brazil	25.3841	2009	Indonesia	24.1075
2002	Latvia	33.2424	2005	Luxembourg	26.8319	2010	Austria	25.2813	2009	Singapore	24.0107
2002	Hungary	33.0848	2005	Uruguay	26.6955	2010	Ireland	24.7865	2009	Ireland	23.9115
2002	Sweden	33.0805	2005	Denmark	26.6372	2010	China	24.6776	2009	Germany	23.8560
2002	Ireland	32.8737	2005	Ireland	26.5930	2010	Germany	24.6096	2009	China	23.8382

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2002	United Kingdom	32.8695	2005	Vietnam	26.4480	2010	Bolivia	24.4082	2009	Romania	23.4351
2002	Argentina	32.8128	2005	Austria	26.4369	2010	Romania	24.1219	2009	Slovenia	23.3504
2002	Denmark	32.6524	2005	Czech Republic	26.0536	2010	Indonesia	23.6602	2009	Uruguay	23.2420
2002	Germany	32.6136	2005	China	26.0044	2010	Colombia	23.1250	2009	Slovak Republic	23.1089
2002	Hong Kong, China	32.2943	2005	Latvia	25.8309	2010	Canada	23.0250	2009	Latvia	22.9167
2002	Greece	32.2745	2005	Argentina	24.5830	2010	Hungary	22.3593	2009	Canada	22.3990
2002	Austria	31.9258	2005	Hungary	24.3755	2010	Malaysia	22.3378	2009	Venezuela	21.5366
2002	Czech Republic	31.8645	2005	Estonia	24.2703	2010	Czech Republic	22.2361	2009	Czech Republic	21.2724
2002	China	31.8588	2005	Canada	23.5301	2010	Thailand	22.2055	2009	Argentina	21.0050
2002	Colombia	31.5386	2005	Colombia	23.2440	2010	Singapore	22.0753	2009	Hungary	20.9640
2002	Thailand	31.0234	2005	Paraguay	22.5280	2010	Latvia	20.7431	2009	Malaysia	20.0406
2002	United States	30.3166	2005	Hong Kong, China	21.3572	2010	Uruguay	20.5201	2009	Paraguay	19.6461
2002	Canada	28.3059	2005	Mexico	19.8466	2010	Hong Kong, China	19.0107	2009	Hong Kong, China	17.1633
2002	Mexico	27.9528	2005	Malaysia	19.6995	2010	Mexico	18.4531	2009	Mexico	17.0487

Source: Author´s work in WITS

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Table XVIII gives the Trade Intensity Index for Ecuador in 2002, 2005 and 2010. An index of more (less) than one indicates a bilateral trade flow that is larger (smaller) than expected, given the partner country's importance in world trade. We find that in year 2010, Peru, Venezuela, United States, Uruguay, Bolivia, Columbia, Chile, Argentina, Italy and Spain, all had intense trade relations with Ecuador. All other countries listed in 2010 have potential to increase trade relations with Ecuador (have values of index less than one). To name few are Japan, Malaysia, Belgium, Netherlands, France, Mexico, Germany, among others. The list of 2010 is common with other years except one finds that Ecuador does not have intense trade relations with Brazil in 2010. Ecuador may need to rethink their trade policies with the fast growing Brazil and South Korea.

Table XVIII: Trade Intensity Index (T) for Ecuador in 2002, 2005 and 2010

Year	Partner Name	T	Year	Partner Name	T	Year	Partner Name	T
2002	Peru	72.0119	2005	Bolivia	3.9427	2010	Peru	39.8306
2002	Chile	6.1849	2005	United States	3.3016	2010	Venezuela	21.9345
2002	Venezuela	5.9556	2005	Colombia	27.0774	2010	United States	2.9376
2002	Colombia	43.3249	2005	Chile	11.1877	2010	Uruguay	2.7358
2002	Bolivia	3.9945	2005	Argentina	1.6583	2010	Bolivia	2.2920
2002	Korea, Rep.	3.0628	2005	Brazil	1.2607	2010	Colombia	16.6058
2002	Argentina	2.3994	2005	Italy	1.0587	2010	Chile	13.6759
2002	United States	2.3490	2005	Spain	0.7659	2010	Argentina	1.8007
2002	Paraguay	2.3118	2005	Uruguay	0.7494	2010	Italy	1.0699
2002	Italy	1.5450	2005	Netherlands	0.5363	2010	Spain	1.0041
2002	Uruguay	0.6832	2005	India	0.3456	2010	Japan	0.6947
2002	Spain	0.4948	2005	Mexico	0.3268	2010	Malaysia	0.6529
2002	Belgium	0.4879	2005	Latvia	0.2976	2010	Belgium	0.5871
2002	Netherlands	0.4711	2005	Belgium	0.2820	2010	Netherlands	0.5164
2002	Japan	0.4702	2005	Germany	0.2730	2010	France	0.2824
2002	Germany	0.4320	2005	Canada	0.2015	2010	Mexico	0.2818
2002	Brazil	0.3893	2005	France	0.1834	2010	Germany	0.2709
2002	Poland	0.2778	2005	Slovenia	0.1729	2010	Poland	0.2664
2002	Mexico	0.2241	2005	Japan	0.1640	2010	China	0.2440
2002	United Kingdom	0.1841	2005	Poland	0.1597	2010	Brazil	0.2378
2002	Portugal	0.1694	2005	Paraguay	0.1522	2010	Singapore	0.2113
2002	France	0.1687	2005	United Kingdom	0.1473	2010	Portugal	0.1968
2002	Canada	0.1368	2005	Portugal	0.0850	2010	Bulgaria	0.1867

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2002	Romania	0.1244	2005	Denmark	0.0714	2010	Paraguay	0.1861
2002	China	0.0710	2005	Sweden	0.0296	2010	Romania	0.1522
2002	Indonesia	0.0594	2005	Indonesia	0.0281	2010	Lithuania	0.1383
2002	Greece	0.0410	2005	Czech Republic	0.0236	2010	Greece	0.1353
2002	Sweden	0.0372	2005	Estonia	0.0182	2010	Denmark	0.1351
2002	Finland	0.0281	2005	Hong Kong, China	0.0182	2010	Slovenia	0.1287
2002	Luxembourg	0.0272	2005	Korea, Rep.	0.0162	2010	Canada	0.1248
2002	India	0.0216	2005	Finland	0.0154	2010	United Kingdom	0.1241
2002	Hong Kong, China	0.0212	2005	Greece	0.0146	2010	Sweden	0.0468
2002	Denmark	0.0177	2005	Slovak Republic	0.0139	2010	Finland	0.0385
2002	Bulgaria	0.0135	2005	Vietnam	0.0134	2010	India	0.0346
2002	Vietnam	0.0123	2005	China	0.0132	2010	Vietnam	0.0321
2002	Czech Republic	0.0089	2005	Lithuania	0.0125	2010	Austria	0.0316
2002	Slovak Republic	0.0086	2005	Ireland	0.0105	2010	Slovak Republic	0.0297
2002	Austria	0.0073	2005	Malta	0.0080	2010	Ireland	0.0258
2002	Slovenia	0.0066	2005	Bulgaria	0.0079	2010	Korea, Rep.	0.0248
2002	Ireland	0.0047	2005	Thailand	0.0073	2010	Estonia	0.0197
2002	Thailand	0.0046	2005	Singapore	0.0064	2010	Hong Kong, China	0.0167
2002	Singapore	0.0034	2005	Luxembourg	0.0060	2010	Latvia	0.0132
2002	Hungary	0.0028	2005	Austria	0.0058	2010	Malta	0.0107
2002	Lithuania	0.0025	2005	Romania	0.0054	2010	Indonesia	0.0090
2002	Latvia	0.0013	2005	Malaysia	0.0022	2010	Thailand	0.0076
2002	Estonia	0.0008	2005	Hungary	0.0002	2010	Cyprus	0.0061
2002	Malaysia	0.0002	2005	Cyprus	0.0000	2010	Czech Republic	0.0038
						2010	Luxembourg	0.0035
						2010	Hungary	0.0015

Source: Author´s work in WITS

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The **export diversification (DX) index** for a country is defined as: DX_j = (sum $|h_{ij} - x_i|$) / 2 Where h_{ij} is the share of commodity i in the total exports of country j and xi is the share of the commodity in world exports.The lower the index, the less concentrated are a country's exports. Table XVIX gives the Export Diversification index for Ecuador based on trade data disaggregated at 2 Digit and 6 Digit levels. The figures are on the higher side indicating the concentrated trade of Ecuador. Product concentration index below will confirm that more than half of Ecuador´s exports are of Industry 27(Mineral Fuel and Products from the Distillery). Ecuador needs to rethink its trade policy by diversifying its trade into manufactured products and more diversified production structure. Information Technology services, Tourism, Manufacturing of Automobiles, Industrial and Textile Goods and Chemicals are some areas where Ecuador can think of developing niche and cater to European markets. Production and Trade in Climate Smart Goods is another area of focus.

Table XVIX: Export Diversification Index for Ecuador in 2002, 2005 and 2010 based on trade data at 2 and 6 Digit Level Disaggregation

ReporterISO3	Year	DX	ReporterISO3	Year	DX
ECU	2002	0.6549	ECU	2002	0.7609
ECU	2005	0.6983	ECU	2005	0.7453
ECU	2010	0.7020	ECU	2010	0.7012
6digit			2digit		

Source: Author´s work in WITS

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Table XVIX and Table XX shows some conflicting trends for Ecuador from 2002 till 2010. While at 2 digit level the Export Diversification index shows that exports are becoming more diversified, but at the 6 digit disaggregation the index indicates that Ecuador trade is becoming more concentrated. Whatever it may be the tariff liberalization at the international level are done at 6 digit levels. Ecuador needs to keep focusing on diversifying its production and trade structure.

Table XX: Export Diversification Index based on trade data at 6 Digit Level of Some Selected Countries in 2002, 2005 and 2010

Country	2002	2005	2010
Argentina	0.6691	0.6292	0.6492
Austria	0.4319	0.4378	0.4506
Belgium	0.4466	0.4569	0.4516
Bulgaria	0.6306	0.6309	0.5689
Bolivia	0.6936	0.6798	0.5607
Brazil	0.5988	0.5824	0.6127
Canada	0.4835	0.4772	0.4829
Chile	0.7685	0.7752	0.7672
China	0.5395	0.5201	0.4890
Colombia	0.6819	0.6554	0.6777
Cyprus	0.6045	0.5729	0.5787
Czech Republic	0.5260	0.5242	0.4954
Germany	0.3154	0.3379	0.3610
Denmark	0.5076	0.4977	0.4787
Ecuador	0.6549	0.6983	0.7020
Spain	0.4460	0.4530	0.4563
Estonia	0.6392	0.5446	0.5268
European Union	0.2859	0.3028	0.3195
Finland	0.6368	0.6058	0.5726
France	0.3596	0.3944	0.4242
United Kingdom	0.3213	0.3315	0.3532
Greece	0.6542	0.6103	0.5830
Hong Kong, China	0.5383	0.5579	0.5677
Hungary	0.4685	0.5135	0.4913
India		0.6552	0.6255
Ireland	0.6736	0.7002	0.6920
Italy	0.4427	0.4408	0.4418
Japan	0.4420	0.4806	0.4777
Cambodia		0.6383	0.6298
Korea, Rep.	0.5177	0.5216	0.5157
Lithuania	0.6425	0.6085	0.5516

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Luxembourg	0.6749	0.6678	0.6913
Latvia	0.7193	0.6145	0.5600
Mexico	0.5011	0.5028	0.5109
Malta	0.6532	0.6550	0.6542
Malaysia	0.5913	0.5515	0.5491
Netherlands	0.3797	0.4020	0.4026
Peru	0.7578	0.7714	0.7475
Poland	0.5509	0.5603	0.5316
Portugal	0.5945	0.5184	0.5586
Paraguay		0.6701	0.6672
Romania	0.6538	0.5972	0.5531
Singapore	0.5596	0.5576	0.5422
Slovak Republic	0.6102	0.5164	0.5491
Slovenia	0.6233	0.6195	0.5493
Sweden	0.4832	0.4817	0.4657
Thailand	0.5588	0.5429	0.5359
Uruguay	0.6662	0.6765	
United States	0.3348	0.3471	0.3098
Venezuela			0.7114
Vietnam		0.6737	

Source: Author´s work in WITS

The table XXI below shows the Herfindahl-Hirchman Index (HH) of Trade Concentration. A country with a perfectly diversified export portfolio will have an index close to zero, whereas a country which exports only one export will have a value of 1 (least diversified). The HH index of Ecuador shows that Ecuador´s economy has become less diversified in 2010 from what it was in 2002. In general Latin American countries need to focus on diversifying their production and trade structure.

Table XXI: HH Index for Some Selected Countries based on trade data at 2 Digit Level

Country	2002	2005	2010
Argentina	0.0670	0.0645	0.0601
Austria	0.0712	0.0730	0.0641
Belgium	0.0577	0.0574	0.0539
Bulgaria	0.0407	0.0476	0.0486
Bolivia	0.1308	0.2583	0.2668
Brazil	0.0368	0.0444	0.0598
Canada	0.0811	0.0892	0.0881

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Chile	0.1111	0.1640	0.2204
China	0.0793	0.1011	0.1093
Colombia	0.1463	0.1707	0.3316
Cyprus	0.0809	0.1097	0.0701
Czech Republic	0.0930	0.0961	0.1027
Germany	0.0896	0.0887	0.0736
Denmark	0.0514	0.0532	0.0443
Ecuador	0.2217	0.3746	0.3288
Spain	0.0725	0.0687	0.0537
Estonia	0.0666	0.0829	0.0680
Finland	0.1162	0.1104	0.0732
France	0.0605	0.0585	0.0506
United Kingdom	0.0811	0.0763	0.0649
Greece	0.0401	0.0376	0.0380
Hong Kong, China	0.1198	0.1661	0.2336
Hungary	0.1370	0.1448	0.1391
India		0.0553	0.0663
Ireland	0.1366	0.1221	0.1399
Italy	0.0630	0.0658	0.0609
Japan	0.1451	0.1354	0.1139
Cambodia		0.5181	0.3812
Korea, Rep.	0.1255	0.1312	0.1095
Lithuania	0.0679	0.0954	0.0777
Luxembourg	0.0851	0.0759	0.0676
Latvia	0.1302	0.0867	0.0620
Mexico	0.1339	0.1265	0.1296
Malta	0.2948	0.2748	0.3192
Malaysia	0.2045	0.1766	0.1381
Netherlands	0.0398	0.0570	0.0484
Peru	0.1063	0.1256	0.1593
Poland	0.0540	0.0595	0.0649
Portugal	0.0585	0.0500	0.0429
Paraguay		0.1789	0.2024
Romania	0.0728	0.0646	0.0725
Singapore	0.2159	0.2011	0.1681
Slovak Republic	0.0770	0.0846	0.1213
Slovenia	0.0637	0.0692	0.0690
Sweden	0.0776	0.0824	0.0663

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Thailand	0.0861	0.0848	0.0788
Uruguay	0.0680	0.0844	
United States	0.0817	0.0765	0.0558
Venezuela			0.8729
Vietnam		0.1021	

Source: Author´s work in WITS

The Table XXII confirms the results of the earlier mentioned two tables. In 2010, more than 55% of Ecuador´s total exports are of Industrial Code 27(Mineral fuels, oils & product of their distilleries), followed by industrial code, 08(Edible fruit and nuts) covering more than 12% of Ecuadorian exports, followed by 03(Fish & crustacean, mollusc & other aquatic invertebrates (covering more than 6% of Ecuador´s exports), followed by Industrial code 06 (Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage) covering 3.49%, Preparations of meat, of fish or of crustaceans, mollusks or other aquatic invertebrates (chapter 16) covering 3.42 %, Cocoa and cocoa preparations (chapter 18) covering 2.41 %, Preparations of vegetables, fruit, nuts or other parts of plants (chapter 20) covering 1.38% in 2010,among others. The trade concentration of Industrial code 27 has increased from more than 40% in 2002 to more than 55% in 2010. The share of industrial code 03 has come down marginally in 2010 from what it were in 2002. The share of industrial code 08(Edible fruits and nuts) has come down from more than 20% in 2002 to more than 12 % in 2010. The share of industrial code 06 has come down from more than 5 % in 2002 to less than 3.50% in 2010. These trend may also indicate the importance of petroleum oil and other services industry (Travel and Tourism, Information Technology, Infrastructure services, among others) in production and trade structure of Ecuador.

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Table XXII: Product Concentration of 20 Products in Ecuador´s Total Exports in 2002, 2005 and 2010

Year	Ind.	PC	Year	Ind.	PC	Year	Ind.	PC
2002	03	6.9212	2005	03	5.4216	2010	03	6.2553
2002	06	5.8049	2005	06	3.7716	2010	06	3.4949
2002	07	0.7651	2005	07	0.6279	2010	07	0.5066
2002	08	20.0022	2005	08	11.6099	2010	08	12.1166
2002	09	0.2866	2005	09	0.2777	2010	09	0.3932
2002	14	0.0052	2005	14	0.0043	2010	14	0.0110
2002	15	0.5994	2005	15	0.7872	2010	15	1.1744
2002	16	6.8185	2005	16	4.4721	2010	16	3.4523
2002	17	0.6801	2005	17	0.5429	2010	17	0.3159
2002	18	2.5506	2005	18	1.7180	2010	18	2.4197
2002	20	1.5256	2005	20	1.2766	2010	20	1.3855
2002	21	0.7487	2005	21	0.7016	2010	21	0.6458
2002	23	0.3411	2005	23	0.2660	2010	23	0.7253
2002	24	0.2965	2005	24	0.2531	2010	24	0.2277
2002	27	40.8806	2005	27	59.4707	2010	27	55.3032
2002	44	1.2919	2005	44	0.9758	2010	44	1.1758
2002	53	0.1589	2005	53	0.0788	2010	53	0.0752
2002	58	0.0030	2005	58	0.0043	2010	58	0.0599
2002	65	0.0633	2005	65	0.0421	2010	65	0.0584
2002	78	0.0053	2005	78	0.0330	2010	78	0.0500

Source: author´s work in WITS

Conclusions from Trade Indices Work

Ecuador need to rethink its trade policy by diversifying its trade into manufactured products and more diversified production structure. Information Technology services, Tourism, Manufacturing of Automobiles, Education and Training Services, Bio combustibles, Housing materials, Pharmaceutical industries, Health Products and Hospital services, Hardware production, Industrial and Textile Goods, Industrial and Textile Goods and Chemicals are some areas where Ecuador can think of developing niche and cater to European markets. Production and Trade in Climate Smart Goods is another area of focus. In particular, study identifies the following industries for further diversifying industrial structure of Ecuador for its gain in future. These are Industrial Codes- 61(Articles of apparel and clothing accessories, knitted or crocheted), 62(Articles of apparel and clothing accessories, not knitted or crocheted),42(Articles of leather; saddlery and harness; travel goods, handbags and similar containers; articles of animal), 90(Optical, photographic, cinematographic, measuring, checking,

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precision, medical or surgical instruments and apparatus; parts and accessories thereof), 84(Electronic appliances), 85(Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles),87 (Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof), 83 (Miscellaneous articles of base metal), 73 (Articles of iron or Steel), 69 (Ceramic products), 30 (Pharmaceutical products),29(Organic chemicals), Climate Smart Goods- 840510(Clean Coal Technologies), 850720,853710 and 854140(Solar Photovoltaic systems), 848340 and 848360(Wind Power Technologies), 853931(Energy Efficient Lighting), among others. In services sector, Tourism, IT and ITES, Hospital services, Education and Training Services(training of English), Cultural Services, Knowledge Processing Outsourcing and Financial Analytics, Infrastructure services, have lot of potential of bring the necessary foreign exchange and stability into the system .Ecuador need to diversify into the following industries and services for higher and more stable export earnings, job creation and learning effects, and the development of new skills and infrastructure that would facilitate the development of even newer export products.

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II Trade Liberalization of CSG and Other Specialized Products: Comparative Analysis Using SMART

II.I Simulations Done Using Smart Analysis (Within Wits) For Working Out The Liberalization Impact Of CSG Trade Of Ecuador With Mercosur And China, Japan, Us And Eu In 2010

The study uses SMART- Single Market Partial Equilibrium Simulation Tool (available within WITS Database) to understand the liberalization effects of tariffs (zero tariffs) on the importer.

Rationale for Market Access Analysis

Despite successive rounds of multilateral, regional and unilateral trade liberalization, some trade barriers (including tariffs) remain highly restrictive in many (both developed and developing) countries.

For any government, it is crucial to be able to assess or to pre-empt the impact of different trade policy options. Market access analysis is a useful tool that can be used to anticipate the likely economic effects of various policy alternatives.

Impact of domestic trade reforms. For political economy or social purposes, it is often important to determine the distribution of the potential gains and losses from any contemplated policy changes. This will assist in anticipating any adjustment costs associated with reform implementation.

Impact of foreign trade liberalization. For instance, when preparing for trade negotiations, market access analysis helps identify the sensitive sectors where negotiating efforts should be focused. Also, it could be useful in the formation of negotiating coalitions in multilateral/regional negotiations.

The market access analysis tool included in the WITS package allows the researcher to investigate the impact of unilateral/ preferential/multilateral trade reforms at home or abroad on various variables including: Trade flows (import, exports, trade creation and trade diversion), world prices, tariff revenue and economic welfare.

The total trade effects are worked out by adding up the **price effects** (terms of trade effect) and quantity effects of trade by adding the trade creation and trade diversion effects. In addition the total welfare effect, consumer surplus effect and revenue effects of tariff reduction is also worked out.

For understanding the impact of tariff cuts, we discuss the opposite scenario of the impact on the economy if tariffs are imposed by the ´Small Country´ and another by one ´Large Country´.

Small Country Case: A Country is small enough to have any impact on terms of trade.

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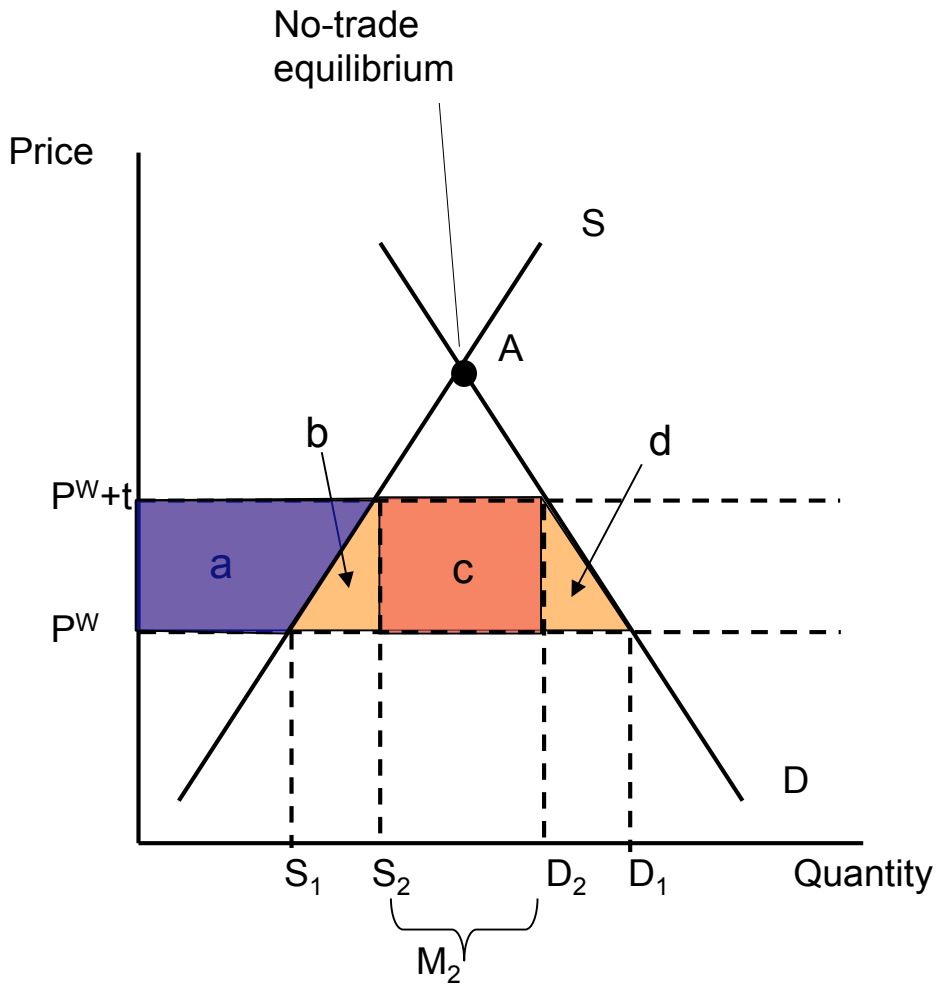
The tariff increases the price from *P W* to *P W + t in the figure below*. As a result, consumer surplus falls by *(a + b + c + d)*. Producer surplus rises by area *a*, and government revenue increases by the area *c*. Therefore, the net loss in welfare, the deadweight loss to Home, is *(b + d)*, which is measured by the two triangles *b* and *d* in figure below.

Overall Effect of the Tariff on Welfare

The overall impact of the tariff in the small country can be summarized as follows:

Fall in consumer surplus	*-(a+b+c+d)*
Rise in producer surplus	*+a*
Rise in government revenue	*+c*
Net effect on Home welfare	***-(b+d)***



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Therefore, any reductions in tariffs for small country will reduce production and consumption distortions. It would mean that consumer surplus will increase, producer surplus will decrease and welfare will improve of the small economy.

Large Country Case (see figure below): The Country is large enough to have impact on prices (terms of trade). The terms of trade improves for the tariff imposing country. The net effect on the welfare of the importing country is ambiguous.

Loss in consumer surplus-(A+B+C+D)

Gain in Producer Surplus +A

Government Revenue + C+E

Net Effect of Tariff = E-(B+D)

E is the terms of trade gain and B+D are the distortions in the economy. Hence, there are optimal tariffs which maximizes welfare (E-(B+D). The formula for the optimal tariff works out is the reciprocal of the elasticity of the foreign supply curve (upward sloping for large importing country). Reduction in tariffs for large country will effect terms of trade and reduction in distortions due to increase in consumer surplus and reduction in producer surplus and reduction in tariff revenue for the Government.

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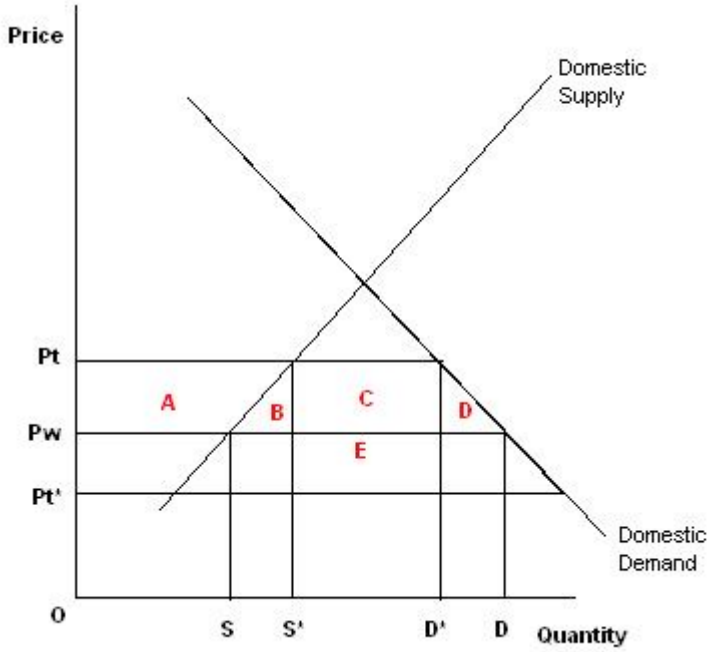

Trade Creation & Trade Diversion and Total Trade Effects in SMART (Quantity Effects of Tariff Liberalization)

The explanatory table below shows the cost to the United States of purchasing an automobile part from various source countries, with and without tariffs. The numbers illustrate the idea of trade diversion, under which the United States could switch from buying the auto part from Asia before NAFTA (for $20.90 with a 10% tariff) to Mexico after NAFTA (for $20 with zero tariff). While the United States gains 90¢ on each unit from paying a lower price, it also loses $1.90 in tariff revenue from not purchasing from Asia. An initial tariff of 20% going down to zero levels will show that trade is created with Mexico. Consumers gain in US because they are now getting cars from Mexico at US $ 20 and at the same time the Mexican Producers gain. Trade creation is always welfare improving while trade diversion most of times are welfare reducing (except when Mexicans can put extra effort in providing all the car requirements of the US).

U.S. Tariff

	0%	10%	20%
From Mexico, before NAFTA	$20	$22	$24
From Asia, before NAFTA	$19	$20.90	$22.80
From Mexico, after NAFTA	$20	$20	$20
From Asia, after NAFTA	$19	$20.90	$22.80
From the United States	$22	$22	$22

Source: Feenstra and Taylor, 2008

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Trade creation (in SMART model) is defined as the direct increase in imports following a reduction on the tariff imposed on good *g* from country *c*. If the tariff reduction on good *g* from country *c* is a preferential tariff reduction (i.e. it does not apply to other countries, *c*), then imports of good *g* from country *c* are further going to increase due to the substitution away from imports of good *g* from other countries that becomes relatively more expensive. This is the definition of trade diversion in the SMART model. For exporting countries, **total trade effect** is made of trade diversion and trade creation.

Equations for Trade Creation and Trade Diversion are given in Appendix Table VI. The values will depend on import demand elasticity, substitution elasticity and supply elasticity.

Simulation I: Liberalization of CSG Trade with MERCOSUR countries in 2010

The first simulation is the liberalization impacts of zero tariffs on imports of CSG from the rest of the nine MERCOSUR countries. The following are the outputs of the SMART analysis (within WITS).

The **Detailed Data report** is to check the raw data used for smart simulation just to make sure the dataset corresponds to expectations.

The **Export View report** shows the impact of the tariff reform on partner's exports to the considered market. It displays the pre value of exports (before the tariff change), the post value of exports (after the tariff change) to the considered market as well as the net value between the two, considered as the change in exports revenue

The **Market View report** returns all three types of effects affecting the market (trade value, tariff revenue and welfare change) by individual product code and for all products as one aggregate.

The **Revenue Impact report** returns individual results on the market's revenue by product code and for all products as one aggregate. The report displays the tariff revenue change between the pre and post tariff cut situation as well as the trade total effects.

The **Trade Creation Effect report** returns individual results on Trade Total effect by product code/partner combination and for all products as one aggregate. This report also shows the trade diversion effect among partners and trade creation effect for both the market and its partners. In SMART, beneficiaries of the tariff reduction enjoy both positive diversion effect and positive creation effect while all other partners will suffer from negative diversion effect and no trade creation effect

The **Welfare Effect report** returns individual results on the market's welfare by product code and for all products as one aggregate. The report displays the Total Trade Effect, which is defined as the sum of Trade Diversion effect, Trade Creation Effect and Price Effect as well as the Welfare Effect defined as the benefits consumers in the importing country derive from the lower domestic prices after the removal or reduction of tariffs.

In the SMART modeling framework, a change in trade policy (say preferential tariff liberalization) affects not only the price index/level of the composite good but also the relative prices of the different varieties. Despite the export supply elasticity,

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the import demand elasticity and the substitution elasticity[9], it will lead to changes in the chosen aggregate level of spending on that good as well as to changes in the composition of the sourcing of that good. Both channels affect bilateral trade flows.

As mentioned above SMART reports the results of any trade policy shock on a number of variables. In particular, it reports the effects on trade flows (i.e. imports from the different sources). It also decomposes those trade effects in trade creation and trade diversion. Trade creation is defined as the direct increase in imports following a reduction on the tariff imposed on good *g* from country *c*. If the tariff reduction on good *g* from country *c* is a preferential tariff reduction (i.e. it does not apply to other countries, *c*), then imports of good *g* from country *c* are further going to increase due to the substitution away from imports of good *g* from other countries that becomes relatively more expensive. This is the definition of trade diversion in the SMART model.

9 Import Demand Elasticity: Values used by default in SMART have been empirically estimated for each country and every HS 6-digit product. For more details see Hiau Looi Kee& Alessandro Nicita& Marcelo Olarreaga, 2008. "Import Demand Elasticitiesand Trade Distortions," The Review of Economics and Statistics, MIT Press, vol. 90(4), pages 666-682, 07. Substitution Elasticity: Is the substitution elasticity value between partners. Substitution elasticity entails a product by product simulation, which is based on the assumption that any product is independent of another product. SMART uses 1.5 as the default value. However, one can change this default value. It is recommended to keep it at 1.5 for industrial products but to increase it for primary goods. The reason being that the higher the substitution elasticity, the higher the substitutability of the same product from different suppliers. However, the more sophisticated a product is, the higher its rigidity of being substitutable. Supply Elasticity: Is the export supply elasticity value. By default, SMART uses 99 for an infinite elasticity for all products and partners. The reason being that we are dealing with a single-country simulation tool, so one country is too small compared to the rest of the world in order to have an impact on the price level. However, if you consider imports of a certain product from a bigger entity (like the European Union e.g.) to be relatively high and have a real impact on the world price level, you can lower the supply elasticity

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We summarize the results in Tables I through III **(Simulation I**). Table I gives the total trade effect (sum of price-terms of trade effect, and quantity effects-trade creation and trade diversion effects) of tariff liberalization undertaken by Ecuador in context of MERCOSUR countries (simulations) in 2010. Price effects in these simulations are zero because we assume Ecuador to be the 'small country'. Colombia gains the most in terms of total trade effects followed by Argentina and Peru. Chile has negative total trade effects because Chile already has a free trade policy with most of its Latin American Partners. Total trade effect for the US is negative and relatively higher as there is trade diversion from US to MERCOSUR countries for trade in CSG goods. For saving space the trade diversion impact on all countries is not shown. The total trade effect on the World is 3111.64 1000 US $.

Table I: Trade Creation, Trade Diversion and Total Trade Effects of Tariff Liberalization with MERCOSUR Countries only for CSG Imports for Simulations Undertaken by Ecuador in 2010

Country	TradeTotalEffect in 1000 USD	TradeCreation Effect in 1000 USD	TradeDiversion Effect in 1000 USD	OldSimple DutyRate	NewSimple DutyRate
Argentina	283.918	163.449	120.469	3.05	0.00
Bolivia	2.521	1.301	1.220	1.90	0.00
Brazil	407.221	266.318	140.903	3.10	0.00
Chile	-35.802	0.000	-35.802	0.00	0.00
Colombia	3,856.045	2,526.573	1,329.472	8.30	0.00
Paraguay	0.152	0.076	0.076	3.39	0.00
Venezuela	73.243	35.232	38.011	9.33	0.00
Uruguay	0.506	0.285	0.222	1.52	0.00
Peru	224.942	118.401	106.541	7.26	0.00
UnitedStates	-637.852	0.000	-637.852	7.01	7.01
Spain	-74.646	0.000	-74.646	7.85	7.85
UnitedKingdom	-16.162	0.000	-16.162	6.29	6.29
Mexico	-183.279	0.000	-183.279	5.97	5.97
Italy	-110.727	0.000	-110.727	7.27	7.27
Germany	-106.627	0.000	-106.627	7.61	7.61
China	-305.511	0.000	-305.511	6.73	6.73
India	-12.172	0.000	-12.172	6.15	6.15
World	3,111.634	3,111.634	0.000	6.44	5.18

Source: Author´s work in WITS. Price effects are zero as we assume that Ecuador is ´small country´

SMART also calculates the impact of the trade policy change on tariff revenue, consumer surplus and welfare.

A tariff revenue change on a given import flow is computed simply as the final Ad Valorem tariff multiplied by the final import value minus the initial Ad Valorem tariff multiplied by the initial import value.

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It should be noted that tariff revenue change is made of two opposite effects:

1. A tariff revenue loss at constant import value, which corresponds to a transfer from the State to consumers and is equal to Q0*(t0-t1).
2. A tariff revenue gain through the increase in imports which enlarges the tax base and is equal to (Q1-Q0)*t.

Using SMART internal import demand elasticity values, the tariff liberalization simulation returns a negative tariff revenue change (that is revenue gain from increased imports not enough to dominate revenue loss due to tariff decrease) in most cases.

Table II below shows that the welfare effects of tariff liberalization for CSG products. This works out to be 351.76 1000 US $ while the total imports before tariff reduction is 252,746.147, 1000 US$. The revenue effect works out to be -2,276.697, 1000 US $. The total import change is 3111.634, 1000 US$ due to reduction in tariffs on imports of CSG from MERCOSUR.

Table II: Revenue and Welfare Effects of CSG Liberalization undertaken by Ecuador (Simulations Only) with MERCOSUR Countries in 2010

Product Code	Welfare in 1000 USD	Revenue Effect in 1000 USD	TradeTotal Effect in 1000 USD	TradeValue in 1000 USD
csgcomb	351.763	-2,276.697	3,111.634	252,746.147

Source: Author´s work in WITS

Table III below shows the tariff change in revenue of -3029.456 while the consumer surplus due to reduction in tariffs on CSG coming from MERCOSUR countries. This work out to be 180.812, 1000 US dollars.

Table III: Simulation Results: Consumer Surplus and Tariff Change in Revenue for Ecuador after its liberalization with MERCOSUR in Trade in CSG Products

ImportsBefore in 1000 USD	ImportChange	TariffRevenue in 1000 USD	Tariff New Revenue in 1000 USD	Tariff Change In Revenue in 1000 USD	ConsumerSurplus in 1000 USD
252,746.147	3.111.634	16,282.010	13,252.550	-3,029.456	180.812

Source: Author´s work in WITS

Table IV below shows the trade creation, trade diversion and total trade effects of liberalization of CSG trade with the main suppliers of CSG goods, i.e., the US, Japan and China **(Simulation 2).** The highest total trade effect occurs in the US of the tune of 8023.8,1000 US$ followed by China worth 5338,1000US$ while the country which has the highest negative total trade effect is Columbia (-787.63, 1000 US$). Mexico has total negative trade effect of -379.09 ,1000 US&

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while Germany is the most affected country in Europe of the tune of -369.29,1000US$. The total import price change with all countries is 9702.19,1000 US$

Table IV: Trade Creation, Trade Diversion and Total Trade Effects of Tariff Liberalization of CSG Trade with China, Japan and the US for Simulations Undertaken by Ecuador in in 2010

PartnerName	Trade Total Effect in 1000 USD	Trade Creation Effect in 1000 USD	Trade Diversion Effect in 1000 USD	Old Simple Duty Rate	New Simple Duty Rate
China	5,338.083	3,870.511	1,467.572	6.73	0.00
Japan	407.789	261.120	146.669	5.10	0.00
UnitedStates	8,023.866	5,570.565	2,453.301	7.01	0.00
Argentina	-149.808	0.000	-149.808	3.05	3.05
Bolivia	-0.777	0.000	-0.777	1.90	1.90
Brazil	-288.973	0.000	-288.973	3.10	3.10
Chile	-106.380	0.000	-106.380	0.00	0.00
Colombia	-787.637	0.000	-787.637	8.30	8.30
Peru	-59.719	0.000	-59.719	7.26	7.26
Paraguay	-0.140	0.000	-0.140	3.39	3.39
Uruguay	-0.450	0.000	-0.450	1.52	1.52
Venezuela	-26.459	0.000	-26.459	9.33	9.33
Canada	-124.123	0.000	-124.123	6.50	6.50
Germany	-369.291	0.000	-369.291	7.61	7.61
Italy	-317.928	0.000	-317.928	7.27	7.27
Mexico	-379.093	0.000	-379.093	5.97	5.97
Spain	-292.742	0.000	-292.742	7.85	7.85
Taiwan, China	-112.799	0.000	-112.799	6.53	6.53
World	9,702.196	9,702.196	0.000	6.44	2.85

SOURCE: Author´s work in WITS

Table V below gives the revenue and the welfare effects of tariff liberalization undertaken by Ecuador (simulations only) with respect to China, Japan and the US. The Welfare effect works out to be 786.20,1000US$ for Ecuador. The figure is higher (more than double) with what it were when Ecuador liberalized its trade of CSG products with the MERCOSUR countries.

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Table V: Revenue and Welfare Effects of CSG Liberalization undertaken by Ecuador (Simulations Only) with China, Japan and the US in 2010

Trade Total Effect in 1000 USD	Welfare in 1000 USD	Revenue Effect in 1000 USD	Trade Value in 1000 USD
9,702.196	786.220	-7,274.732	252,746.147

Source: Author´s work in WITS

Table VI shows that consumer surplus effect is higher than when Ecuador liberalized its trade of CSG with MERCOSUR countries.

Table VI: Simulation Results: Consumer Surplus and Tariff Change in Revenue for Ecuador after its liberalization China, Japan and the US in Trade in CSG Products

ImportChange	Tariff Revenue in 1000 USD	Tariff New Revenue in 1000 USD	Tariff Change In Revenue in 1000 USD	Consumer Surplus in 1000 USD
9.702.196	16,282.010	7,491.704	-8,790.301	450.986

Source: Author´s work in WITS

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Table VII indicates that Germany, Italy and Spain are the greatest gainers due to liberalization of Ecuadorian trade with EU27**(Simulation 3)**. The total trade effect for Germany works out to be 2686.755, 1000 US$ (export surge), followed by Italy of the tune of 2035.086,1000 US$ followed by Spain of the tune of 1362.69,1000 US $. United States, Columbia and China are the countries who have the greatest trade diversion effects because of preferences given by Ecuador to EU27 countries. The total trade effect (total import surge with respect to all countries) works out to be 5601.571,1000 US $

Table VII: Trade Creation, Trade Diversion and Total Trade Effects of Tariff Liberalization of Ecuadorian CSG Trade with the EU 27 for Simulations Undertaken by Ecuador in in 2010.

Partner Name	Trade Total Effect in 1000 USD	Trade Creation Effect in 1000 USD	Trade Diversion Effect in 1000 USD	Old Simple Duty Rate	New Simple Duty Rate
Sweden	286.873	179.537	107.336	6.06	0.00
Spain	1,362.694	880.241	482.453	7.85	0.00
Netherlands	472.833	321.712	151.121	6.60	0.00
Italy	2,035.086	1,277.382	757.704	7.27	0.00
Germany	2,686.755	2,089.803	596.952	7.61	0.00
Argentina	-75.200	0.000	-75.200	3.05	3.05
Australia	-7.953	0.000	-7.953	6.29	6.29
Austria	45.128	21.019	24.109	4.92	0.00
Belgium	396.383	277.261	119.121	7.11	0.00
Bolivia	-0.645	0.000	-0.645	1.90	1.90
Brazil	-110.155	0.000	-110.155	3.10	3.10
Bulgaria	0.020	0.010	0.009	3.13	0.00
Canada	-31.145	0.000	-31.145	6.50	6.50
Chile	-52.725	0.000	-52.725	0.00	0.00
China	-475.419	0.000	-475.419	6.73	6.73
Colombia	-319.996	0.000	-319.996	8.30	8.30
UnitedKingdom	362.098	241.962	120.136	6.29	0.00
UnitedStates	-928.260	0.000	-928.260	7.01	7.01
Uruguay	-0.635	0.000	-0.635	1.52	1.52
Venezuela	-7.869	0.000	-7.869	9.33	9.33
World	5,601.571	5,601.571	0.000	6.44	4.65

Source: Author´s work in WITS

Table VIII shows the consumer surplus effects of liberalization equivalent to 310.696,1000 US$, an amount less than when Ecuador liberalized CSG trade with China, Japan and the US, but more than when Ecuador liberalized its trade with MERCOSUR countries

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Table VIII: Consumer Surplus and Tariff Change in Revenue Effects of Liberalization of Ecuadorian CSG Trade with EU27 Countries

Imports Before in 1000 USD	Import Change	Tariff Revenue in 1000 USD	Tariff New Revenue in 1000 USD	Tariff Change In Revenue in 1000 USD	Consumer Surplus in 1000 USD
252,746.147	5.601.571	16,282.010	12,016.081	-4,265.925	310.696

Source: Author´s work in WITS

Table IX shows the welfare effects of liberalizing Ecuadorian CSG trade with EU27 Countries. The amount works out to be 534.350,1000 US$, less than when Ecuador liberalized its trade with China, Japan and the US, but more than when it's liberalized its trade with Mercosur Countries

Table IX: Welfare and Total Trade Effect of Liberalizing Ecuadorian CSG Trade with EU27 Countries

Product Code	Trade Total Effect in 1000 USD	Welfare in 1000 USD	New Weighted Rate	Old Weighted Rate
csgcomb	5,601.571	534.350	4.65	6.44

Source: Author´s work in WITS

In Summary, SMART Analysis helps us to establish that it is better and more beneficial to liberalize Ecuadorian CSG trade with the Japan, the US and the China, followed by EU 27, the main suppliers (exporters) of CSG products rather than MERCOSUR countries

1.2 Smart Analysis For Trade In Specialized Products Of Ecuador

The first simulations are about Liberalization of 20 Products (in which Ecuador had Comparative Advantage) with MERCOSUR countries in 2010. The Table X below shows the trade creation, trade diversion and total trade effect of reducing tariffs on 20 specialized products with MERCOSUR Countries only. The major gainers in Latin American region in terms of total trade effect are Peru (62,438.419, 1000 US$), followed by Columbia (28,396.772,1000 US$) and Argentina (26,132.059,1000 US$), followed by Bolivia, Venezuela, Brazil and Uruguay, Paraguay and Chile have negative total trade effect. Chile imposes very low tariffs for products originating in Latin America. Any further tariff liberalization in Latin America makes goods cheaper of other Latin American countries. Therefore, in Chile one sees higher trade diversion than trade creation leading to negative total trade effect. The total import change for all countries in the Worlds is 110,484.049,1000 US $. United States, Mexico and Spain, among others are the most affected because of substantial trade diversion effect.

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Table X: Trade Creation, Trade Diversion and Total Trade Effects of Tariff Liberalization of Ecuadorian Trade in 20 Specialized Products with the MERCOSUR countries for Simulations Undertaken by Ecuador in in 2010.

Partner Name	Trade Total Effect in 1000 USD	Trade Creation Effect in 1000 USD	Trade Diversion Effect in 1000 USD	Old Simple Duty Rate	New Simple Duty Rate
World	110,484.049	110,484.050	0.000	14.18	9.07
Argentina	26,132.059	18,054.437	8,077.621	9.74	0.00
Bolivia	8,837.414	8,198.047	639.367	11.24	0.00
Brazil	2,114.354	1,439.326	675.028	10.23	0.00
Chile	-4,417.713	838.672	-5,256.386	0.84	0.00
Paraguay	-4,272.821	193.607	-4,466.428	5.65	0.00
Peru	62,438.419	57,417.643	5,020.776	17.07	0.00
Uruguay	108.583	59.242	49.341	4.48	0.00
Venezuela	5,633.141	3,923.585	1,709.556	8.10	0.00
Colombia	28,396.772	20,359.491	8,037.281	17.47	0.00
Belgium	-294.149	0.000	-294.149	16.18	16.18
Canada	-145.185	0.000	-145.185	16.85	16.85
Germany	-173.796	0.000	-173.796	14.75	14.75
Guatemala	-119.065	0.000	-119.065	15.24	15.24
Italy	-165.487	0.000	-165.487	18.47	18.47
Mexico	-508.007	0.000	-508.007	15.18	15.18
Netherlands	-150.731	0.000	-150.731	12.07	12.07
Spain	-402.059	0.000	-402.059	16.98	16.98
United States	-8,033.844	0.000	-8,033.844	17.56	17.56
United Kingdom	-164.771	0.000	-164.771	14.51	14.51

Source: Author´s work in WITS. Please note that price effect is zero because the assumption of small country holds.

Table XI below gives the consumer surplus and tariff revenue effects of tariff liberalization with MERCOSUR countries. The consumer surplus effect is US$ 12,844.879,1000 US$ while the revenue effect is negative -74,320.888,1000 US $

Table XI: Consumer Surplus and Tariff Change in Revenue Effects of Liberalization of Ecuadorian Trade in 20 Specialized Products with MERCOSUR Countries in 2010

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Revenue Effect in 1000 USD	Trade Value in 1000 USD	Tariff Revenue in 1000 USD	Tariff NewRevenue in 1000 USD	Tariff Change In Revenue in 1000 USD	Consumer Surplus in 1000 USD
-74,320.888	3,713,676.641	526,578.830	346,949.249	-179,629.578	12,844.879

Source: Author´s work in WITS

The Table XII shows the welfare effect of tariff liberalization of such 20 products with MERCOSUR countries in 2010. The Welfare effect works out to be 9,453.874,1000 US $.

Table XII: Welfare Effects of Liberalization of 20 Products with MERCOSUR in 2010

Product Code	Trade Total Effect in 1000 USD	Welfare in 1000 USD
20ECUCA	110,484.049	9,453.874

Source: Author´s work in WITS

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Simulation Two: Table XIII bellow shows the tariff liberalization impact of liberalizing trade of 20 products (at two digit level) with the China, Japan and the US. One would have expected larger gains as compared to a scenario when Ecuador liberalized its trade with MERCOSUR countries (like in the case of CSG goods). Also, the total trade effect is 41,659.447,1000 US $, an amount (increase in imports) lowers than when Ecuador liberalized its trade of 20 products with MERCOSUR, which is 110,484.049,1000 US $. The table also shows that the US gains the most, followed by China and then Japan. The most affected(negative total trade effect) will be Argentina, Chile, Columbia and Peru in the Latin American region while Mexico, Spain and Belgium gets affected the most due to liberalization with the China, Japan and the US.

Table XIII: Trade Creation, Trade Diversion and Total Trade Effects of Tariff Liberalization of Ecuadorian Trade of 20 specialized products with the China, Japan and the US for Simulations Undertaken by Ecuador in in 2010.

Partner Name	Trade Total Effect in 1000 USD	Trade Creation Effect in 1000 USD	Trade Diversion Effect in 1000 USD	Old Simple Duty Rate	New Simple Duty Rate
World	41,659.447	41,659.447	0.000	14.18	7.88
Argentina	-5,516.203	0.000	-5,516.203	9.74	9.74
Bolivia	-484.978	0.000	-484.978	11.24	11.24
Chile	-3,351.370	0.000	-3,351.370	0.84	0.84
Colombia	-2,571.654	0.000	-2,571.654	17.47	17.47
Paraguay	-67.529	0.000	-67.529	5.65	5.65
Peru	-1,720.109	0.000	-1,720.109	17.07	17.07
Uruguay	-17.761	0.000	-17.761	4.48	4.48
Venezuela	-180.280	0.000	-180.280	8.10	8.10
Brazil	-437.420	0.000	-437.420	10.23	10.23
China	9,523.760	7,436.136	2,087.624	16.82	0.00
Japan	323.048	264.813	58.235	17.58	0.00
Belgium	-115.961	0.000	-115.961	16.18	16.18
Germany	-204.064	0.000	-204.064	14.75	14.75
Italy	-121.725	0.000	-121.725	18.47	18.47
India	-41.036	0.000	-41.036	15.76	15.76
Mexico	-280.899	0.000	-280.899	15.18	15.18
Spain	-206.672	0.000	-206.672	16.98	16.98
United States	52,073.213	33,958.497	18,114.715	17.56	0.00

Source: Author´s work in WITS

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The Table XIV shows that the welfare effect is 3031.310 US$, an amount lower when Ecuador liberalized its trade of 20 specialized products with the MERCOSUR. The revenue effect is -27,166.540,1000 US $

Table XIV: Welfare and Tariff Change in Revenue Effects of Liberalization of Ecuadorian Trade in 20 Specialized Products with the China, the Japan and the US in 2010

Revenue Effect in 1000 USD	Trade Total Effect in 1000 USD	Trade Value in 1000 USD	Trade Total Effect in 1000 USD	Welfare in 1000 USD
-27,166.540	41,659.447	3,713,676.641	41,659.447	3,031.310

Source: Author´s work in WITS

The table XV below shows that the consumer surplus is lower when Ecuador liberalizes its trade of 20 specialized products with the MERCOSUR countries.

Table XV: Tariff Change in Revenue and Consumer Surplus Effects of Liberalization of Ecuadorian Trade of 20 Specialized Products with the China, Japan and the US in 2010.

Imports Before in 1000 USD	Import Change	Tariff Revenue in 1000 USD	Tariff New Revenue in 1000 USD	Tariff Change In Revenue in 1000 USD	Consumer Surplus in 1000 USD
3,713,676.641	41.659.447	526,578.830	295,876.426	-230,702.401	4,594.678

Source: Author´s work in WITS

Simulation Three: The table XVI below shows the total trade effect, trade creation and trade diversion effect of liberalizing trade of 20 specialized products with the EU 27 countries in 2010

The maximum gain in terms of total trade effect is for Spain(2724.209,1000 US $),followed by Germany, Belgium ,Italy and Netherlands. Columbia and Chile in Latin American region while the US in North America will be the countries which will have maximum trade diversion.

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Table XVI: Trade Creation, Trade Diversion and Total Trade Effects of Tariff Liberalization of Ecuadorian Trade of 20 specialized products with the EU 27 for Simulations Undertaken by Ecuador in in 2010.

Partner Name	TradeT otal Effect in 1000 USD	Trade Creation Effect in 1000 USD	Trade Diversion Effect in 1000 USD	Old Simple DutyRate	New Simple Duty Rate
World	7,206.532	7,206.532	0.000	14.18	12.35
Argentina	-376.826	0.000	-376.826	9.74	9.74
Austria	298.425	187.878	110.547	16.99	0.00
Belgium	1,584.957	962.403	622.553	16.18	0.00
Brazil	-177.364	0.000	-177.364	10.23	10.23
Canada	-277.069	0.000	-277.069	16.85	16.85
Chile	-880.214	0.000	-880.214	0.84	0.84
China	-309.681	0.000	-309.681	16.82	16.82
Colombia	-876.010	0.000	-876.010	17.47	17.47
Denmark	171.244	66.369	104.874	16.70	0.00
France	869.018	495.032	373.986	14.89	0.00
Germany	1,819.315	1,215.762	603.553	14.75	0.00
Italy	1,549.563	1,010.249	539.314	18.47	0.00
Mexico	-61.756	0.000	-61.756	15.18	15.18
Netherlands	1,160.392	666.897	493.495	12.07	0.00
Peru	-491.587	0.000	-491.587	17.07	17.07
Spain	2,724.209	1,737.373	986.836	16.98	0.00
United Kingdom	519.172	227.380	291.792	14.51	0.00
United States	-661.349	0.000	-661.349	17.56	17.56

Source: author´s work in WITS

Table XVII gives the Welfare, Revenue and Consumer Surplus effects. All figures are lower than when Ecuador liberalized its trade with the China, Japan and the US and MERCOSUR Countries. The maximum gain was when Ecuador liberalized its trade of 20 products with the MERCOSUR.

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Table XVII: Welfare, Revenue and Consumer Surplus Effects of Tariff Liberalization of Ecuadorian Trade of 20 Specialized Products with the EU27 in 2010

Revenue Effect in 1000 USD	Trade Total Effect in 1000 USD	Welfare in 1000 USD	Imports Before in 1000 USD	Import Change	Tariff Revenue in 1000 USD	Tariff New Revenue in 1000 USD	Tariff Change In Revenue in 1000 USD	Consumer Surplus in 1000 USD
-5,358.885	7,206.532	766.643	3,713,676.641	7.206.532	526,578.830	459,372.249	-67,206.578	955.775

Source: author´s work in WITS

We repeat the tariff liberalization impact of liberalizing 238 products (6 digit levels) with all regional groups-MERCOSUR, China, Japan and the US considered as one group and EU27 Countries in 2010. We get the same results when we liberalized trade of 20 products**.** It is beneficial to trade in 238 products (6 digits) with the MERCOSUR trading partners rather than China, Japan and the US or the EU 27. Please see Appendix Tables VII through IX for the results put in the table.

Conclusions from SMART ANALYSIS

In summary It is beneficial to trade in 20 products (2 digit) and 238 products(6 digit) with the MERCOSUR trading partners while for trade in CSG it is better to liberalize trade with the Japan, the US and the China, the main suppliers (exporters)of CSG products.

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III Export Potential and Basis of Trade of Climate Smart Goods and Specialized Products of Ecuador Using Gravity Analysis

III.1 Gravity Analysis

We use the gravity analysis to explain the basis of trade of CSG between Ecuador and countries in MERCOSUR (nine excluding Ecuador), EU27, NAFTA (03 countries), East Asia (11) and India in 2010. We do this regression exercise on cross sectional data for 2010. Gravity Analysis helps us to explain basis of trade of merchandize and services. Gravity model examines the role of tariff barriers, inter country dispersion of income, prices, trade costs, preferential trading arrangements, trade resistance terms, inflations, economic size and endowments, general policy environment and overall infrastructure, distance between trading partner, membership of multilateral agreement, foreign direct investments, common language and borders, common colony, among others on trade of merchandize and services. For Example Gravity Model can explain what is the basis of trade in Climate Smart Goods (64 goods list defined by the UNESCAP). CSG are defined as components, products and technologies which tend to have relatively less adverse impact on the environment. CSGs constitute low carbon technologies such as solar photovoltaic systems, wind power generation, clean coal technologies and energy-efficient lighting.

We use variant of the Baier and Bergstrand (2001) Gravity formulation. The theoretical justification of using the present gravity formulation is given in Appendix Table X. This study uses gravity analysis which explains log of imports as a function of log of sum of GDPs of the trading partner, log of distance(capturing trade cost in the form of transportation cost, maybe language barriers ,common border and common preferential trading arrangement), log of inter-country dispersion(log of si*sj), log of tariffs-weighted applied tariffs log (1+tariffs) and log of prices in reporting(importer country) and log of prices in partner(exporter country)

We consider 62 trading partners in 2010 .

DATA AND DATA REQUIREMENTS FOR GRAVITY ANALYSIS

Import data to and from Ecuador of CSG goods-one category made of the list of 64 goods (under 6 Digit HS Combined) is taken from WITS data base for 2010

GDP data of trading partners is expressed in billions of US dollars and the basic source of data is the IMF, World Economic Outlook (April 2011 edition)

Distance data is taken from the dist_cepii.xls file of CEPII data base(www.cepii.fr)

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Tariff data is applied weighted tariff (%) on CSG goods for each country available from the TRAINS data (within WITS data base)

Inter country dispersion is product of two terms si *sj where si=GDPi/(GDPi+GDPj) and sj=GDPj/(GDPi+GDPj). Si and Sjis constructed from GDP data of trading partners. The product has an inverse relationship with variance of country's share of income in total group income. Variance of country's share of income in total group income is inversely related to volume of trade between countries. Please see appendix Table X for understanding the relationship between volume of trade and inter country dispersion of income.

Prices data of reporter (importer) and partner (exporter) from the GDP deflators available from the World Bank World Development Indicators available at the World Bank website for 2010(Index Numbers)

Hypotheses

- Sum of GDPs (sizes) matter for imports of country. Positive sign is hypothesized
- Distance is negatively related to imports. Greater distance means larger transportation cost, maybe higher language barriers, no common borders and limited access to each other's goods because of limited open regionalism.
- Lower is the inter country dispersion of income (si*sj) higher is the trade between countries (Helpman and Krugman, 1985). See Appendix Table X for understanding the relationship between equality of income and volume of trade.
- Larger are the tariffs, lower will be the imports as tariffs are trade costs

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- Higher prices in reporter country increases imports while lower prices in partner country lowers imports. Higher the price in the exporter's country more is the incentive to supply CSG goods abroad.
- All variables are in logs(natural) so the estimates of parameters will capture elasticity of explanatory variables with respect to imports

Regression Results

Dependent Variable: SER01		log of imports		
Method: Least Squares				
Date: 01/27/12 Time: 02:38				
Sample: 1 62				
Included observations: 62				
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
constant	-1.36185	5.740469	-0.23724	0.8134
lntariffs	-0.06713	0.325049	-0.20652	0.8371
lnsumofGDPs	4.581373	0.814848	5.622365	0
lndistance	-1.60284	0.26348	-6.08335	0
lnsisj	4.025633	0.982838	4.095925	0.0001
lnpriceimporter	1.617518	0.605196	2.67272	0.0099
lnpriceexporter	-1.12037	0.367492	-3.04869	0.0035
R-squared	0.66722	Mean dependent va		5.918755
Adjusted R-squared	0.630917	S.D. dependent var		3.038994
S.E. of regression	1.846256	Akaike info criterion		4.170202
Sum squared resid	187.4764	Schwarz criterion		4.410362
Log likelihood	-122.276	F-statistic		18.37907
Durbin-Watson stat	2.286915	Prob(F-statistic)		0

Source: Eviews is used for regression analysis

All variables explaining imports of Ecuador of CSG to and from its trading partners come with the usual sign except partner countries prices. Maybe CSG goods which have relatively low tariffs are traded at free trade prices and lower prices increases import demand. All are statistically significant (from t values and associated p values) except tariffs. R2 is 0.66 showing a good fit. White consistent standard errors takes care of heteroscedasticity. F test indicates overall importance of all variables taken together.

Standardized beta coefficients (not shown) results show that size of trading partner is the most important explanatory variable explaining trade of Ecuador of CSG with its trading partner. Then comes inter country dispersion of income, followed by distance, followed by reporter(importer) country's prices followed by exporter country's prices and then at the

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last are the tariffs(any way relatively lower for CSG products than what are with respect to total trade of Ecuador or trade of specialized products). Then, why do we need tariff liberalization for CSG goods. Tariff liberalization may lead countries to achieve positive effective protection level if that is in country's interest. Trade in CSG consists mostly of component trade (inputs) to cleaner technologies and thus is also associated with transfer and investment into new technologies. Also, those Latin American countries who have a sufficiently large domestic market to develop cost effective manufacturing capacities at different stages of the supply chain may be more interested in liberalizing imports of certain intermediate products (such as solar cells, silicon ingots, gear boxes, and electronic control equipment). On the other hand, some of the Latin countries including Ecuador may need a certain level of tariff protection to build up local capacities and probably attract some FDI as well. Also, one cannot undermine the role of tariffs as trade of CSG is component trade (components to clean low carbon technologies) and such products cross custom boundaries many times..

Higher incomes a mean larger demand for climate smart components for cleaner technologies (based on knowledge from research on environmental Kuznetz curve). Higher incomes also lead to generation of resources to adopt cleaner technologies often with higher FDI and better infrastructure. However, in many developing countries a number of non technological and economic factors stand in a way for deployment of cleaner technologies. These include insufficient technical knowledge and absorption capacity to produce these innovative technologies locally, insufficient market size to justify local production units and insufficient purchasing power and financial resources to acquire the innovative products (Jha, 2009).

The extended gravity model used in the study (Mathur, 2011) analyzed ESCAP countries trade of CSG with host of countries. The study found a weak positive impact of regional trade agreements, mitigation policy and infrastructure on import of CSGs. Perhaps an inclusion of variables such as carbon taxation and domestic regulations would improve the model's explanatory power. Other possible variables including environmental subsidies, funding of environmental research projects, degree of industrialization, privatization and deregulation of markets, domestic standards and certification requirements, and domestic policies related to IPR, all of which could potentially improve the model. However data on such possibly useful variables are not available for a sufficient number of countries in the region. In addition, from the analysis done by Mathur (2011) it appears that language, domestic regulations, and the level of certifications and standards could play a particularly important role in stimulating trade in CSGs. The analysis also showed that tariffs do not appear to play a huge role in determining trade in CSGs.

III.2 Gravity Analysis: Potential of Trade (Export) for Ecuador in CSG Products in2010

We use the estimated equation of the gravity model to predict the values of imports (log). If the actual imported values of CSG exceed the fitted values, we call it import potential for the importing country or export potential for the Exporting Country. We get the following results. The first column depicts the import potential of the reporter or the importing country (second column) or the export potential of the exporting country (third column and is Ecuador). Positive values mean positive export potential (for exporters-Ecuador) or import potential (for importers). Ecuador seems to have positive export potential for CSG products with respect to Bolivia, Chile, Colombia, Peru and Singapore. The export potential with respect to its four Latin American Partners works out to be 34.84 million US $. There is, however, negative potential for exports of CSG to all its Latin American partners taken together (Argentina, Bolivia, Brazil, Chile, Columbia, Paraguay, Peru and Venezuela of the tune of negative 4.9 million. This is because of high negative potential with respect to Venezuela, Argentina and Brazil. These countries may be are more inclined towards exporting the CSG products to Ecuador rather

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than importing it. SMART analysis had shown that it is more beneficial for Ecuador to liberalize its trade with the China, Japan and the US. Both Ecuador and the trading partners China, Japan and the US gain by such a move. The next table (next section) confirms the same. There is lot of potential gains (for both Exporters and for Ecuador importing the CSG product) if Ecuador liberalizes its trade with the China, Japan, the US and the EU.

-1835.84	Argentina	ecu
487.7235	Bolivia	ecu
-4150.26	Brazil	ecu
-862.018	Canada	ecu
2383.047	Chile	ecu
-438.082	China	ecu
10977.05	Colombia	ecu
-15.03	Hong Kong	ecu
-95.0325	Korea, Rep	ecu
-1573.93	Mexico	ecu
-9.45748	Paraguay	ecu
20942.54	Peru	ecu
94.40047	Singapore	ecu
-2395.8	United Stat	ecu
-78399.1	Venezuela	ecu

Eviews is used for regression analysis

III.3 Gravity Analysis: Export Potential in CSG for Other Countries targeting Ecuador

The export potential for China, Japan and the US works out to be 95 million US $ in CSG. The export potential of the Latin American partners(Columbia, Argentina, Brazil, Paraguay, Uruguay, Chile, Peru, Bolivia and Venezuela) works out to be little more than 13 million US $. This confirms the SMART results earlier that for Ecuador, it is more beneficial for Ecuador to liberalize its CSG trade with the China, Japan, the US and EU27 rather than with MERCOSUR countries. There are more gains for both Ecuador and its trading partners if its liberalizes its trade of CSG with the most efficient suppliers of CSG products, the Japan, the China, EU27 and the US.

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3129.998	ecu	Argentina
57.94174	ecu	Austria
305.8984	ecu	Belgium
25.1797	ecu	Bolivia
14801.86	ecu	Brazil
-12.6218	ecu	Bulgaria
-3734.29	ecu	Canada
2276.634	ecu	Chile
49086.83	ecu	China
-7397.7	ecu	Colombia
-1.05194	ecu	Cyprus
-181.126	ecu	Czech Repu
85.81275	ecu	Denmark
4131.618	ecu	Finland
-1660.14	ecu	France
5637.105	ecu	Germany
-341.035	ecu	Greece
691.6041	ecu	Hong Kong,
-26.2943	ecu	Hungary
295.5748	ecu	India
404.8591	ecu	Indonesia
-402.86	ecu	Ireland
8499.415	ecu	Italy
2646.389	ecu	Japan
852.4722	ecu	Korea, Rep.
2.236048	ecu	Latvia
-2.75789	ecu	Lithuania
-26.3791	ecu	Luxembour
920.0683	ecu	Malaysia
1908.015	ecu	Mexico
250.0459	ecu	Netherland
3.225574	ecu	Paraguay
1.957566	ecu	Peru
-395.719	ecu	Poland
-467.575	ecu	Portugal
211.124	ecu	Romania
1376.677	ecu	Singapore
-38.9377	ecu	Slovak Repu
1.568218	ecu	Slovenia
2596.047	ecu	Spain
1058.544	ecu	Sweden
291.8869	ecu	Thailand
-521.268	ecu	United King
44045.36	ecu	United Stat
182.4031	ecu	Uruguay
2.237917	ecu	Venezuela
-14.105	ecu	Vietnam

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III.4 International and National Policies to Promote Trade of CSG

Keep focusing on increasing growth rates of GDP of all Lower inter country dispersion of income Lower trade costs between countries by having open regionalism policies, reduce transportation costs within and between countries, lower border disputes to have open trade between neighboring countries.

Increase prices for exporters and lower prices of CSG goods in importers country by focusing on having sound competition policies, effective legislations for sound environmental policy(say increasing paper less trade and single window clearance as a starting point, carbon tax and regional emission trading system), appropriate regulatory framework, financial infrastructure and investment climate for production of CSGs, having appropriate standards and labels, mechanism of technology transfer, mechanisms to promote CSG trade among countries by coordination and cooperation and promoting R&D activities for CSG products among countries

III.5 Environmental Sustainability in Ecuador

As regards the international scene in the fields of the environment and sustainable development, Ecuador has ratified the main conventions (Biodiversity, Desertification, and Climate Change) and, in particular, the Kyoto Protocol in 1999. Ecuador has a good background in terms of environmental legislation, strategies and plans, dating back to the beginning of the 1980s. Possibly, this can be the reason of having some positive trade balance for Climate Smart Goods with the Latin American trading partners in 2010(see Table I above). The Environmental issues and policies need to be very high on the agendas of governments. The country faces many other serious threats including intensive deforestation (mainly caused by encroaching agriculture, logging, and exploitation of hydrocarbons); a significant loss of biodiversity, soil and water pollution (mainly due to mining and hydrocarbon extraction); erosion caused by poor agricultural practices in vulnerable areas (leading to erosion and desertification); institutional weakness in ensuring compliance with the legal framework; and a lack of local and national capacity to develop and sustain effective environmental management, both generally and in sensitive areas such as the Amazon and the Galápagos Islands. The challenge is to tackle all these problems on the basis of a land-use planning model that promotes environmental awareness and sustainable development, ensures that disaster risk reduction is incorporated within all activities, secures the rational use of natural resources and, where relevant, protects the rights of indigenous and Afro-Ecuadorean peoples living in the affected areas (European Commission, Ecuador Strategy Paper, 2007). Promoting the CSG goods will be the good strategy for sustainable growth, having safe and secure energy source, directing social spending towards low carbon emanating technologies and promotion of small and medium enterprises for production of CSG goods.

Various national and international policies can be followed by Ecuador and its trading partners to promote trade of CSG goods. Gravity analysis (third objective) reinforces the below points

- Keep focusing on increasing growth rates of GDP of all. Larger sizes promote trade of Climate Smart Goods.
- Lower inter country dispersion of income for promoting trade of CSG among countries
- Lower trade costs between countries by having open regionalism policies, reduce transportation costs within and between countries, lower border disputes to have open trade between neighboring countries.
- Increase prices for exporters and lower prices of CSG goods in importers country by focusing on having sound competition policies, effective legislations for sound environmental policy(say increasing paper less trade and single window clearance as a starting point, carbon tax and regional emission trading system),

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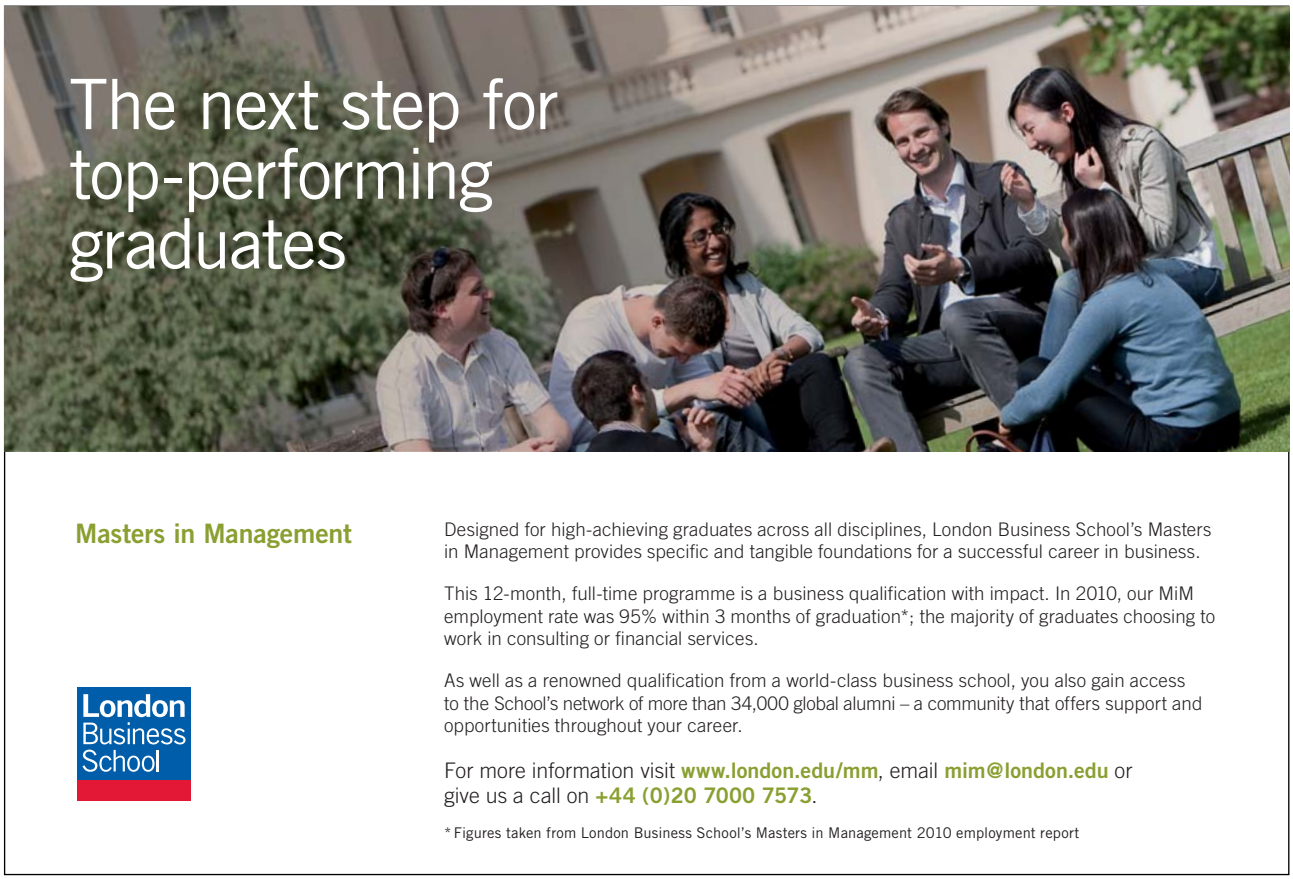
appropriate regulatory framework, financial infrastructure and investment climate for production of CSGs, having appropriate standards and labels, mechanism of technology transfer, mechanisms to promote CSG trade among countries by coordination and cooperation and promoting R&D activities for CSG products among countries

- Lower tariffs by small countries in the American Peninsula for imports of CSG from Ecuador. In particular there is potential to reduce tariffs(Applied duties) by Dijbouti(26%), Belize(15%), Costa Rica(10%), Guaetmala(11.97%), Honduras(9.87%), Nicaragua(12.49%), Cuba(8.99%) and El Salvador(12%).

Following are the potential barriers to production, trade and investment of CSG. Ecuadorian governments need to attend to the following points

- Low level of competition
- Limited foreign ownership
- Inefficient transmission and grid interconnection
- Limited access to local financing
- Inadequate training and skills to produce CSGs
- Weak Intellectual property rights enforcement

Climate change specific policies may include the following for Ecuador. This is adapted from the studies undertaken by UNESCAP (2011, a, b). It will help Ecuador to adapt and acclimatize itself to the CSG environment



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1) Nationally Appropriate Mitigation Actions (NAMA)
   Nationally Appropriate Mitigation Actions (NAMAs) are voluntary emission reduction measures undertaken by countries that are reported by national governments to UNFCCC, and can cover any policy that works towards reducing Green House Gas(GHG) emissions. In principle, this means that NAMAs also cover carbon-friendly trade and investment policies. Apart from the policies discussed in this study, NAMAs cover a wide range of policy areas, including sectoral policies. NAMAs involve improvements of land, soil and water management The idea is that some policies that are effective in some countries may not be effective in others, so the countries themselves should be able to design their own mitigation strategies. Whatever strategy a country chooses, it must conform to international trade rules if they affect trade. NAMAs ensure that mitigation actions undertaken at the national level are recognized internationally and that they will bolster the demand for CSGTs, particularly in renewables. However, it is important to have a proper monitoring, evaluation and verification process in place with clear objective indicators and measurements to ensure that NAMAs are actually implemented

2) National Adaptation Programmes of Action (NAPA)
   NAPAs can take many forms, including awareness creating campaigns, the construction of flood shelters and flood protection systems (dams, dykes etc.), research and development of drought and saline tolerant crops, evacuation of coastal areas and retraining facilities. Many such actions require substantive amounts of investment and thus offer investment opportunities.

3) Environmental policy (environmental standards, carbon taxes should be designed carefully so that national and international companies get affected in the same manner, cap-and-trade schemes for greenhouse gas reductions, also know as Emission Trading Schemes)

   Emission Trading Schemes or Systems (ETS) at the national, regional or multilateral level, i.e. CDM under the Kyoto Protocol, set an aggregate limit on the amount of GHGs that may be emitted annually by certain capped sources. Subject to the overall limit, capped sources may buy and sell permits for the right to emit GHGs.

4) Industrial policy (including energy efficiency standards)
   Energy efficiency labels are informative labels attached to manufactured products to describe the product's energy performance (usually in the form of energy use, efficiency or energy cost). These labels give consumers the data necessary to make informed purchases, and to promote the trade and purchase of CSGs and other green products. Carbon standards are an important tool for informing consumers of the carbon footprint of a particular product as well as for indirectly encouraging domestic demand for, and production of products on the basis of RE

5) Public procurement of energy efficient products
   Sustainable public procurement is a tool that allows governments to leverage public spending in order to promote the country's social, environmental and economic policies. It provides governments with a powerful tool to influence the way in which businesses operate through purchasing decisions. Government procurement often involves large sums, with regard to investment projects and in the procurement of goods and services for consumption. More importantly, it includes the procurement of key infrastructure, such as power- and

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transport-related infrastructure as well as public buildings, i.e. the type of investments that will have an impact on GHG emission levels for many years to come.

By applying clear sustainability criteria in purchasing and investment decisions, governments can provide a major driving force for lowering emissions. First, this will help to ensure that public investments are low-emitting and use low GHG-emitting input materials. Second, in so doing, this will stimulate the market for environmental goods and services, thus stimulating innovation and increasing the competitiveness of such goods and services, both locally and globally. By actually encouraging green procurement practices in government activities, new markets for indigenous green products and services can be developed

6) Energy policy (e.g. requirements of renewable/low-carbon energy shares in energy mix of utilities, feed-in tariffs, subsidies and incentives for low-carbon investments). Policies to be in consonance with the WTO provisions

7) Technology policy (related to generation, dissemination and diffusion of chronology policy (related generation, low-carbon know-how)

8) Trade policy adjustments for low-carbon activities (e.g. tariff reductions for capital goods/inputs for low-carbon activities, tariff policy of the home country with respect to potential host countries – for export activities of Multinational Companies)

9) Incentives for manufacturers of low carbon goods and/or providers of energy efficiency or process improvement services (e.g. tax benefits, subsidies concessionary loans, export guarantee insurance). Policies to be in consonance with the WTO provisions

10) Reducing Emissions from Deforestation and Forest Degradation

Closely related to cap-and-trade systems is the reducing emissions from deforestation and forest degradation (REDD) mechanism, which uses market/financial incentives to reduce GHG emissions from deforestation and forest degradation. Such actions offset carbon emissions and contribute to carbon credits. Actions involve reforestation and afforestation. REDD"+" adds to these actions in order to include the possibility of offsetting emissions through sustainable forest management, conservation and increasing forest carbon stocks. REDD and REDD+ are important for business as such actions contribute to sustainable business practices, ensuring sustained long-term supplies of forest-based raw materials for a variety of industries (e.g. furniture, and pulp and paper), and the preservation of forests with added benefits such as conservation of bio-diversity. Actions involving REDD are important NAMAs and are potentially an important carbon offset credit under cap-and-trading schemes. Forest-rich countries stand to potentially benefit from REDD projects. Apart from REDD, specific sectoral policies can be designed to mitigate GHG emissions. In various energy-intensive sectors, binding emission reduction targets need to be imposed in combination with emission crediting schemes. In the agricultural sector, land, livestock and waste management needs to be improved while increased attention should be paid to the development of drought or flood-resistant crops. In summary, this policy will include

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- Creating a financial value for the carbon stored in standing forests;
- Industrialized countries to make financial transfers to developing countries like Ecuador to compensate them for avoiding deforestation.

11) Legal framework and compliance mechanisms for climate change mitigation and adaptation

This is required for the effective implementation of all NAMAs and NAPAs and any other policy outlined above. A comprehensive "green growth" legislative framework would also ensure the coordination, consistency and coherence among all policies and ensure environmentally sustainable and climate-smart economic growth.

12) Strengthening supply-side capacities of small and medium-sized enterprises to produce and use CSGs.

13) Strengthen public-private partnerships and promote adoption and implementation of the principles of corporate social responsibility

14) When negotiating trade agreements, ensure broad coverage of CSGs and climate-smart services as well as deep commitments (ideally zero tariffs with generous rules of origin and verifiable NTBs such as standards)

15) Avoid Non tariff Barriers (NTBs) such as local content requirements, which also discourage investment and may violate the WTO Trade-Related Investment Measures (TRIMS) Agreement, and ensure that others (such as standards, taxes and subsidies) are applied in a non-discriminatory manner (national treatment).

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16) Keep Regional Trade Agreements (RTAs) open to new members in order to avoid trade diversion. Liberalization of CSGs has more impact with wider membership. Regional cooperation can be in the form of establishment of regional emission trading schemes, regional investment collaboration, regional harmonization of climate smart standards and labels, regional financing schemes, regional cooperation in development of climate smart technologies and technical assistance.

17) Promote exports of CSGs through environmental regulations and incentives while avoiding restrictive trade practices, including Border Carbon Adjustments (BCAs), which may violate WTO rules or otherwise constitute distortions of international trade

18) Apart from subsidies there are other financial instruments for supporting the production and development of CSGs. Many of those instruments have close links to subsidies or are themselves subsidies in disguise. In particular, development banks can provide soft loans for such purposes, refinanced by governments. Such loans offer flexible or lenient terms for repayment, usually at lower than market interest rates. In particular, such loans could be channelled to SMEs to raise their capacity to adopt green practices (e.g. acquire or develop CSTs). For example, the India Renewable Energy Development Agency provides loans for clean energy projects while government low interest loans have assisted in the development of the PV industry in the Republic of Korea. Green bonds are tax-exempt bonds that are issued by qualified central or local government agencies for the development of environmentally-friendly projects. A related concept is climate bonds, which are bonds issued by a government or corporate entity in order to raise finance for climate change mitigation or adaptation-related programmes or projects. All funds raised from such bonds will only go to climate-related programmes or assets, such as Renewable Energy plants or climate mitigation focused funding programmes. Various provisions in the tax code could be made to allow suitable tax breaks for enterprises or adopt relaxed tax calculation methods based on the equipment and technologies (and their depreciation) used by enterprises. Tax breaks could be given to enterprises that undertake R&D in CSGs or development of CSGs, and/or enterprises that are actually already producing such goods and climate-smart services. Such measures are normally associated with the promotion of investment .In the absence of an internationally agreed-defined list of CSGs and climate-smart services, countries could adopt their own lists for tax purposes. Another end-user type of innovative financing mechanism is dealer-credit financing where the Renewable Energy provider obtains a loan from a financial institution, either national or international, which is then converted into a loan to consumers so that they can purchase the appropriate Renewable Energy Technology. Additional financial instruments include risk-sharing instruments such as catastrophe bonds, weather derivatives, mutual funds and micro-insurance index-based schemes through partnerships involving the private sector.

19) SThe Government can help improve the CSG production, trade and investment by adopting the following policies

a) Start Incubation programmes for small and medium enterprises interested in developing CSGs.
b) Link Multinationals with domestic enterprises to transfer technology for producing CSGs
c) Apprise and inform all on standards for motor vehicles;buildings,etc, labels and rules and regulations for producing and importing CSGs
d) Improve access to finance, strengthen IPR climate, strengthen domestic R&D and national innovation system, hone human resource and skills and promote public and private partnerships for the production of CSGs

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e) Low cost loans for developing new CSG products
f) Leverage the power of institutional investors such as pension funds, insurance companies and sovereign wealth funds towards CSG production and R&D
g) Provide infrastructure support such as special economic zones for facilitating production of CSGs
h) Provide corruption free bureaucracy and enabling regulatory framework where in disputes can be settled
i) Liberalize and deregulate energy markets

III.6 Gravity Analysis For Trade Of 20 Specialized Products Of Ecuador

We use the gravity analysis to explain the basis of trade of 20 specialized products between Ecuador and countries in MERCOSUR (nine excluding Ecuador), EU27, NAFTA (03 countries), East Asia (11) and India. We do this regression exercise on cross sectional data for 2010. Gravity Analysis helps us to explain basis of trade of merchandize and services. Gravity model examines the role of tariff barriers, inter country dispersion of income, prices, trade costs, preferential trading arrangements, trade resistance terms, inflations, economic size and endowments, general policy environment and overall infrastructure, distance between trading partner, membership of multilateral agreement, foreign direct investments, common language and borders, common colony, among others on trade of merchandize and services.

As before we use variant of the Baier and Bergstrand (2001) Gravity formulation. This study uses gravity analysis which explains log of imports as a function of log of sum of GDPs of the trading partner, log of distance(capturing trade cost in the form of transportation cost, maybe language barriers ,common border and common preferential trading arrangement), log of inter-country dispersion(log of si*sj), log of tariffs-weighted applied tariffslog (1+tariffs) and log of prices in reporting(importer country) and log of prices in partner(exporter country)

We consider 65 trading partners in 2010.

Import data to and from Ecuador of 20 specialized goods-one category is taken from WITS data base for 2010

Data And Data Requirements For Gravity Analysis

GDP data of trading partners is expressed in billions of US dollars and the basic source of data is the IMF, World Economic Outlook (April 2011 edition)

Distance data is taken from the dist_cepii.xls file of CEPII data base (www.cepii.fr)

Tariff data is applied weighted tariff (%) for each country is available from the TRAINS data (within WITS data base)

Intercountry dispersion is product of two terms si *sj where si=GDPi/(GDPi+GDPj) and sj=GDPj/(GDPi+GDPj). Si and Sjis constructed from GDP data of trading partners. The product has an inverse relationship with variance of country's share of income in total group income. Variance of country's share of income in total group income is inversely related to volume of trade between countries. Please see appendix Table VII for understanding the relationship between volume of trade and inter country dispersion of income.

Prices data of reporter (importer) and partner (exporter) from the GDP deflators available from the World Bank World Development Indicators available at the World Bank website for 2010(Index Numbers)

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- **Hypotheses**Sum of GDPs (sizes) matter for imports of country. Positive sign is hypothesized
- Distance is negatively related to imports. Greater distance means larger transportation cost, maybe higher language barriers, no common borders and limited access to each other's goods because of limited open regionalism.
- Lower is the inter country dispersion of income(si*sj) higher is the trade between countries (Helpman and Krugman,1985)
- Larger are the tariffs, lower will be the imports as tariffs are trade costs
- Higher prices in reporter country increases imports while lower prices in partner country lowers imports. Higher the price in the exporter's country more is the incentive to supply CSG goods abroad.
- All variables are in logs(natural) so the estimates of parameters will capture elasticity of explanatory variables with respect to imports

Regression Results

	Dependent Variable: SER01				
	Method: Least Squares				
	Date: 01/31/12 Time: 08:23				
	Sample: 1 65				
	Included observations: 65				
	White Heteroskedasticity-Consistent Standard Errors & C				
	Variable	Coefficient	Std. Error	t-Statistic	Prob.
	C	9.352303	7.175336	1.303396	0.1976
tariffs	SER02	-1.00856	0.275368	-3.66258	0.0005
distance	SER03	-2.04551	0.190326	-10.7474	0
intercountrydispersion	SER04	1.071621	0.857488	1.249722	0.2164
sumgdps	SER05	2.154259	0.729975	2.95114	0.0046
priceimorter	SER06	0.222428	0.482644	0.460853	0.6466
priceexporter	SER07	1.391106	0.818167	1.700272	0.0944
	R-squared	0.745147	Mean dependent va		8.360802
	Adjusted R	0.718783	S.D. dependent var		3.284182
	S.E. of regr	1.741599	Akaike info criterion		4.048925
	Sum squar	175.9238	Schwarz criterion		4.28309
	Log likelihc	-124.59	F-statistic		28.26366
	Durbin-Wa	2.41406	Prob(F-statistic)		0

All variables come with the right signs. R2 is 0.74. 74% of the variability in the dependent variable (log of imports) can be explained by variability in the explanatory variables. White consistent standard errors take care of Heteroscedasticity. Size of trading partners, distance and tariffs (both have negative impact) matter (statistically) for imports of specialized products to and from Ecuador from MERCOSUR, EU27, EAST ASIA, NAFTA countries and India in 2010. Inter country dispersion of income and prices are not important for trade of 20 specialized products. Unlike trade in CSG, reduction in tariffs are important for movement of Ecuadorian goods across countries

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Distance matters for imports of specialized products because Latin American countries trade more among themselves because of one common language, common market MERCOSUR and custom union the Andean region and because of lower transportation cost

III.7 Export Potential of Ecuador to Some Selected Countries: Gravity Analysis

We use the estimated equation of the gravity model to predict the values of imports (log). If the actual imported values of specialized products exceed the fitted values, we call it import potential for the importing country or export potential for the Exporting Country. We get the following results. The first column depicts the import potential of the reporter or the importing country (second column) or the export potential of the exporting country (third column and is Ecuador). Positive values mean positive export potential (for exporters-Ecuador) or import potential (for importers).

290040.1	Venezuela	ecu
-4759.89	Argentina	ecu
-709.13	Bolivia	ecu
-819955	Brazil	ecu
36633.4	Canada	ecu
799241.2	Chile	ecu
345205.7	China	ecu
-222946	Colombia	ecu
4455.463	Hong Kong	ecu
261.5587	Indonesia	ecu
130585.4	Japan	ecu
1504.165	Korea, Rep	ecu
-23582.9	Mexico	ecu
-1124.93	Paraguay	ecu
487399.3	Peru	ecu
-1493.3	Singapore	ecu
1370.239	Vietnam	ecu
923086.6	United Stat	ecu
-564.786	Uruguay	ecu

Ecuador has positive export potential in providing these specialized products to Venezuela, Peru and Chile. These together add up to 1576.668 million US$ in 2010. The export potential to the US is worth 923 million US $ in 2010

We work out the Export Potential for 20 Specialized Products of Other Countries into Ecuador in 2010 using Gravity Analysis

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180570.3	ecu	Argentina
99.78049	ecu	Austria
3068.556	ecu	Belgium
66681.59	ecu	Bolivia
-50628.4	ecu	Brazil
-17.9234	ecu	Bulgaria
2826.779	ecu	Canada
92744.8	ecu	Chile
35029.64	ecu	China
31974.83	ecu	Colombia
1817.811	ecu	Cyprus
-157.46	ecu	Czech Repu
122.4923	ecu	Denmark
-227.039	ecu	Estonia
-207.343	ecu	Finland
-6676.82	ecu	France
-1827.26	ecu	Germany
-39.4012	ecu	Greece
239.037	ecu	Hong Kong,
643.3756	ecu	India
-462.804	ecu	Indonesia
55.46467	ecu	Ireland
628.5142	ecu	Italy
-4298.49	ecu	Japan
100.7447	ecu	Korea, Rep.
-530.895	ecu	Lithuania
27.55283	ecu	Luxembour
174.1041	ecu	Malaysia
-22028	ecu	Mexico
13692.75	ecu	Netherland
20531.03	ecu	Paraguay
163806.5	ecu	Peru
285.4557	ecu	Poland
2648.288	ecu	Portugal
-136.186	ecu	Romania
345.896	ecu	Singapore
-109.84	ecu	Slovak Repu
5187.999	ecu	Vietnam
-227.525	ecu	Slovenia
4967.741	ecu	Spain
-1049.65	ecu	Sweden
500.1947	ecu	Thailand
-3280.85	ecu	United King
-12044.4	ecu	United Stat
92.29361	ecu	Uruguay
-4134093	ecu	Venezuela

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Argentina, Peru and Columbia, among other Latin American countries have lot of potential in trading of such products with Ecuador. SMART analysis confirms that liberalizing imports with respect to MERCOSUR countries will bring more overall gain to Ecuador.

III.8 Other Benefits of being Part of an Economic Agreement

The above analysis covers more technical aspects of an economic agreement. SMART analysis, in particular, gives numbers for evaluating the benefits of an economic agreement. The other benefits of having a preferential trading arrangement is to discuss the following

- Discuss energy and security issues
- Infrastructure Development including IT and Telecommunications and advent of some new air, road and rail links for increasing connectivity
- Services and Investment Liberalization measures
- Harmonizing regulatory standards relating to customs, accounting, educational services including professional activity
- Measures to tackle Climate Change, Disaster Management
- Tackle issues of Women Empowerment, Child Care
- Information Technology Enabled Services like Telemedicine and Tele-education
- Solar Rural Electrification, seed testing and rain water harvesting
- Dealing with financial crisis
- Water Scarcity
- Discuss ways and means to increase human capital and tackle inequality and poverty

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Limitations of the Study

There are several challenges related to the Harmonized Commodity Coding and Description (HS) system makes it tricky to:

- Isolate 'climate-friendly' products from others for easier trade liberalization. 'Dual-use' categories include environmental and non-environmental products. E.g. *Efficient supercritical and ultra-supercritical boilers (and turbines) cannot be easily tracked because there is no suitable HS code differentiation for boilers (and turbines) by temperature and pressure*.
- Deal with intrinsically 'dual-use' products such as pipes and valves.
- it is difficult to distinguish between traditional coal and "clean" coal technologies at the HS 6-digit level, a fair amount of the trade analyzed here may in fact still be traditional "dirty" coal technologies. Further examination at a more disaggregated HS level and of regional industry trade trends is needed for a more accurate evaluation.

Future Research

It will be interesting to find the intensity of carbon emissions of the specialized products of Ecuador at both 2 digits and at 6 digit level of disaggregation. They are probably lower than the EU27, US, China, India and Brazil. Also, emission intensity indices of exports and imports can also be worked out. The values of these indices range from 0 to infinite but the important benchmark is a value equal to 1. For example, if the emission intensity index of imports is larger than 1, emissions embodied in goods produced overseas and transported to a destination are larger than the emissions that would have been caused by local production in that destination of the same amount of goods. In other words, from a climate change perspective, it would have been less damaging to produce these goods locally than to import them. In the opposite case, when the index is less than 1, the environment is less damaged by trade than when no trade takes place. The index value of 1 indicates that emissions associated with imports of goods are the same as those associated with local production replacing trade.

Summary and Policy Conclusions

According to the International Panel on Climate Change (IPCC) there is compelling evidence that GHG emissions cause climate change and that most GHG emissions are due to anthropogenic factors. The changes in climate foreseen towards the end of this century involve a gradual warming of the planet, with a temperature increase ranging from 1.1°C to 6.4°C above pre-industrial levels during the twenty-first century. Therefore, there appears to be a certain urgency to initiate actions to curb global GHG emissions and drastically reduce the unsustainable use of so-called carbon sinks, such as the world's forests and oceans, in order to prevent global temperatures from rising by more than 2°C, which is the rate at which climate change can still be managed. This study details various policies including trade and investment policies in Climate Smart Goods(CSGs) to limit climate change.

Climate Smart Goods are defined as broadly as products, components and technologies that tend to have less adverse impact on climate change (greenhouse gas emissions[10]) and environment in general. The study considers a 64 goods list of CSG floated by the UNESCAP- APTIR (2011), basically constituting low carbon emanating industries. Access to CSG is very

10 **Greenhouse gas** - a gas that "traps" infrared radiation in the lower atmosphere causing surface warming; water vapor, carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, and ozone are the primary greenhouse gases in the Earth's atmosphere.

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important for implementation of various strategies of technological transformation deemed necessary to mitigate climate change. For example, CSGs consists of articles of iron and steel and aluminum, machinery and mechanical appliances, electrical machinery equipment, ships, boats and floating structures, glass and glass ware articles, among others. One of the subcategories of CSG clean coal technology aims to improve energy efficiency and reduce environmental impacts, including technologies of coal extraction, coal preparation and coal utilization. Wind technology another sub category of CGS focuses on wind energy generation and is composed of three integral components: the gear box, coupling and wind turbine. Wind power and turbine production has experienced stupendous growth over recent years and is now one of the most widespread forms of climate smart technologies. As the region will have to come to terms with the expected effects of climate change, there is a collective need to increase trade and investment in these goods, which would benefit companies in different parts of the supply chain, and, hence all countries, no matter what their stage of development.

The interest in the subject of Trade in Climate Smart Goods was fuelled by Ecuador's positive trade balance with the rest of the Andean Community and MERCOSUR region in 2010. This may be a reflection of Ecuador's maturity in dealing with environmental issues since the early 1980s. It may be also due to preferential trade policies followed upon by member nations of the ANDEAN region. Or, the above trend can be just a consequence of their fast export growth. One, however, would like to establish with more certainty the association of various policies that have been put in place to help mitigate climate change and trade pattern changes. The study looks closely at the trade indices, worked out for Ecuador's total trade, CSG trade and specialized products and uses gravity analysis which helps in finding the export potential for trade in CSG and other products. As Ecuador in the Latin American region probably continues to design policies more conducive to fostering climate smart development, their domestic capacity to meet the increased domestic demand for climate smart goods and services, and then foreign demand through exports, is likely to increase. Depending on the relative strengths of the incentives between those in the region and outside, trade flows and patterns of the region is being affected possibly by reorienting the Ecuadorian trade more towards the intra-regional focus and hence the positive trade balance with the ANDEAN and MERCOSUR region. Whatever may be the exact reason, one thing which surely comes out of the study (SMART analysis) is that for Ecuador it will be better to liberalize CSG trade with the leading suppliers of the CSG goods, the China, Japan and the US.

In particular, Ecuador had a comparative advantage in the production of two Industry codes out of 64 goods list (based on RCA analysis). These industries are

732111

Solar driven stoves, ranges, grates, cookers (including those with subsidiary boilers for central heating), barbecues, braziers, gas-rings, plate warmers and similar non-electric domestic appliances, and parts thereof, of iron or steel.

732190

Stoves, ranges, grates, cookers (including those with subsidiary boilers for central heating), barbecues, braziers, gas-rings, plate warmers and similar non-electric domestic appliances, and parts thereof, of iron or steel.

These industries have potential for greater trade and inward foreign direct investment. The study identifies the markets for the same using the Export Specialization Index. These are Chile, Columbia and Peru. Gravity analysis helps us to work out

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the export potential of Ecuador for 64 goods list of CSG. The export potential of Ecuador to four Latin American –Bolivia, Chile, Columbia and Peru is 34.79 million US$. However, the greater potential lies with the other countries marketing the CSG goods in Ecuador. These countries include the most efficient suppliers of CSG goods, the China, Japan and the US.SMART results confirm that Ecuador will gain more(in terms of total trade effect, welfare and consumer surplus effects) by liberalizing its imports of Climate Smart Goods with the China, Japan and the US instead of MERCOSUR or EU27 countries.

Trade in CSG will help Ecuador to promote alternative industries in the face of Global Economic Downturn. Also, it will help country to look for safe, alternative and reliable energy source rather than believing in trade of crude and Petroleum Oil only or investing a great deal in nuclear energy. Nuclear energy was in the brink of being affected in Japan due to recent Earthquake in Japan. Ecuador can direct its social spending in promoting small industries which can provide CSG goods at low cost. Countries can gain in terms of their comparative advantage and establish new industries. Positions keep changing in terms of the advantage of producing goods and services. Based on our analysis and review of studies done on CSG (APTIR, 2011, ICSTD, WTO and World Bank) one may conclude that various national and international policies can be followed by Ecuador and its trading partners to promote trade of CSG goods. Gravity analysis (third objective) reinforces the below points

- Keep focusing on increasing growth rates of GDP of all. Larger size promotes trade of Climate Smart Goods.
- Lower inter country dispersion of income for promoting trade of CSG among countries
- Lower trade costs between countries by having open regionalism policies, reduce transportation costs within and between countries, lower border disputes to have open trade between neighboring countries.

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- Increase prices for exporters and lower prices of CSG goods in importers country by focusing on having sound competition policies, effective legislations for sound environmental policy(say increasing paper less trade and single window clearance as a starting point, carbon tax and regional emission trading system), appropriate regulatory framework, financial infrastructure and investment climate for production of CSGs, employ feed in tariffs for promoting CSGs, have appropriate standards and labels, mechanism of technology transfer, mechanisms to promote CSG trade among countries by coordination and cooperation and promoting R&D activities for CSG products among countries
- Lower tariffs by small countries in the American Peninsula for imports of CSG from Ecuador. In particular there is potential to reduce tariifs(Applied duties) by Dijbouti(26%), Belize(15%), Costa Rica(10%), Guaetmala(11.97%), Honduras(9.87%), Nicaragua(12.49%), Cuba(8.99%) and El Salvador(12%)

Countries including Ecuador need to design sustainable and climate smart growth that entails sharply reduced GHG emissions to a level of 450 ppm(or may be lower) and that limits the global temperature rise to not more than 2 degrees Celsius by the end of the century. The stud lists such policies and is not confined to trade policies alone. Trade policies related to CSG though are the main focus of this study. The entire set of policies which can reduce GHG emissions and limit climate change can be structured into regulatory measures(including regulations, standards and labeling), economic incentives(including taxes, tradable permits and subsidies conforming to WTO laws and provisions), trade and investment policies and financial, energy and enterprise development policies, among others.

Regional climate-smart value chains could provide new opportunities for many less developed economies in the region to become parts and components suppliers to the leading CSG exporters in Latin American Region and other regions. At the same time, the capacity of domestic SMEs in the area of CSGs should be enhanced so that they can evolve into suppliers of low-carbon products and become effectively integrated with low-carbon value chains.

The study is also able to identify some specialized industries and identify markets for the two digit and 6 digit industries for Ecuador using RCA and Export Specialization index. There are 20 such products at the two digit level and 238 products/ industrial codes at 6 digit level disaggregation in 2010 were in Ecuador has a comparative advantage in production. These industrial sectors are potential for inviting FDI into Ecuador.

Export specialization and HH indices indicate the more concentrated nature of Ecuadorian production and trade structure. Ecuador needs to rethink its trade policy by diversifying its trade into manufactured products and more diversified production structure. Information Technology services, Tourism, Manufacturing of Automobiles, Education and Training Services, Bio combustibles, Housing materials, Pharmaceutical industries, Health Products and Hospital services, Hardware production, Industrial and Textile Goods and Chemicals are some areas where Ecuador can think of developing niche and cater to European markets. Production and Trade in Climate Smart Goods is another area of focus. In particular, study identifies the following industries for further diversifying industrial structure of Ecuador for its gain in future. These are Industrial Codes- 61(Articles of apparel and clothing accessories, knitted or crocheted), 62(Articles of apparel and clothing accessories, not knitted or crocheted),42(Articles of leather; saddlery and harness; travel goods, handbags and similar containers; articles of animal), 90(Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof), 84(Electronic appliances), 85(Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles),87 (Vehicles other than railway or tramway rolling-

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stock, and parts and accessories thereof), 83 (Miscellaneous articles of base metal), 73 (Articles of iron or Steel), 69 (Ceramic products), 30 (Pharmaceutical products),29(Organic chemicals), Climate Smart Goods- 840510(Clean Coal Technologies), 850720,853710 and 854140(Solar Photovoltaic systems), 848340 and 848360(Wind Power Technologies), 853931(Energy Efficient Lighting), among others. In services sector, Tourism, IT and ITES, Hospital services, Education and Training Services(training of English), Cultural Services, Knowledge Processing Outsourcing and Financial Analytics, Infrastructure services have lot of potential of bring the necessary foreign exchange and stability into the system .Ecuador need to diversify into the following industries and services for higher and more stable export earnings, job creation and learning effects, and the development of new skills and infrastructure that would facilitate the development of even newer export products.

Gravity Analysis has been used in this study the basis of trade of CSG goods of Ecuador and Trade of 20 specialized products in 2010. Further, the variant of the Baier and Bergstrand (2001) gravity model has been used to work out the export potential of CSG and specialized products to and from Ecuador. The theoretical justification of extending the most simple Gravity model, as used in this study, is done using extensions of work done by Helpman and Krugman (1985). Appendix Table X gives the note linking less dispersion of income with volume of trade.

SMART analysis on trade liberalization shows that it is beneficial to trade in 20(2digit level) and 238 products (at 6 digit level) with the MERCOSUR trading partners while for trade in CSG it is better to liberalize trade with the Japan, the US and the China, the main suppliers (exporters) of CSG products rather than EU 27 and MERCOSUR Countries in 2010.

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Abbreviations and Acronyms

APEC Asia-Pacific Economic Cooperation
APTIR Asia-Pacific Trade and Investment Report
BCA border carbon adjustment
CDM clean development mechanism
CFL compact fluorescent lamp
CH4 methane
CO2 carbon dioxide
CSGTs climate-smart goods and technologies
CSR corporate social responsibility
CSTs climate-smart technologies
EGS environmental goods and services
ESCAP Economic and Social Commission for Asia and the Pacific
FDI foreign direct investment
FiT feed-in-tariff
FTA free trade agreement
GATT General Agreement on Tariffs and Trade
GDP gross domestic product
GHG greenhouse gas
IMF International Monetary Fund
IPCC Intergovernmental Panel on Climate Change
IPR intellectual property rights
LDCs least developed countries
N2O nitrous oxide
NAMAs Nationally Appropriate Mitigation Actions
NAPAs National Adaptation Programmes of Action
NGOs non-governmental organizations
NTBs non-tariff barriers
OECD Organisation for Economic Co-operation and Development
PPM Parts per million
PFC Perfluorocarbons
PV Photovoltaic
R&D Research and Development
RCA Revealed Comparative Advantage
CBT Convention on Biological Diversity
EGS Environmental Goods and Services
WTO World Trade Organization
FDI Foreign Direct Investment
UNESCAP United Nations Economic and Social Commission for Asia and the Pacific

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ESCAP Economic and Social Commission for Asia and the Pacific
IPR Intellectual Property Rights
UNFCCC United Nations Framework Convention on Climate Change
RE Renewable Energy
CGS Climate Smart Goods
CST Climate Smart Technologies
GDP Gross Domestic Product
WIT's World Integrated Trade Solution
CSG Climate Smart Goods
RCA Revealed Comparative Advantage
SMART Single Market Partial Equilibrium Simulation Tool

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Data Base: Trade and Tariff Data will come from the WITS data base. SMART analysis is in WITS. The url is http://wits.worldbank.org/wits/

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Appendix

Table I: Climate Smart Goods

1	380210	Activated carbon
2	392690	Articles of plastics & arts. ofoth. mats. of 39.01-39.14, n.e.s. in Ch.39
3	392010	PVC or polyethylene plastic membrane systems to provide an impermeable base for landfill sites and protect soil under gas stations, oil refineries, etc. from infiltration bypollutants and for reinforcement of soil.
4	560314	Nonwovens, whether or not impregnated, coated, covered or laminated: of manmade filaments; weighing more than 150 g/m2 for filtering wastewater.
5	701931	Thin sheets (voiles), webs, mats, mattresses, boards, and similar nonwoven products.
6	730820	Towers and lattice masts for wind turbine.
7	730900	Containers of any material, of any form, for liquid or solid waste, including formunicipal Ordangerouswaste.
8	732111	Solar driven stoves, ranges, grates, cookers (including those with subsidiary boilers for central heating), barbecues, braziers, gas-rings, plate warmers and similar non-electricdomestic appliances, and parts thereof, of iron or steel.
9	732190	Stoves, ranges, grates, cookers (including those with subsidiary boilers for centralheating), barbecues, braziers, gas-rings, plate warmers and similar non-electric domestic appliances, and parts thereof, of iron or steel.
10	732490	Watersavingshower.
11	761100	Aluminum reservoirs, tanks, vats and similar containers for any material (specificallytanks or vats for anaerobic digesters for biomass gasification).
12	761290	Containers of any material, of any form, for liquid or solid waste, including formunicipal Ordangerouswaste.
13	840219	Vapor generating boilers, not elsewhere specified or included hybrid.
14	840290	Super-heated water boilers and parts of steam generating boilers.
15	840410	Auxiliary plant for steam, water, and central boiler.
16	840490	Parts for auxiliary plant for boilers, condensers for steam, vapor power unit.
17	840510	Producer gas or water gas generators, with or without purifiers.
18	840681	Turbines, steam and other vapor, over 40 MW, not elsewhere specified or included.
19	841011	Hydraulic turbines and water wheels of a power not exceeding 1,000 kW.
20	841090	Hydraulic turbines and water wheels; parts, including regulators.
21	841181	Gas turbines of a power not exceeding 5,000 kW.
22	841182	Gas turbines of a power exceeding 5,000 kW.

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23	841581	Compression type refrigerating, freezing equipment incorporating a valve for reversalof cooling/heating cycles (reverse heat pumps).
24	841861	Compression type refrigerating, freezing equipment incorporating a valve for reversalof cooling/heating cycles (reverse heat pumps).
25	841869	Compression type refrigerating, freezing equipment incorporating a valve for reversalof cooling/heating cycles (reverse heat pumps).
26	841919	Solar boiler (waterheater).
27	841940	Distillingorrectifyingplant.
28	841950	Solar collector and solar system controller, heat exchanger.
29	841989	Machinery, plant or laboratory equipment whether or not electrically heated (excluding furnaces, ovens etc.) for treatment of materials by a process involving a change oftemperature.
30	841990	Medical, surgical or laboratory stabilizers.
31	848340	Gears and gearing and other speed changers (specifically for wind turbines).
32	848360	Clutches and universal joints (specifically for wind turbines).
33	850161	AC generators not exceeding 75 kVA (specifically for all electricity generating renewableenergyplants).
34	850162	AC generators exceeding 75 kVA but not 375 kVA (specifically for all electricitygeneratingrenewableenergyplants).
35	850163	AC generators not exceeding 375 kVA but not 750 kVA (specifically for all electricity generatingrenewableenergyplants).
36	850164	AC generators exceeding 750 kVA (specifically for all electricity generating renewableenergyplants).
37	850231	Electric generating sets and rotary converters; wind-powered.
38	850680	Fuel cells use hydrogen or hydrogen-containing fuels such as methane to produce an electric current, through an electrochemical process rather than combustion.
39	850720	Other lead acidaccumulators.
40	853710	Photovoltaicsystemcontroller.
41	853931	Dischargelamps, (ex ultraviolet), fluorescent.
42	854140	Photosensitive semiconductor devices, including photovoltaic cells whether or notassembled in modules or made up into panels; light-emitting diodes.
43	900190	Mirrors of other than glass (specifically for solar concentrator systems).
44	900290	Mirrors of glass (specifically for solar concentrator systems).
45	903210	Thermostats.
46	903220	Manostats.
47	700800	Multiple-walled insulating units of glass

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48	730431	Tubes, pipes & hollow profiles (excl. of 7304.10-7304.29), seamless, of circular cross-section, of cold-drawn/cold-rolled (cold-reduced) steel
49	730441	Tubes, pipes & hollow profiles (excl. of 7304.10-7304.39), seamless, of circular cross-section, of stainless steel, cold-drawn/cold-rolled (cold-reduced)
50	730451	Tubes, pipes & hollow profiles (excl. of 7304.10-7304.49), seamless, of circular cross-section, of alloy steel other than stainless steel, cold-drawn/cold-rolled (cold-reduced)
51	840682	Steam turbines &oth. vapour turbines (excl. for marine propulsion), of an output not >40MW
52	841012	Hydraulic turbines & water wheels, of a power >1000kW but not >10000kW
53	841013	Hydraulic turbines & water wheels, of a power >10000kW
54	850239	Electric generating sets n.e.s. in 85.02
55	850300	Parts suit. for use solely/princ. with the machines of 85.01/85.02
56	850440	Staticconverters
57	902830	Electricity meters, incl. calibrating meters therefor
58	903020	Cathode-ray oscilloscopes & cathode-ray oscillographs
59	903031	Multimeters
60	903039	Instruments & app. for meas./checking voltage/current/resistance/power (excl. of 9030.31), without a recording device
61	890790	Floating structures other than inflatable rafts (e.g., rafts (excl. inflatable), tanks, coffer-dams, landing-stages, buoys & beacons)
62	847989	Machines & mech. appls. having individual functions, n.e.s./incl. in Ch.84
63	842129	Filtering/purifying mach. & app. for liquids (excl. of 8421.21-8421.23)
64	842139	Filtering/purifying mach. & app. for gases, other than intake air filters for int. comb.engines

Source: UNESCAP, APTIR,2011

Table III: List of 96 Industries at 2 Digit Level, HS 2002 given in WITS

HS 2002 Product Code	HS 2002 Product Description	RowNum
01	Live animals	1
02	Meat and edible meat offal	2
03	Fish & crustacean, mollusc & other aquatic invert	3
04	Dairy prod; birds' eggs; natural honey; edible pr	4
05	Products of animal origin, nes or included.	5
06	Live tree & other plant; bulb, root; cut flowers	6
07	Edible vegetables and certain roots and tubers.	7
08	Edible fruit and nuts; peel of citrus fruit or me	8

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09	Coffee, tea, matï and spices.	9
10	Cereals	10
11	Prod.mill.indust; malt; starches; inulin; wheat g	11
12	Oil seed, oleagi fruits; miscell grain, seed, fru	12
13	Lac; gums, resins & other vegetable saps & extrac	13
14	Vegetable plaiting materials; vegetable products	14
15	Animal/veg fats & oils & their cleavage products;	15
16	Prep of meat, fish or crustaceans, molluscs etc	16
17	Sugars and sugar confectionery.	17
18	Cocoa and cocoa preparations.	18
19	Prep.of cereal, flour, starch/milk; pastrycooks'	19
20	Prep of vegetable, fruit, nuts or other parts of	20
21	Miscellaneous edible preparations.	21
22	Beverages, spirits and vinegar.	22
23	Residues & waste from the food indust; prepr ani	23
24	Tobacco and manufactured tobacco substitutes	24
25	Salt; sulphur; earth & ston; plastering mat; lime	25
26	Ores, slag and ash.	26
27	Mineral fuels, oils & product of their distillati	27
28	Inorgn chem; compds of prec mtl, radioact element	28
29	Organic chemicals.	29
30	Pharmaceutical products.	30
31	Fertilisers.	31
32	Tanning/dyeing extract; tannins & derivs; pigm et	32
33	Essential oils & resinoids; perf, cosmetic/toilet	33
34	Soap, organic surface-active agents, washing prep	34
35	Albuminoidal subs; modified starches; glues; enzy	35
36	Explosives; pyrotechnic prod; matches; pyrop allo	36
37	Photographic or cinematographic goods.	37
38	Miscellaneous chemical products.	38
39	Plastics and articles thereof.	39
40	Rubber and articles thereof.	40
41	Raw hides and skins (other than furskins) and lea	41
42	Articles of leather; saddlery/harness; travel goo	42
43	Furskins and artificial fur; manufactures thereof	43
44	Wood and articles of wood; wood charcoal.	44

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45	Cork and articles of cork.	45
46	Manufactures of straw, esparto/other plaiting mat	46
47	Pulp of wood/of other fibrous cellulosic mat; was	47
48	Paper & paperboard; art of paper pulp, paper/pape	48
49	Printed books, newspapers, pictures & other produ	49
50	Silk.	50
51	Wool, fine/coarse animal hair, horsehair yarn & f	51
52	Cotton.	52
53	Other vegetable textile fibres; paper yarn & wove	53
54	Man-made filaments.	54
55	Man-made staple fibres.	55
56	Wadding, felt & nonwoven; yarns; twine, cordage,	56
57	Carpets and other textile floor coverings.	57
58	Special woven fab; tufted tex fab; lace; tapestri	58
59	Impregnated, coated, cover/laminated textile fabr	59
60	Knitted or crocheted fabrics.	60
61	Art of apparel & clothing access, knitted or croc	61
62	Art of apparel & clothing access, not knitted/cro	62
63	Other made up textile articles; sets; worn clothi	63
64	Footwear, gaiters and the like; parts of such art	64
65	Headgear and parts thereof.	65
66	Umbrellas, walking-sticks, seat-sticks, whips, et	66
67	Prepr feathers & down; arti flower; articles huma	67
68	Art of stone, plaster, cement, asbestos, mica/sim	68
69	Ceramic products.	69
70	Glass and glassware.	70
71	Natural/cultured pearls, prec stones & metals, co	71
72	Iron and steel.	72
73	Articles of iron or steel.	73
74	Copper and articles thereof.	74
75	Nickel and articles thereof.	75
76	Aluminium and articles thereof.	76
78	Lead and articles thereof.	77
79	Zinc and articles thereof.	78
80	Tin and articles thereof.	79
81	Other base metals; cermets; articles thereof.	80

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82	Tool, implement, cutlery, spoon & fork, of base m	81
83	Miscellaneous articles of base metal.	82
84	Nuclear reactors, boilers, mchy & mech appliance;	83
85	Electrical mchy equip parts thereof; sound record	84
86	Railw/tramw locom, rolling-stock & parts thereof;	85
87	Vehicles o/t railw/tramw roll-stock, pts & access	86
88	Aircraft, spacecraft, and parts thereof.	87
89	Ships, boats and floating structures.	88
90	Optical, photo, cine, meas, checking, precision,	89
91	Clocks and watches and parts thereof.	90
92	Musical instruments; parts and access of such art	91
93	Arms and ammunition; parts and accessories thereo	92
94	Furniture; bedding, mattress, matt support, cushi	93
95	Toys, games & sports requisites; parts & access t	94
96	Miscellaneous manufactured articles.	95
97	Works of art, collectors' pieces and antiques.	96

Source: WITS Data base

Table III: Trade in 20 Specialized Products of Ecuador with MERCOSUR, ANDEAN, China, Japan, Mexico, United States and India

PartnerName	Year	Trade Flow Name	ECU in 1000 USD
andeancustomsunionwithoutecuador --	2010	Gross Exp.	1591667.804
andeancustomsunionwithoutecuador --	2010	Gross Imp.	1116073.952
China	2010	Gross Exp.	294625.329
China	2010	Gross Imp.	46976.609
India	2010	Gross Exp.	10137.907
India	2010	Gross Imp.	3789.544
Japan	2010	Gross Exp.	398847.687
Japan	2010	Gross Imp.	602.410
latinamericancommonmarket --- merco	2010	Gross Exp.	2748685.830
latinamericancommonmarket --- merco	2010	Gross Imp.	1773188.192
Mexico	2010	Gross Exp.	73680.365
Mexico	2010	Gross Imp.	14688.304

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United States	2010	Gross Exp.	5984676.802
United States	2010	Gross Imp.	2206778.350

Table IV: 213 out of more than 5300 Industries at 6 digit HS level in which Ecuador has Comparative Advantage in Production in 2009

HS 2002	Country	COUNTRY	YEAR	6 DIGIT Product Code	RCA
H2	ECU	Ecuador	2009	560729	1.0155
H2	ECU	Ecuador	2009	392410	1.0165
H2	ECU	Ecuador	2009	081340	1.0169
H2	ECU	Ecuador	2009	520942	1.0236
H2	ECU	Ecuador	2009	721011	1.0303
H2	ECU	Ecuador	2009	392220	1.0453
H2	ECU	Ecuador	2009	480451	1.0658
H2	ECU	Ecuador	2009	391590	1.0675
H2	ECU	Ecuador	2009	392190	1.1048
H2	ECU	Ecuador	2009	902129	1.1057
H2	ECU	Ecuador	2009	551321	1.1185
H2	ECU	Ecuador	2009	441129	1.1317
H2	ECU	Ecuador	2009	740400	1.1540
H2	ECU	Ecuador	2009	611790	1.1630
H2	ECU	Ecuador	2009	681190	1.1632
H2	ECU	Ecuador	2009	480525	1.1671
H2	ECU	Ecuador	2009	854072	1.1679
H2	ECU	Ecuador	2009	210210	1.1700
H2	ECU	Ecuador	2009	830990	1.1709
H2	ECU	Ecuador	2009	902121	1.1739
H2	ECU	Ecuador	2009	580500	1.1847
H2	ECU	Ecuador	2009	721720	1.1908
H2	ECU	Ecuador	2009	160520	1.1947
H2	ECU	Ecuador	2009	852721	1.2000
H2	ECU	Ecuador	2009	841810	1.2069
H2	ECU	Ecuador	2009	780110	1.2698
H2	ECU	Ecuador	2009	830910	1.2788
H2	ECU	Ecuador	2009	540110	1.2796
H2	ECU	Ecuador	2009	841229	1.2821

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H2	ECU	Ecuador	2009	820719	1.3358
H2	ECU	Ecuador	2009	730630	1.3581
H2	ECU	Ecuador	2009	600621	1.3672
H2	ECU	Ecuador	2009	480519	1.3816
H2	ECU	Ecuador	2009	691010	1.4036
H2	ECU	Ecuador	2009	071332	1.4523
H2	ECU	Ecuador	2009	180200	1.5204
H2	ECU	Ecuador	2009	580429	1.5239
H2	ECU	Ecuador	2009	480830	1.5367
H2	ECU	Ecuador	2009	380890	1.5391
H2	ECU	Ecuador	2009	550932	1.5417
H2	ECU	Ecuador	2009	100890	1.5566
H2	ECU	Ecuador	2009	940290	1.5702
H2	ECU	Ecuador	2009	160419	1.5887
H2	ECU	Ecuador	2009	401590	1.6124
H2	ECU	Ecuador	2009	740110	1.6230
H2	ECU	Ecuador	2009	960810	1.6504
H2	ECU	Ecuador	2009	870210	1.6510
H2	ECU	Ecuador	2009	480810	1.6600
H2	ECU	Ecuador	2009	200510	1.6870
H2	ECU	Ecuador	2009	540239	1.6984
H2	ECU	Ecuador	2009	271019	1.7119
H2	ECU	Ecuador	2009	843221	1.7345
H2	ECU	Ecuador	2009	140110	1.7438
H2	ECU	Ecuador	2009	611511	1.7596
H2	ECU	Ecuador	2009	760820	1.7631
H2	ECU	Ecuador	2009	470720	1.7856
H2	ECU	Ecuador	2009	160415	1.7956
H2	ECU	Ecuador	2009	071022	1.8433
H2	ECU	Ecuador	2009	760529	1.8925
H2	ECU	Ecuador	2009	740321	1.8934
H2	ECU	Ecuador	2009	610331	1.9012
H2	ECU	Ecuador	2009	480449	1.9271
H2	ECU	Ecuador	2009	540251	1.9299
H2	ECU	Ecuador	2009	392020	1.9583
H2	ECU	Ecuador	2009	071410	1.9855

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H2	ECU	Ecuador	2009	180310	10.0348
H2	ECU	Ecuador	2009	550952	10.1456
H2	ECU	Ecuador	2009	140190	10.4097
H2	ECU	Ecuador	2009	060390	10.5258
H2	ECU	Ecuador	2009	240110	10.6413
H2	ECU	Ecuador	2009	200899	10.8063
H2	ECU	Ecuador	2009	482020	10.9693
H2	ECU	Ecuador	2009	650400	11.0853
H2	ECU	Ecuador	2009	560210	11.4382
H2	ECU	Ecuador	2009	691090	11.4788
H2	ECU	Ecuador	2009	081190	11.4863
H2	ECU	Ecuador	2009	030342	12.3346
H2	ECU	Ecuador	2009	030344	13.0412
H2	ECU	Ecuador	2009	080720	14.9536
H2	ECU	Ecuador	2009	581100	144.3902
H2	ECU	Ecuador	2009	200799	15.0508
H2	ECU	Ecuador	2009	540252	15.1690
H2	ECU	Ecuador	2009	650200	155.4081
H2	ECU	Ecuador	2009	030410	16.2073
H2	ECU	Ecuador	2009	170410	16.8875
H2	ECU	Ecuador	2009	030341	17.4121
H2	ECU	Ecuador	2009	080450	17.7824
H2	ECU	Ecuador	2009	100610	18.6659
H2	ECU	Ecuador	2009	030339	19.1615
H2	ECU	Ecuador	2009	151321	19.2521
H2	ECU	Ecuador	2009	270750	19.4288
H2	ECU	Ecuador	2009	230120	19.6393
H2	ECU	Ecuador	2009	391723	2.0072
H2	ECU	Ecuador	2009	340120	2.0256
H2	ECU	Ecuador	2009	720410	2.0762
H2	ECU	Ecuador	2009	151790	2.1184
H2	ECU	Ecuador	2009	640419	2.1241
H2	ECU	Ecuador	2009	442190	2.1291
H2	ECU	Ecuador	2009	030229	2.1636
H2	ECU	Ecuador	2009	230990	2.2349
H2	ECU	Ecuador	2009	090411	2.3542

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H2	ECU	Ecuador	2009	071390	2.3858
H2	ECU	Ecuador	2009	390750	2.4056
H2	ECU	Ecuador	2009	630691	2.4214
H2	ECU	Ecuador	2009	511000	2.4300
H2	ECU	Ecuador	2009	382319	2.4719
H2	ECU	Ecuador	2009	110610	2.4863
H2	ECU	Ecuador	2009	030520	2.5216
H2	ECU	Ecuador	2009	051191	2.5237
H2	ECU	Ecuador	2009	071333	2.5438
H2	ECU	Ecuador	2009	550931	2.5753
H2	ECU	Ecuador	2009	845020	2.5881
H2	ECU	Ecuador	2009	081110	2.6299
H2	ECU	Ecuador	2009	731512	2.6314
H2	ECU	Ecuador	2009	410390	2.6661
H2	ECU	Ecuador	2009	761490	2.6793
H2	ECU	Ecuador	2009	251512	2.7396
H2	ECU	Ecuador	2009	170490	2.7653
H2	ECU	Ecuador	2009	630140	2.7928
H2	ECU	Ecuador	2009	441299	2.8911
H2	ECU	Ecuador	2009	960719	2.9173
H2	ECU	Ecuador	2009	060240	2.9702
H2	ECU	Ecuador	2009	521142	2.9723
H2	ECU	Ecuador	2009	030623	2.9799
H2	ECU	Ecuador	2009	790390	2.9882
H2	ECU	Ecuador	2009	150790	20.2600
H2	ECU	Ecuador	2009	640192	20.5715
H2	ECU	Ecuador	2009	440724	209.9347
H2	ECU	Ecuador	2009	732111	21.3406
H2	ECU	Ecuador	2009	080300	214.1825
H2	ECU	Ecuador	2009	210111	22.8189
H2	ECU	Ecuador	2009	030343	23.2776
H2	ECU	Ecuador	2009	521141	23.7559
H2	ECU	Ecuador	2009	030231	234.8317
H2	ECU	Ecuador	2009	030349	27.7126
H2	ECU	Ecuador	2009	080430	29.0371
H2	ECU	Ecuador	2009	030232	3.1417

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H2	ECU	Ecuador	2009	090111	3.1802
H2	ECU	Ecuador	2009	845012	3.2275
H2	ECU	Ecuador	2009	870421	3.2561
H2	ECU	Ecuador	2009	220710	3.2659
H2	ECU	Ecuador	2009	040110	3.4176
H2	ECU	Ecuador	2009	190532	3.4516
H2	ECU	Ecuador	2009	382312	3.4681
H2	ECU	Ecuador	2009	030559	3.4710
H2	ECU	Ecuador	2009	200590	3.5786
H2	ECU	Ecuador	2009	440890	3.6048
H2	ECU	Ecuador	2009	030379	3.6527
H2	ECU	Ecuador	2009	180320	3.6665
H2	ECU	Ecuador	2009	200551	3.7394
H2	ECU	Ecuador	2009	151329	3.7923
H2	ECU	Ecuador	2009	440399	3.8004
H2	ECU	Ecuador	2009	551341	3.8550
H2	ECU	Ecuador	2009	740322	3.8818
H2	ECU	Ecuador	2009	740821	3.9123
H2	ECU	Ecuador	2009	551512	3.9424
H2	ECU	Ecuador	2009	841382	3.9767
H2	ECU	Ecuador	2009	650100	34.2127
H2	ECU	Ecuador	2009	521112	34.4334
H2	ECU	Ecuador	2009	151110	34.7290
H2	ECU	Ecuador	2009	591131	34.8201
H2	ECU	Ecuador	2009	200540	35.1679
H2	ECU	Ecuador	2009	071490	35.4994
H2	ECU	Ecuador	2009	200980	36.6786
H2	ECU	Ecuador	2009	151190	4.0921
H2	ECU	Ecuador	2009	151620	4.1298
H2	ECU	Ecuador	2009	030329	4.1557
H2	ECU	Ecuador	2009	611520	4.1613
H2	ECU	Ecuador	2009	160540	4.2641
H2	ECU	Ecuador	2009	200819	4.2747
H2	ECU	Ecuador	2009	320300	4.4758
H2	ECU	Ecuador	2009	030234	4.5269
H2	ECU	Ecuador	2009	180500	4.5890

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H2	ECU	Ecuador	2009	030420	4.7840
H2	ECU	Ecuador	2009	720441	4.8523
H2	ECU	Ecuador	2009	180100	43.0211
H2	ECU	Ecuador	2009	160413	43.6109
H2	ECU	Ecuador	2009	200891	492.3349
H2	ECU	Ecuador	2009	220720	5.2962
H2	ECU	Ecuador	2009	282490	5.3659
H2	ECU	Ecuador	2009	520943	5.3997
H2	ECU	Ecuador	2009	030269	5.4959
H2	ECU	Ecuador	2009	842481	5.5893
H2	ECU	Ecuador	2009	780191	5.8136
H2	ECU	Ecuador	2009	180400	5.9946
H2	ECU	Ecuador	2009	070410	50.9050
H2	ECU	Ecuador	2009	121140	51.8823
H2	ECU	Ecuador	2009	530590	52.6017
H2	ECU	Ecuador	2009	010620	6.0976
H2	ECU	Ecuador	2009	960711	6.1924
H2	ECU	Ecuador	2009	871420	6.6318
H2	ECU	Ecuador	2009	350300	6.8441
H2	ECU	Ecuador	2009	841392	6.9572
H2	ECU	Ecuador	2009	410691	60.4764
H2	ECU	Ecuador	2009	030613	65.5791
H2	ECU	Ecuador	2009	731300	7.0505
H2	ECU	Ecuador	2009	560811	7.2157
H2	ECU	Ecuador	2009	150420	7.2583
H2	ECU	Ecuador	2009	441039	7.6309
H2	ECU	Ecuador	2009	551311	7.8919
H2	ECU	Ecuador	2009	731021	7.9283
H2	ECU	Ecuador	2009	060310	71.2811
H2	ECU	Ecuador	2009	160414	76.0869
H2	ECU	Ecuador	2009	030490	8.1029
H2	ECU	Ecuador	2009	440349	8.4478
H2	ECU	Ecuador	2009	270900	8.5413
H2	ECU	Ecuador	2009	291822	8.9697
H2	ECU	Ecuador	2009	960630	81.8677
H2	ECU	Ecuador	2009	441214	9.1791

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H2	ECU	Ecuador	2009	630533	9.3292
H2	ECU	Ecuador	2009	071029	9.3305
H2	ECU	Ecuador	2009	030239	9.6216
H2	ECU	Ecuador	2009	160420	99.4395

Source

Table V: 238 out of more than 5300 Industries at 6 digit HS level in which Ecuador has Comparative Advantage in Production in 2010

HS 2002	Country	COUNTRY	YEAR	6 DIGIT Product Code	RCA
H2	ECU	Ecuador	2010	330119	1.0072
H2	ECU	Ecuador	2010	591110	1.0179
H2	ECU	Ecuador	2010	551321	1.0199
H2	ECU	Ecuador	2010	640419	1.0419
H2	ECU	Ecuador	2010	681310	1.0426
H2	ECU	Ecuador	2010	540233	1.0633
H2	ECU	Ecuador	2010	401590	1.1022
H2	ECU	Ecuador	2010	852721	1.1197
H2	ECU	Ecuador	2010	110311	1.1379
H2	ECU	Ecuador	2010	253090	1.1380
H2	ECU	Ecuador	2010	843490	1.1549
H2	ECU	Ecuador	2010	110610	1.1559
H2	ECU	Ecuador	2010	401490	1.1652
H2	ECU	Ecuador	2010	830990	1.1700
H2	ECU	Ecuador	2010	030371	1.1731
H2	ECU	Ecuador	2010	382319	1.1878
H2	ECU	Ecuador	2010	160520	1.1998
H2	ECU	Ecuador	2010	610331	1.2017
H2	ECU	Ecuador	2010	740400	1.2152
H2	ECU	Ecuador	2010	441129	1.2220
H2	ECU	Ecuador	2010	060491	1.2366
H2	ECU	Ecuador	2010	721661	1.2420
H2	ECU	Ecuador	2010	843230	1.2628
H2	ECU	Ecuador	2010	841920	1.2635
H2	ECU	Ecuador	2010	630631	1.2722
H2	ECU	Ecuador	2010	870431	1.2747

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H2	ECU	Ecuador	2010	843850	1.2762
H2	ECU	Ecuador	2010	760529	1.2766
H2	ECU	Ecuador	2010	210210	1.2774
H2	ECU	Ecuador	2010	730630	1.2822
H2	ECU	Ecuador	2010	843680	1.2970
H2	ECU	Ecuador	2010	721622	1.3036
H2	ECU	Ecuador	2010	843359	1.3316
H2	ECU	Ecuador	2010	847740	1.3354
H2	ECU	Ecuador	2010	081110	1.3462
H2	ECU	Ecuador	2010	392220	1.3583
H2	ECU	Ecuador	2010	520942	1.3776
H2	ECU	Ecuador	2010	848050	1.3808
H2	ECU	Ecuador	2010	271019	1.3844
H2	ECU	Ecuador	2010	540110	1.3894
H2	ECU	Ecuador	2010	401511	1.3896
H2	ECU	Ecuador	2010	820719	1.4020
H2	ECU	Ecuador	2010	350110	1.4070
H2	ECU	Ecuador	2010	110422	1.4073
H2	ECU	Ecuador	2010	391590	1.4143
H2	ECU	Ecuador	2010	870210	1.4146
H2	ECU	Ecuador	2010	060210	1.4186
H2	ECU	Ecuador	2010	540720	1.4328
H2	ECU	Ecuador	2010	220590	1.4427
H2	ECU	Ecuador	2010	844832	1.4474
H2	ECU	Ecuador	2010	841810	1.4576
H2	ECU	Ecuador	2010	480524	1.4648
H2	ECU	Ecuador	2010	160415	1.4653
H2	ECU	Ecuador	2010	293690	1.4744
H2	ECU	Ecuador	2010	780110	1.4935
H2	ECU	Ecuador	2010	540251	1.4972
H2	ECU	Ecuador	2010	160419	1.5407
H2	ECU	Ecuador	2010	490191	1.5451
H2	ECU	Ecuador	2010	470720	1.5542
H2	ECU	Ecuador	2010	410390	1.6007
H2	ECU	Ecuador	2010	350190	1.6032
H2	ECU	Ecuador	2010	340119	1.6425

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H2	ECU	Ecuador	2010	830910	1.7330
H2	ECU	Ecuador	2010	841382	1.7728
H2	ECU	Ecuador	2010	081340	1.7855
H2	ECU	Ecuador	2010	691010	1.8110
H2	ECU	Ecuador	2010	871420	1.8303
H2	ECU	Ecuador	2010	731431	1.8313
H2	ECU	Ecuador	2010	760820	1.8349
H2	ECU	Ecuador	2010	960810	1.8397
H2	ECU	Ecuador	2010	390910	1.8491
H2	ECU	Ecuador	2010	611520	1.8493
H2	ECU	Ecuador	2010	392112	1.8828
H2	ECU	Ecuador	2010	480519	1.8965
H2	ECU	Ecuador	2010	843221	1.9344
H2	ECU	Ecuador	2010	230990	1.9524
H2	ECU	Ecuador	2010	721720	1.9743
H2	ECU	Ecuador	2010	842490	1.9795
H2	ECU	Ecuador	2010	580429	1.9805
H2	ECU	Ecuador	2010	030342	10.2320
H2	ECU	Ecuador	2010	200899	10.3167
H2	ECU	Ecuador	2010	691090	10.8570
H2	ECU	Ecuador	2010	902129	11.0585
H2	ECU	Ecuador	2010	630533	11.3731
H2	ECU	Ecuador	2010	140190	11.4275
H2	ECU	Ecuador	2010	240110	11.8590
H2	ECU	Ecuador	2010	591131	113.8961
H2	ECU	Ecuador	2010	080450	12.0686
H2	ECU	Ecuador	2010	282590	12.1431
H2	ECU	Ecuador	2010	030239	12.2820
H2	ECU	Ecuador	2010	843210	12.3337
H2	ECU	Ecuador	2010	650400	12.4403
H2	ECU	Ecuador	2010	030410	13.0961
H2	ECU	Ecuador	2010	030341	13.4113
H2	ECU	Ecuador	2010	071029	13.5110
H2	ECU	Ecuador	2010	482020	14.1654
H2	ECU	Ecuador	2010	732111	14.9083
H2	ECU	Ecuador	2010	200799	15.0293

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H2	ECU	Ecuador	2010	291822	15.1293
H2	ECU	Ecuador	2010	440349	15.3178
H2	ECU	Ecuador	2010	170410	15.6746
H2	ECU	Ecuador	2010	640192	16.0254
H2	ECU	Ecuador	2010	080720	16.9383
H2	ECU	Ecuador	2010	030343	17.2718
H2	ECU	Ecuador	2010	521141	18.2633
H2	ECU	Ecuador	2010	090411	18.5926
H2	ECU	Ecuador	2010	030520	2.0574
H2	ECU	Ecuador	2010	580500	2.1331
H2	ECU	Ecuador	2010	291421	2.1863
H2	ECU	Ecuador	2010	282300	2.2119
H2	ECU	Ecuador	2010	611511	2.2162
H2	ECU	Ecuador	2010	761490	2.2184
H2	ECU	Ecuador	2010	441299	2.3194
H2	ECU	Ecuador	2010	293629	2.3274
H2	ECU	Ecuador	2010	740821	2.3288
H2	ECU	Ecuador	2010	900490	2.3872
H2	ECU	Ecuador	2010	740322	2.4534
H2	ECU	Ecuador	2010	100890	2.4639
H2	ECU	Ecuador	2010	843860	2.4707
H2	ECU	Ecuador	2010	030379	2.5918
H2	ECU	Ecuador	2010	440399	2.6578
H2	ECU	Ecuador	2010	870421	2.6642
H2	ECU	Ecuador	2010	790390	2.6824
H2	ECU	Ecuador	2010	170490	2.6928
H2	ECU	Ecuador	2010	240130	2.7886
H2	ECU	Ecuador	2010	051191	2.8020
H2	ECU	Ecuador	2010	630140	2.8446
H2	ECU	Ecuador	2010	630699	2.8543
H2	ECU	Ecuador	2010	200590	2.8643
H2	ECU	Ecuador	2010	841392	2.8647
H2	ECU	Ecuador	2010	190532	2.8954
H2	ECU	Ecuador	2010	841280	2.9470
H2	ECU	Ecuador	2010	071333	2.9693
H2	ECU	Ecuador	2010	140490	2.9788

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H2	ECU	Ecuador	2010	650200	205.5611
H2	ECU	Ecuador	2010	230120	21.3412
H2	ECU	Ecuador	2010	080300	211.3915
H2	ECU	Ecuador	2010	591132	22.2880
H2	ECU	Ecuador	2010	080430	22.6019
H2	ECU	Ecuador	2010	210111	22.6179
H2	ECU	Ecuador	2010	060390	22.6341
H2	ECU	Ecuador	2010	030231	227.8759
H2	ECU	Ecuador	2010	410691	23.1777
H2	ECU	Ecuador	2010	440724	231.4462
H2	ECU	Ecuador	2010	151110	25.8699
H2	ECU	Ecuador	2010	581100	25.8818
H2	ECU	Ecuador	2010	070410	27.2218
H2	ECU	Ecuador	2010	310100	29.8078
H2	ECU	Ecuador	2010	030623	3.0080
H2	ECU	Ecuador	2010	551341	3.0126
H2	ECU	Ecuador	2010	630691	3.0656
H2	ECU	Ecuador	2010	550932	3.0662
H2	ECU	Ecuador	2010	200819	3.1052
H2	ECU	Ecuador	2010	151190	3.2083
H2	ECU	Ecuador	2010	390750	3.2131
H2	ECU	Ecuador	2010	293890	3.2287
H2	ECU	Ecuador	2010	220710	3.2343
H2	ECU	Ecuador	2010	350710	3.2417
H2	ECU	Ecuador	2010	480525	3.3066
H2	ECU	Ecuador	2010	090111	3.3510
H2	ECU	Ecuador	2010	392020	3.4649
H2	ECU	Ecuador	2010	902121	3.5010
H2	ECU	Ecuador	2010	283330	3.6190
H2	ECU	Ecuador	2010	440890	3.6944
H2	ECU	Ecuador	2010	100610	3.7312
H2	ECU	Ecuador	2010	010620	3.7736
H2	ECU	Ecuador	2010	071022	3.7922
H2	ECU	Ecuador	2010	220720	3.8247
H2	ECU	Ecuador	2010	521142	3.8893

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H2	ECU	Ecuador	2010	200551	3.8909
H2	ECU	Ecuador	2010	030559	3.9079
H2	ECU	Ecuador	2010	030234	3.9129
H2	ECU	Ecuador	2010	071490	33.1977
H2	ECU	Ecuador	2010	200980	33.4656
H2	ECU	Ecuador	2010	560811	34.5985
H2	ECU	Ecuador	2010	650100	37.1738
H2	ECU	Ecuador	2010	200540	38.4933
H2	ECU	Ecuador	2010	261690	4.0479
H2	ECU	Ecuador	2010	780191	4.0563
H2	ECU	Ecuador	2010	120799	4.0963
H2	ECU	Ecuador	2010	732190	4.1005
H2	ECU	Ecuador	2010	550952	4.2591
H2	ECU	Ecuador	2010	030229	4.2759
H2	ECU	Ecuador	2010	320300	4.5522
H2	ECU	Ecuador	2010	843880	4.5549
H2	ECU	Ecuador	2010	442190	4.5687
H2	ECU	Ecuador	2010	060240	4.5709
H2	ECU	Ecuador	2010	030232	4.5977
H2	ECU	Ecuador	2010	283210	4.7587
H2	ECU	Ecuador	2010	030420	4.8074
H2	ECU	Ecuador	2010	842481	4.9806
H2	ECU	Ecuador	2010	160413	41.8332
H2	ECU	Ecuador	2010	180100	42.5268
H2	ECU	Ecuador	2010	200891	440.0011
H2	ECU	Ecuador	2010	530590	45.3757
H2	ECU	Ecuador	2010	121140	49.6400
H2	ECU	Ecuador	2010	150790	5.1354
H2	ECU	Ecuador	2010	270750	5.5605
H2	ECU	Ecuador	2010	550931	5.6201
H2	ECU	Ecuador	2010	350300	5.6756
H2	ECU	Ecuador	2010	731021	5.7011
H2	ECU	Ecuador	2010	151620	5.8017
H2	ECU	Ecuador	2010	180400	5.8099
H2	ECU	Ecuador	2010	282490	5.8160

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H2	ECU	Ecuador	2010	441214	5.8357
H2	ECU	Ecuador	2010	180500	5.9592
H2	ECU	Ecuador	2010	610329	6.2350
H2	ECU	Ecuador	2010	151329	6.3184
H2	ECU	Ecuador	2010	150420	6.3796
H2	ECU	Ecuador	2010	071080	6.8384
H2	ECU	Ecuador	2010	551030	6.8429
H2	ECU	Ecuador	2010	521112	65.8305
H2	ECU	Ecuador	2010	030349	66.5027
H2	ECU	Ecuador	2010	160414	69.1536
H2	ECU	Ecuador	2010	180310	7.1265
H2	ECU	Ecuador	2010	030339	7.1427
H2	ECU	Ecuador	2010	180320	7.3915
H2	ECU	Ecuador	2010	340120	7.4426
H2	ECU	Ecuador	2010	540252	7.6386
H2	ECU	Ecuador	2010	441039	7.7524
H2	ECU	Ecuador	2010	030269	7.8148
H2	ECU	Ecuador	2010	060310	70.0387
H2	ECU	Ecuador	2010	391723	8.0609
H2	ECU	Ecuador	2010	902110	8.1478
H2	ECU	Ecuador	2010	843240	8.3045
H2	ECU	Ecuador	2010	040110	8.3791
H2	ECU	Ecuador	2010	843410	8.4327
H2	ECU	Ecuador	2010	731300	8.4546
H2	ECU	Ecuador	2010	843420	8.9175
H2	ECU	Ecuador	2010	030613	81.8905
H2	ECU	Ecuador	2010	160420	87.4395
H2	ECU	Ecuador	2010	960630	87.6294
H2	ECU	Ecuador	2010	081190	9.2526
H2	ECU	Ecuador	2010	030490	9.4154
H2	ECU	Ecuador	2010	270900	9.5642
H2	ECU	Ecuador	2010	030344	9.8240
H2	ECU	Ecuador	2010	151321	9.9991

Source: Author´s work in WITS

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Table VI Equations for Trade Creation and Trade Diversion

We follow James and Olareagga,2005.

Domestic prices are given by:

$$p^{d}_{g,c} = p^{w}_{g,c}\left(1 + t_{g,c}\right) \tag{3}$$

where $p^{w}_{g,c}$ is the world price of good g imported from c, $t_{g,c}$ is the tariff imposed on imports of good g imported from c, and is defined as:

$$t_{g,c} = t^{MFN}_{g}\left(1 - \theta_{g,c}\right) \tag{4}$$

where t^{MFN}_{g} is the Most Favored Nation (MFN) tariff imposed on good g, and $\theta_{g,c}$ is the tariff preference ratio on good g when imported from country c.[1]

[1] By (4), $\theta_{g,c} = 1 - t_{g,c} \big/ t^{MFN}_{g}$.

Trade creation

Trade creation is defined as the direct increase in imports following a reduction on the tariff imposed on good g from country c. To obtain this, SMART uses the definition of price elasticity of import demand:

$$\varepsilon_{g,c} = \frac{dm_{g,c} \big/ m_{g,c}}{dp^{d}_{g,c} \big/ p^{d}_{g,c}} < 0 \tag{5}$$

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Solving (5) for $dm_{g,c}$ we obtain the trade creation ($TC_{g,c}$) evaluated at world prices and associated with the tariff reduction on good g when imported from country c:[2]

$$TC_{g,c} = p^{w}_{g,c}\, dm_{g,c} = p^{w}_{g,c}\, \varepsilon_{g,c}\, m_{g,c} \frac{dt_{g,c}}{(1+t_{g,c})} = \varepsilon_{g,c}\, m_{g,c} \frac{dp\, dt_{g,c}}{(1+t_{g,c})} \quad (7)$$

Equation (7) defines the extent of trade creation on imports of good g from country c.

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If the tariff reduction on good *g* from country *c* is a preferential tariff reduction (i.e., it does not apply to other countries, *c* , then imports from country), then imports of good *g* from country *c* are further going to increase due to the substitution away from imports of good *g* from other countries that becomes relatively more expensive. This is the definition of trade diversion in the SMART model.

In order to measure trade diversion, let us use the definition of the elasticity of substitution, $\sigma_{g,c,\neq c}$ across imports of good *g* from country *c* and all other countries (c):

$$\sigma_{g,c,\neq c} = \frac{d\left(\frac{m_{g,c}}{m_{g,\neq c}}\right)}{d\left(\frac{p_{g,c}^{d}}{p_{g,\neq c}^{d}}\right)} < 0$$

$$TD_{g,c} = dm_{g,c} = \frac{m_{g,\neq c} m_{g,c}}{m_{g,\neq c} + m_{g,c}} \frac{dt_{g,c}}{1+t_{g,c}} \sigma_{g,c,\neq c} \qquad (12)$$

Table VII: Trade Creation, Trade Diversion and Total Trade Effects of Liberalizing Trade of 238 Products with MERCOSUR

Partner Name	Trade Total Effect in 1000 USD	Trade Creation Effect in 1000 USD	Trade Diversion Effect in 1000 USD	Old Simple Duty Rate	New Simple Duty Rate
World	62,008.734	62,008.734	0.001	11.77	6.59
Argentina	512.963	493.439	19.524	5.67	0.00
Belgium	-80.506	0.000	-80.506	8.44	8.44
Bolivia	234.473	225.201	9.272	7.50	0.00
Brazil	5,618.631	4,552.948	1,065.682	6.20	0.00
Chile	-2,505.149	17.379	-2,522.527	0.06	0.00
China	-2,810.155	0.000	-2,810.155	11.60	11.60
Colombia	38,642.954	30,662.966	7,979.987	12.23	0.00

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Finland	-7.880	0.000	-7.880	8.13	8.13
France	-70.493	0.000	-70.493	8.59	8.59
Germany	-134.458	0.000	-134.458	9.50	9.50
Italy	-96.702	0.000	-96.702	8.75	8.75
Japan	-828.724	0.000	-828.724	12.27	12.27
Mexico	-1,240.764	0.000	-1,240.764	10.68	10.68
Netherlands	-15.076	0.000	-15.076	7.21	7.21
Spain	-303.619	0.000	-303.619	10.24	10.24
United Kingdom	-177.004	0.000	-177.004	11.93	11.93
United States	-1,966.266	0.000	-1,966.266	12.11	12.11
Venezuela	9,808.559	7,935.644	1,872.915	11.90	0.00
Uruguay	1.313	1.230	0.083	2.71	0.00
Paraguay	0.177	0.077	0.100	11.72	0.00
Peru	22,642.250	18,119.850	4,522.400	12.68	0.00

Source: author´s work in WITS

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Table VII Revenue, Welfare and Consumer Surplus Effects of Liberalizing Trade of 238 products with MERCOUR in 2010

Revenue Effect in 1000 USD	Welfare in 1000 USD	Imports Before in 1000 USD	Import Change	Tariff Revenue in 1000 USD	Tariff New Revenue in 1000 USD	Tariff Change InRevenue in 1000 USD	Consumer Surplus in 1000 USD
-32,972.615	5,863.381	3,053,362.446	62.008.734	359,266.300	205,174.992	-154,091.311	5,689.966

Source: author´s work in WITS

Table VIII: Trade Creation Effects of Liberalizing Trade of 238 Products with the China, Japan and the US

Partner Name	Trade Total Effect in 1000 USD	Trade Creation Effect in 1000 USD	Trade Diversion Effect in 1000 USD	Old Simple Duty Rate	New Simple Duty Rate
World	45,743.157	45,743.155	0.001	11.77	7.65
Argentina	-95.350	0.000	-95.350	5.67	5.67
Austria	-11.062	0.000	-11.062	2.54	2.54
Belgium	-32.102	0.000	-32.102	8.44	8.44
Bolivia	-98.524	0.000	-98.524	7.50	7.50
Brazil	-687.729	0.000	-687.729	6.20	6.20
Canada	-17.872	0.000	-17.872	11.41	11.41
Chile	-601.623	0.000	-601.623	0.06	0.06
China	22,452.945	15,970.726	6,482.219	11.60	0.00
Colombia	-3,357.426	0.000	-3,357.426	12.23	12.23
France	-117.360	0.000	-117.360	8.59	8.59
Germany	-107.905	0.000	-107.905	9.50	9.50
Italy	-120.328	0.000	-120.328	8.75	8.75
Japan	23,426.521	14,253.482	9,173.039	12.27	0.00
United Kingdom	-64.391	0.000	-64.391	11.93	11.93
United States	24,290.050	15,518.947	8,771.103	12.11	0.00
Venezuela	-247.008	0.000	-247.008	11.90	11.90
Mexico	-1,091.793	0.000	-1,091.793	10.68	10.68
Netherlands	-8.153	0.000	-8.153	7.21	7.21
Korea, Rep.	-1,495.916	0.000	-1,495.916	10.45	10.45

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Peru	-1,565.454	0.000	-1,565.454	12.68	12.68
Spain	-168.490	0.000	-168.490	10.24	10.24
Thailand	-8,971.571	0.000	-8,971.571	13.65	13.65

Table VIII: Welfare, Revenue and Consumer Surplus Effects of Liberalizing Trade OF 238 Products with the China, Japan and the US

Welfare in 1000 USD	Revenue Effect in 1000 USD	Imports Before in 1000 USD	Import Change	Tariff Revenue in 1000 USD	Tariff New Revenue in 1000 USD	Tariff Change In Revenue in 1000 USD	Consumer Surplus in 1000 USD
4,164.738	-35,146.525	3,053,362.44	45.743.157	359,266.30	236,978.974	-122,287.329	4,440.046

Source: author´s work in WITS

Table IX: Liberalizing Trade OF 238 Products with the EU27 in 2010

Partner Name	Trade Total Effect in 1000 USD	Trade Creation Effect in 1000 USD	Trade Diversion Effect in 1000 USD	Old Simple Duty Rate	New Simple Duty Rate
World	3,227.968	3,227.968	0.000	11.77	10.58
Argentina	-26.647	0.000	-26.647	5.67	5.67
Austria	53.683	28.156	25.527	2.54	0.00
Belgium	232.872	99.409	133.462	8.44	0.00
Bolivia	-35.433	0.000	-35.433	7.50	7.50
Brazil	-139.523	0.000	-139.523	6.20	6.20
Canada	-4.277	0.000	-4.277	11.41	11.41
Chile	-130.223	0.000	-130.223	0.06	0.06
China	-291.306	0.000	-291.306	11.60	11.60
Colombia	-560.776	0.000	-560.776	12.23	12.23
France	997.024	566.422	430.602	8.59	0.00
Germany	752.843	371.363	381.479	9.50	0.00
Italy	1,015.885	531.426	484.460	8.75	0.00
Japan	-66.192	0.000	-66.192	12.27	12.27
Mexico	-282.787	0.000	-282.787	10.68	10.68

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Netherlands	69.341	35.641	33.700	7.21	0.00
Paraguay	-0.094	0.000	-0.094	11.72	11.72
Peru	-394.963	0.000	-394.963	12.68	12.68
Spain	1,286.169	666.652	619.517	10.24	0.00
United Kingdom	693.585	369.266	324.319	11.93	0.00
United States	-330.679	0.000	-330.679	12.11	12.11

Source: author´s work in WITS

Table IX: Welfare, Revenue and Consumer Surplus Effects of Liberalizing Trade OF 238 Products with the EU27

Trade Total Effect in 1000 USD	Welfare in 1000 USD	Revenue Effect in 1000 USD	Imports Before in 1000 USD	Import Change	Tariff Revenue in 1000 USD	Tariff New Revenue in 1000 USD	Tariff Change In Revenue in 1000 USD	Consumer Surplus in 1000 USD
3,227.968	367.072	-2,904.662	3,053,362.446	3.227.968	359,266.300	323,425.47	-35,840.829	360.685

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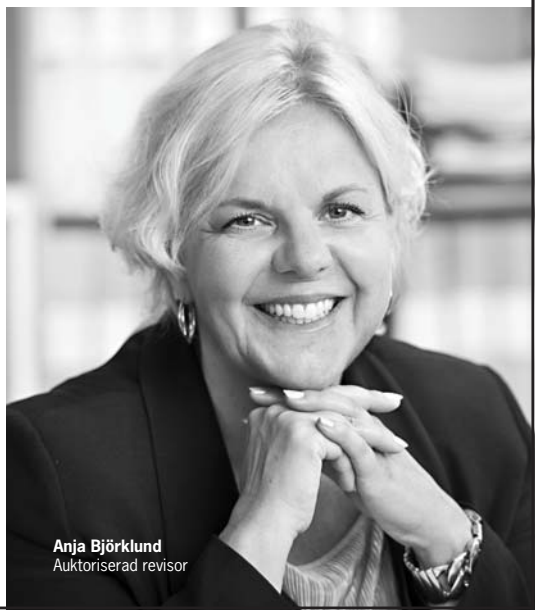

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Table X: Theoretical Justification of Using the Gravity Model (in this Study) and Volume of Trade and Trade Equality

To understand the relationship between dispersions of incomes across countries and volume of trade we refer to the most simple version of the Gravity Model. The most simple version relates volume of trade between two countries is directly proportional to GDP of the exporting country(higher the GDP, higher is the number of varieties produced, more are the varieties traded), the relative size of the importing country approximated by the importing country's share in World GDP and inversely related to the distance between countries. Therefore,

Trade=(GDP_1*share)/$Dist^n$= (1/GDP_w). (GDP_1* GDP_2)/ $Dist^n$

Start with the GDP of Country 1, GDP_1. Each of the goods produced in Country 1 is a differentiated product, so they are different from the varieties produced in other countries. Every other country will demand the goods of Country 1(because they are different from their home produced goods), and the amount of their demand will depend on two factors (1) the relative size of the importing country because larger countries demand more and (2) the distance between two countries because being farther away will lead to higher transportation costs and less trade.

We use the most simple Gravity Model (without distance) to show the relationship between inequality of income and volume of trade. Consider a model of all differentiated goods with same and homothetic tastes. The utility function is Dixit Stiglitz Utility Function with all varieties entering the utility function. Consider three countries (1, 2 and 3) in the entire world. The volume of trade is worked out using the simple matrix below

To Imports from Country

Exports from Country!

	Country1	Country2	Country3	Volume of Trade
Country 1		GDP_1*s_2	GDP_1*s_3	GDP_1*s_2+ GDP_1*s_3
Country2	GDP_2*s_1		GDP_2*s_3	GDP_2*s_1+ GDP_2*s_3
Country3	GDP_3*s_1	GDP_3*s_2		GDP_3*s_1+ GDP_3*s_2
Volume of Trade	GDP_2*s_1 +GDP_3*s_1	GDP_1*s_2 +GDP_3*s_2	GDP_1*s_3 +GDP_2*s_3	Total Volume Of Trade= GDP_1*s_2+ GDP_1*s_3 +GDP_2*s_1+ GDP_2*s_3 +GDP_3*s_1+ $GDP_3*s_{2=}$ GDP_2*s_1 +GDP_3*s_1 +GDP_1*s_2 +GDP_3*s_2 +GDP_1*s_3 +GDP_2*s_3

Here s_j=GDP_j/GDP_w j=1,2,3

GDP_1+GDP_2+GDP_3=GDP_w

Total Volume of Trade= GDP_2*s_1 +GDP_3*s_1 +GDP_1*s_2 +GDP_3*s_2 +GDP_1*s_3 +GDP_2*s_3

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= $s_1(GDP_w-GDP_1)$ $+s_2(GDP_w-GDP_2)+s_3(GDP_w-GDP_3)=GDP_w(s_1+s_2+s_3)-\sum s_jGDP_j=GDP_w-\sum s_j$ $s_jGDP_w=GDP_W(1-\sum s_j^2)=GDP_w(1-H)$, where H is the Herfindahl Index of Trade Concentration.

Consider now the World with n countries. Also, now countries 1, 2 and 3 form a preferential trading arrangement (say A). See how reducing dispersion of income across countries will increase volume of trade between countries.

$S_j=GDP_j/GDP_w=(GDP_j/GDP_A)*(GDP_A/GDP_w)=s_{jA}*s_A$, where

$GDP_1+GDP_2+GDP_3=GDP_A, s_A= GDP_A/GDP_w$

Now Total Volume of Trade (VT) between countries 1, 2 and 3 in a World of n countries=

$GDP_As_A-\sum s_jGDP_j= GDP_As_A-\sum s_{jA}*s_{A*}\ s_{jA*}GDP_A= GDP_As_A(1-\sum s_{jA}^2)= GDP_As_A(1-H_A)=VT_A$. The volume of trade between any other three countries who have formed an economic union(B), will be $VT_B= GDP_Bs_B(1-H_B)$. If $s_A=s_B$, then regional group whose $H_A<H_B$, then $VT_A>VT_B$. In another words regional groups whose trade is less concentrated than another region whose trade is more concentrated, the volume of trade in the first group(among itself) will be larger. Also, volume of trade and term$(1-\sum s_{jA}^2)$ is directly and positively related. One can prove that Variance of s_{jA} and term $(1-\sum s_{jA}^2)$ is inversely related. Therefore, lower dispersion of income across countries in terms of their GDP share in regional GDP will increase volume of trade in the region. Further, in regional group if there are only two countries, then term $(1-\sum s_{jA}^2)$ is equal to $2s_i*s_j$. Baier and Bergstrand (2001) in his gravity formulation include among traditional variables (size of trading partners and distance and other trade cost), include term s_i*s_j as indicator of dispersion of income between two countries and prices of traded goods in exporting and importing countries. The study also uses Baier and Bergstrand gravity formulation.

Appendix Table XI: Details of the 6 digit products in which Ecuador has RCA Advantage in 2010

0106.20.00	- Reptiles (including snakes and turtles)
0302.29.00	- Other
0302.31.00	- Albacore or white tuna (Thunnus alalunga)
0302.32.00	- Yellowfin tunas (yellowfin) (Thunnus albacares)
0302.34.00	- Bigeye tuna or bigeye (Thunnus obesus)
0302.39.00	- Other
0302.69.00	- Other
0303.39.00	- Other
0303.41.00	- Albacore or white tuna (Thunnus alalunga)
0303.42.00	- Yellowfin tunas (yellowfin) (Thunnus albacares)
0303.43.00	- Skipjack or stripe-bellied bonito
0303.44.00	- Bigeye tuna or bigeye (Thunnus obesus)
0303.49.00	- Other
0303.71.00	- Sardines (Sardina pilchardus, Sardinops spp.), Sardinella (Sardinella spp.) And sprat (Sprattus sprattus)
0303.79.00	- Other:

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0304.10.00	- Fresh or chilled:
0304.20.00	- Frozen fillets:
0304.90.00	- Other:
0305.20.00	- Livers and roes of fish, dried, smoked, salted or in brine
0305.59.00	- Other:
0306.13.00	- Shrimps and prawns:
0306.23.00	- Shrimps and prawns:
0401.10.00	- Of a fat content not exceeding 1% by weight
0511.91.00	- Products of fish or crustaceans, molluscs or other aquatic invertebrates, dead animals of Chapter 3:
0602.10	- Unrooted cuttings and slips:
0602.40.00	- Roses, grafted
0603.10.00	- Fresh:
0603.90.00	- Other:
0604.91.00	- Fresh
0704.10.00	- Cauliflowers and headed broccoli (“broccoli”)
0710.22.00	- Beans (beans, beans, beans, bean) (Vigna spp., Phaseolus spp.)
0710.29.00	- Other
0710.80	- Other vegetables:
0713.33	- Beans (beans, beans, beans, beans) (Phaseolus vulgaris):
0714.90	- Other:
0803.00	Bananas, including plantains, fresh or dried.
0804.30.00	- Pineapple (pineapple)
0804.50	- Guavas, mangoes and mangosteens:
0807.20.00	- Papayas
0811.10	- Strawberries (strawberries):
0811.90	- Other:
0811.90.10	- Containing added sugar or other sweetening matter
0813.40.00	- Other fruits or nuts
0901.11	- Not decaffeinated:
0904.11.00	- Neither crushed nor ground
1006.10	- Paddy rice (rice “paddy”):
1008.90	- Other cereals:
1103.11.00	- Of wheat
1104.22.00	- Of oats
1106.10.00	- Of the vegetables of heading 07.13
1207.99	- Other:

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1211.40.00	- Poppy straw
1401.90.00	- Other
1404.90	- Other:
1504.20	- Fats and fish oils and their fractions, other than liver oils:
1507.90	- Other:
1511.10.00	- Crude oil
1511.90.00	- Other
1513.21	- Crude oil:
1513.29	- Other:
1516.20.00	- Fats and oils and their fractions
1604.13	- Sardines, sardinella and sprats:
1604.14	- Tunas, skipjack and bonito (Sarda spp.)
1604.15.00	- Mackerel
1604.19.00	- Other
1604.20.00	- Other prepared or preserved fish
1605.20.00	- Shrimps and prawns
1704.10	- Chewing gums, including sugar-coated:
1704.90	- Other:
1801.00	Cocoa beans, whole or broken, raw or roasted.
1803.10.00	- Not defatted
1803.20.00	- Degreased totally or partially
1804.00	Butter, cocoa fat and oil.
1805.00.00	Cocoa powder, not containing added sugar or other sweetening matter.
1905.32.00	- Waffles and wafers (“wafers”, “wafer”) and “waffles” (“waffles”)
2005.40.00	- Peas (peas, peas) (Pisum sativum)
2005.51.00	- Shelled
2005.90.00	- Other vegetables (even ‘wild’) and mixtures of vegetables:
2007.99	- Other:
2008.19	- Other, including mixtures:
2008.91.00	- Palm hearts
2008.99	- Other:
2009.80	- Any fruit juice or fruit, or vegetable:
2101.11.00	- Extracts, essences and concentrates
2102.10	- Yeasts:
2205.90.00	- Other
2207.10.00	- Undenatured ethyl alcohol of alcoholic strength of not less than 80% vol

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2207.20.00	- Ethyl alcohol and other spirits, denatured, of any strength
2301.20	- Flours, meals and "pellets" of fish or crustaceans, molluscs or other aquatic invertebrates:
2309.90	- Other:
2401.10	- Snuff without STEMMED OR STRIPPED:
2401.30.00	- Waste of snuff
2530.90.00	- Other
2616.90	- Other:
2707.50	- Other mixtures of aromatic hydrocarbon including losses, a higher or equal to 65% by volume at 250 ° C, ASTM D 86:
2709.00.00	Crude oils obtained from bituminous minerals.
2710.19.00	- Medium oils and preparations:
2823.00	Oxides of titanium.
2824.90.00	- Other:
2825.90	- Other:
2832.10.00	- Sodium sulphite
2833.30	- Alum:
2914.21.00	- Camphor
2918.22	- O-Acetylsalicylic acid, its salts and esters:
2936.29	- Other vitamins and their derivatives:
2936.90.00	- Other, including natural concentrates
3101.00	Animal manure or plant, whether or not mixed together or chemically treated, fertilizers produced by the mixing or chemical treatment of animal or vegetable.
3203.00	Colouring matter of vegetable or animal origin (including dyeing extracts but excluding animal black), whether or not chemically defined; preparations as specified in Note 3 to this Chapter based on coloring matter of vegetable or animal origin.
3301.19	- Other:
3401.19	- Other:
3401.20.00	- Soap in other forms
3501.10.00	- Casein
3501.90	- Other:
3503.00	Gelatin (gelatin in square or rectangular sheets, including surface-worked or colored) and their derivatives, isinglass, other glues of animal origin, excluding casein glues of heading 35.01.
3507.10.00	- Rennet and concentrates
3823.19.00	- Other
3907.50.00	- Alkyd resins
3909.10	- Urea resins, resins thiourea:
3915.90.00	- Of other plastics

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3917.23	- Of polymers of vinyl chloride:
3921.12.00	- Of polymers of vinyl chloride
3922.20.00	- Toilet seats and covers
4014.90.00	- Other
4015.11.00	- Surgical
4015.90	- Other:
4103.90.00	- Other
4106.91.00	- In the wet state (including "wet-blue ')
4403.49.00	- Other
4403.99.00	- Other
4407.24.00	Virola, Mahogary
4408.90.00	- Other
4410.39.00	- Other
4411.29.00	- Other:
4412.14.00	- Other plywood, consisting solely of sheets of wood (other than bamboo), each ply not exceeding 6 mm:
4412.99.00	- Other
4421.90	- Other:
4707.20.00	- Other paper or paperboard made mainly of bleached chemical pulp, not colored in the mass
4805.19.00	- Other
4805.24.00	- Of a weight exceeding 150 g/m2
4805.25.00	- Weighing more than 150 g/m2
4820.20.00	- Notebooks
4901.91.00	- Dictionaries and encyclopaedias, and serial installments
5209.42.00	- Woven fabrics of denim ("Denim")
5211.12.00	- In twill, including cross twill or 4
5211.41.00	- Plain weave
5211.42.00	- Woven fabrics of denim ("Denim")
5305.90.00	- Other
5401.10	- Of synthetic filaments:
5402.33.00	- Of polyesters
5402.51.00	- Of nylon or other polyamides
5402.52.00	- Of polyesters
5407.20.00	- Woven fabrics obtained from strip or the like
5509.31.00	- Single
5509.32.00	- Or cabled

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5509.52.00	- Mixed mainly or solely with wool or fine animal hair
5510.30.00	- Other yarn, mixed mainly or solely with cotton
5513.21.00	- Of polyester staple fibers, plain weave
5513.41.00	- Of polyester staple fibers, plain weave
5608.11.00	- Made up fishing Networks
5804.29.00	- Of other textile materials
5805.00.00	Hand-woven tapestries (Gobelins, Flanders, Aubusson, Beauvais and the like) and needle (for example, of "petit point" cross stitch) made in panels.
5811.00.00	Quilted textile products in the piece, composed of one or more layers of textile materials combined with a matter of padding by stitching or otherwise securing, other than embroidery of heading 58.10.
5911.10.00	- Textile fabrics, felt and felt-lined woven fabrics, combined with one or more layers of rubber, leather or other material, of a kind used for the manufacture of card clothing and similar products for other technical purposes, including narrow fabrics of velvet impregnated with rubber, for covering warp
5911.31.00	- Weighing less than 650 g/m2
5911.32.00	- Weighing not less than 650 g/m2
6103.29	- Of other textile materials:
6103.31.00	- Of wool or fine animal hair
6115.11.00	- Of synthetic fibers, of title less than 67 decitex per single yarn
6115.20.00	- Other pantyhose and tights:
6117.90	- Parts:
6301.40.00	- Blankets of synthetic fibers (excluding electric)
6305.33	- Other, strip or the like, of polyethylene or polypropylene:
6306.91.00	Synthetic fiber sails
6306.99.00	- Of other textile materials
6401.92.00	- Covering the ankle but not covering the knee
6404.19.00	- Other
6501.00.00	Helmets without lasting board or profiled wing platters (disks) and cylinders but are cut in the sense of height, felt for hats
6502.00	Hat-shapes, plaited or made by assembling strips of any material, lasting board or profiled wing and no garnish.
6504.00.00	Hats and other headgear, plaited or made by assembling strips of any material, trimmed
68.13.10.00	Brake linings and pads
6910.10.00	- Of porcelain
6910.90.00	- Other
7216.22.00	- T sections
7216.61.00	- Obtained from flat-rolled products
7217.20.00	- Zinc

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7306.30	- Other, welded, of circular cross section, of iron or non-alloy steel:
7310.21.00	- Cans to be closed by soldering or crimping
7313.00	Barbed wire of iron or steel wire (single or double) and strips, twisted, even barbed, of iron or steel, of a kind used for fencing.
7314.31.00	- Galvanized
7321.11	- For gas fuel or for both gas and other fuels:
7321.90	- Parts:
7403.22.00	- A copper-tin (bronze)
7404.00.00	Waste and scrap copper.
7408.21.00	- A copper-zinc (brass)
7605.29.00	- Other
7608.20.00	- The aluminum alloys
7614.90.00	- Other
7801.10.00	- Refined lead
7801.91.00	- Antimony as the principal other element by weight
7903.90.00	- Other
8207.19	- Other, including parts:
8309.10.00	- Cover crown
8309.90.00	- Other
8412.80	- Other:
8413.82.00	- Liquid Elevators
8413.92.00	- Of liquid elevators
8418.10	- Combined refrigerator-freezers with separate external doors:
8419.20.00	- Sterilizers medical, surgical or laboratory
8424.81	- For agricultural or horticultural:
8424.90	- Parts:
8432.10.00	- Ploughs
8432.21.00	- Harrows (scraper) disks
8432.30.00	- Seeders, planters and transplanters
8432.40.00	- Manure spreaders and fertilizer distributors
8433.59	- Other:
8434.10.00	- Milking machines
8434.20.00	- Machinery for the dairy industry
8434.90	- Parts:
8436.80	- Other machines and apparatus:
8438.50	- Machinery for the preparation of meat:

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8438.60.00	- Machinery for the preparation of fruits or vegetables
8438.80	- Other machines and apparatus:
8448.32	- Of machines for preparing textile fibers, other than card clothing:
8477.40.00	- Vacuum molding machines and other thermoforming machines
8480.50.00	- Moulds for glass
8527.21.00	- Combined with sound recording or reproducing apparatus
8702.10	- With piston engine (piston) compression ignition (diesel or semi-diesel):
8704.21	- The maximum gross vehicle weight exceeding 5 t:
8704.31	- The maximum gross vehicle weight exceeding 5 t:
8714.20.00	- From wheelchairs and other vehicles for disabled
9004.90	- Other:
9021.10	- Articles and equipment for orthopedics or fractures:
9021.21.00	- Artificial teeth
9021.29.00	- Other
9606.30	- Button molds and other parts of buttons, button blanks:
9608.10	- Pens:

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Appendix Table XII: Various Important Meetings Held by International Community to Tackle Climate Change

United Nations Conference on Environment and Development (Earth Summit), held in **Rio de Janeiro** on 14 June 1992 was a summit held under the aegis of the United Nations. The issue was sustainable development of countries. It was the planet's first summit to discuss global warming related issues.

The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change. The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries and the European community for reducing greenhouse gas (GHG) emissions .These amount to an average of five per cent against 1990 levels over the five-year period 2008-2012. The major distinction between the Protocol and the Convention is that while the Convention **encouraged** industrialised countries to stabilize GHG emissions, the Protocol **commits** them to do so. Recognizing that developed countries are principally responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities."

The Kyoto Protocol was adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005. The detailed rules for the implementation of the Protocol were adopted at COP 7 in Marrakesh in 2001, and are called the "Marrakesh Accords." **The Kyoto mechanisms** under the Treaty, countries must meet their targets primarily through national measures. However, the Kyoto Protocol offers them an additional means of meeting their targets by way of three market-based mechanisms.

The Kyoto mechanisms are:

- Emissions trading – known as "the carbon market"
- Clean development mechanism (CDM)
- Joint implementation (JI).

The mechanisms help stimulate green investment and help Parties meet their emission targets in a cost-effective way.

The Bali Action Plan is part of the Bali Road Map agreed to at the Thirteenth Session of the Conference of Parties of UNFCCC in Bali in December 2007. The Action Plan encompasses a comprehensive process to enable the implementation of the UNFCCC through long-term cooperative action up to and beyond 2012, by addressing the following pillars: (a) a shared vision for long-term cooperative action, including a long-term global goal for emission reductions; (b) enhanced national/international action on mitigation of climate change; (c) enhanced action on adaptation; (d) enhanced action on technology development and transfer to support action on mitigation and adaptation; (e) enhanced action on the provision of financial resources and investment to support action on mitigation and adaptation and technology cooperation.

Copenhagen Accord, 2009, reaffirms the importance of restricting global temperature rise to 2°C. It is not considered to be a legally binding agreement like the Kyoto Protocol. The Accord requires Annex I signatories to submit individual mitigation targets and non Annex I countries to submit NAMAs. Annex I countries are those member countries of UNFCCC and its Kyoto Protocol that are classified as industrialized countries and as countries with economies in

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transition. Annex II countries, a subgroup of Annex I countries, comprise the developed countries that pay for the costs of developing countries. In addition, there is the group of developing countries (non-Annex I countries). Of particular concern, however, is the fact that the estimated sum of submitted targets by Annex I countries falls markedly short of limiting CO2e concentrations to 450 ppm and the associated rise in global average temperatures of 2°C.

The urgency to tackle climate change was again underscored at **COP16** in Cancún, Mexico, held from 29 November to 10 December 2010 and **COP17 in Durban**, South Africa, held from 28 November to 9 December 2011. The agreement adopted by COP16 called again for a paradigm shift towards building a low-carbon society and establishing a "Green Climate

Fund" worth $100 billion annually by 2020, to assist poorer countries in financing emission reductions and adaptation. It also established a Technology Mechanism, which will consist of a Technology Executive Committee, and a Climate Technology Centre and Network.

COP17 agrees to an extension of the Kyoto Protocol, by five years and to advance the implemention of the Bali Action Plan, agreed at COP 13 in 2007, and the Cancún Agreements. The "Durban Platform for Enhanced Action" commits all countries to cut carbon emissions for the first time. A road map guides countries towards the conclusion of a legal agreement which includes mandatory cuts in carbon emissions for all countries by 2015, but the agreement will only come into affect from 2020 onwards.

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Education
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Somesh K. Mathur, PhD has nearly eleven years of teaching and research experience at the Department of Economics, Jamia Millia Islamia (Central University), Delhi prior to his joining the IIT Kanpur (www.iitk.ac.in) in 2008. While teaching at the Jamia he completed his M. Phil and PhD degrees in economics from the Centre for International Trade and Development, JNU(Jawaharlal Nehru University, New Delhi). He joined as Fellow at the RIS, Ministry of External Affairs, Government of India in April, 2006 on deputation from the Department of Economics, JMI for two years. In 2008, he has joined on permanent basis IIT Kanpur as Assistant Professor of Economics in the Humanities and Social Sciences (H&SS) department of the IIT Kanpur. At present he has been elevated to position of Associate Professor of Economics, HSS, IIT K.

His area of interest lies in efficiency and productivity analysis, new trade and growth theories, Evaluating Economic agreements, convergence issues, TRIPS and other WTO issues. He has participated in various national and international conferences and has published in referred national and international journals like Review of international economics, Geneva Papers on Risk and Insurance, Economic and Political Weekly, Journal of Korean Economy, Indian Economic Review, Journal of Business and Economics, Journal of World Intellectual Property Rights, Journal of Infrastructure Development, Foreign Trade Review, UNESCAP and ADB Publications, among others.

Dr. Mathur has taught papers like Pure Theory of International Trade, Quantitative Methods, Econometrics, International Finance and Banking, Microeconomics and Corporate Finance to the post graduate students of the University. He has also taught national income accounting, mathematical methods of economics, microeconomics and Indian economy at the graduate level. Dr Mathur has been awarded his PhD in Economics in December, 2005 from SIS, JNU and has completed his term as a research fellow at RIS, Ministry of External Affairs, Government of India (www.ris.org.in). He has authored 5 books (including two e-books) on Global Economic Trends and South Asia, Economic Growth and Convergence in Selected South Asian and East Asian Economies: A Data Envelopment Analysis, an e-book on Perspective of Economic Growth in Selected South Asian and East Asian Countries (www.ideaindia.com). He has published his fourth book (e-book) on IT Success Model of India. This is his fifth e-book on Trade in Climate Smart Goods and Specialized Products of Ecuador.

Dr Mathur has also worked as the P3 Economic Affairs officer at the UNESCAP office in Bangkok in 2010 on the project on Trade in Climate Smart Goods.

At present he is attached to the ITT, UTE, Quito under the Prometeo Project of the SENESCYT for four months. He arrived on Sunday, January 1, 2012 in the country to participate as a researcher at Prometheus Programme carried out by the National Secretariat for Higher Education, Science, Technology and Innovation - SENESCYT.

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1. Perspective of Economic Growth and Convergence in Selected South Asian and East Asian Economies, E-Book published by ideaindia.com, London. Growth and Convergence (www.ideaindia.com<http://www.ideaindia.com/>), December, 2006
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MPhil and PhD work

MPhil thesis: Thesis title Pattern of International Trade: A Gravity
Equation Analysis (1997)
PhD thesis: Thesis Title: Perspective of Economic Growth in Selected South
Asian and Easta Asian Countries (2005)

Associations

- Life Member, Indian Econometric Society
- National Knowledge Commission on TRIPS October, 2006 -2008
- National Working Groups on Patents
- International Peace Science Congress, Cornell University since June 2001
- Member International Biometric Society

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