Economic analysis of inclusion of aviation activities in the EU Emission Trading System: EU vs. Non EU airlines, a competitive approach

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May, 2013

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Abstract

In 2003 the European Union (EU) established an emission trading system (ETS) based on Directive 2003/87/EC, hereafter the ETS Directive. The ETS came into force on the 1st of January 2005. The directive is one of the cornerstones of the EU’s policy to fight against climate change with the main objective to reduce emission of greenhouse gases (GHG). In 2008 the EU issued Directive 2008/101/EC, hereafter the Aviation Directive which is an amendment of the previous ETS Directive. With the amendment the EU included aviation activities in the ETS scheme. The decision to include aviation in the ETS has faced a huge opposition from non EU operators due to the fact that not only EU operators have to comply with EU ETS. All operators that operate to- and from the airports of the EU member states are supposed to surrender allowances for their emission of carbon dioxide (CO₂). The including of aviation to ETS should have started on the 1st of January 2012. However the European Commission, hereafter the Commission, proposed to the European Parliament and the Council to defer the requirement to submit allowances for emissions from inbound and outgoing flights in the EU but keep the emission requirements for flights within the EU unchanged. In this thesis an assessment of possible economic effects on aircraft operators and consumers is conducted. The main objective is to assess if, and then how the ETS can affect competition between EU and non EU operators; how airline operators and the non EU states react to the ETS, and if the ETS might eventually have adverse effect in form of carbon leakage. Finally, the legal grounds for a worldwide solution will be assessed and how the International Civil Aviation Organization (ICAO) should react to this debate and come up with a transparent solution in order to reduce emission of CO₂ without distorting competition and jeopardizing sovereignty of ICAO’s member states. Economic analysis of specific rules on aviation in the ETS will be the cornerstone in the analysis in order to assess the legislative decisions by the EU and the ICAO. In order to compare the difference of economic impact of EU ETS and a possible ICAO framework both methods will be introduced. If a transparent solution is to be established, sovereignty of ICAO members needs to be respected. Borders need to be set aside, competition needs to be protected and efficiency needs to be promoted.

Keywords: EU, ETS, ICAO, CO₂, aviation, competition, economic analysis of law, consequence based arguments
Abbreviations

A4A: Air Transport Association of America
C02: Carbon dioxide
EC: European Community
ECJ: European Court of Justice
EIT: Economies in transition
ETS: Emission Trading System
EU: European Union
GIACC: Group on International Aviation and Climate Change
GHG: Greenhouse Gases
IATA: International Air Transport Association
ICAO: International Civil Aviation Organization
IETA: International Emission Trading Association
NACC: National Airlines Council of Canada
NAP: National Allocation Plan
OECD: Organization for Economic Cooperation and Development
OXERA: Oxford Economic Research Associates
PATA: Pacific Asia Travel Association
UN: United Nations
UNFCCC: United Nations Framework Convention on Climate Change
WWF: World Wildlife Fund
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1. Introduction

In 1997 the Conference of the Parties under the United Nations Framework Convention on Climate Change (UNFCCC) made a decision on the legal binding obligations on reduction of Greenhouse gases by signing the Kyoto Protocol. The protocol sets binding targets for the European Community and other 37 industrialized countries (Annex 1 parties) and commits them to reduce GHG emissions. In order to keep track of CO₂ emission the Kyoto Protocol established a frame for an international emission trading system that can be used by the Annex 1 parties as means to fulfill their obligations. The EU is the only Annex I party that has decided to establish a mandatory cap and trade system under the Protocol, some other parties have made voluntary systems. Member States of the European Union are committed by the Kyoto Protocol to reduce emission of GHG. The EU has put its effort into the climate fight in order to assist their member states to reach the emission targets set in the Kyoto Protocol. In 2003 they issued the ETS Directive that limits pollution of GHG among companies located within the EU. It’s main objective is to reduce pollution within the EU and show a social responsibility in the pollution fight (European Commission, 2009). In 2008 the EU issued a new version, The Aviation Directive that included aviation in the ETS. The most surprising change that was introduced in the Aviation Directive was that non-EU airlines had been included in the international aspect of the EU ETS (Directive 2008/101/EC, 2008). The including of aviation in the ETS, especially the international aspect has faced a lot of opposition in the aviation society. Many non-EU countries such as USA, China and Russia oppose EU’s decision to include non EU operators in the ETS (Green Air, 2012).

Legislators have a very powerful tool in their hands in the fight against global warming. They can create a framework that polluters are supposed to work within, and if they go outside the box defined by law they will be punished. However, legislators need to be aware of what kind of effects might come along with the law they set. Economic analysis of law is an essential factor in policy-making in order to enhance efficiency and effectiveness in policy making. To assess if the Aviation Directive is an efficient and effective way to reach policy objectives of the EU, an economic analysis of the Directive is needed. In order to get a clearer picture of possible effects on competition between EU and non EU operators, several case studies are shown in chapter 6 where
EU operators are put at a competitive disadvantage compared to non EU operators. In 2006 a working group of the European Commission made an impact assessment of the inclusion of aviation activities in the ETS. Their conclusion was that the inclusion of aviation activities would not have serious effects on airline operators as airlines could pass on the ETS compliance cost to consumers; price elasticity of EU consumers is quite low and airline operators could even gain in form of windfall profits (European Commission, 2006(a)). Stakeholders such as associates of European aircraft operators did not agree to the assumptions made in the Commission’s report. Therefore they hired external specialists to perform another assessment report. Ernst & Young and York aviation (2007), found out that most of the assumptions made by the Commission were not realistic as it is not possible to compare aviation to other markets that have entered the EU ETS, such as the electricity sector. In chapter 8 the reports by the Commission on the one hand, and Ernst and Young and York aviation acting on behalf of association of European aircraft operators on the other hand, are compared and economic effects are assessed.

1.1. Problem Statement

Currently the future of the inclusion of aviation to the scheme is in a fog. In November 2012 the European Commission issued Memo 12/854 to defer the requirement to include inbound and outgoing flights from/to the EU to the ETS. According to the proposal from the European Commission (2012(b)), the decision is intended to reinforce this positive momentum, and to enhance the chances of a successful outcome of the 2013 ICAO assembly. The Commission believes that ICAO can develop and adopt a framework facilitating States' application of market based measures to international aviation. Due to high opposition from non-EU countries to the including of aviation activities to the ETS, the EU seems to be willing to give non EU countries the chance of finding a global solution to reduce emission of CO₂ from aviation. The EU has stopped the clock for one year to give ICAO a chance to find a global solution. Obligations to submit allowances for incoming and outgoing flights under the ETS will be temporarily deferred, however the scheme will remain unchanged for flights within the EU. If ICAO does not manage to find a global solution this year the EU will start the clock again and charge all operators that operate to and from the EU from 1st of January 2014, allowances for their emission of CO₂ regardless of the operator’s origin (European
Commission, 2012(c)). Since the EU issued the Aviation Directive there has been a serious conflict between EU and non-EU countries. The main reason is that large independent countries such as USA, Russia, India and other large countries find that the EU is stepping on their toes and limiting their sovereignty in global aviation. This debate has caused high tension among EU and non-EU countries due to political sensitivity of the issue, especially after the ruling of the ECJ in case 366/10. Some are even afraid that this debate might eventually lead to a trade war if a global solution is not found in the next year or so (Chen & Tin, 2012).

The main problem analysis in the following paper will emphasize on the economic effects of the Aviation Directive. First part of the economic analysis will focus on possible economic effects of the initial Aviation Directive and how competition between EU and non EU airlines might be affected. In the second part the focus will be on assessing how the proposal of the Commission to defer submission of allowances for inbound and outgoing flights to/from the EU can affect competition between EU and non EU airlines. Will the Aviation Directive affect competition at all, and if so, how? Finally, the legal grounds for a world wide solution will be assessed, and how the ICAO should find a worldwide nondiscriminatory solution. A fair solution that keeps all operators, regardless of their origin, at the same table without distorting competition is essential in order to create an effective and efficient emission trading system.

1.2 Methodology

The main objective of the thesis is to evaluate economic effects of the EU ETS, mainly on competition between EU and non EU operators. Economic analysis of law and consequence based arguments will be the cornerstone in the analysis on how certain versions of the ETS Directive can affect competition between EU and non EU operators and other economic aspects such as effects on EU hubs and consumers. Consequence-based arguments are an approach that should be used by all legislators in order to understand the possible economic effects that may follow when new legislation is issued, or current law changed. Material issued by the EU will be used throughout the thesis, such as ETS Directive and the Aviation Directive, summary of case 366/10 and various papers concerning the ETS. The UNFCCC and IPCC will also be used as a substantial contribution to the thesis in form of environmental information as well as legal material.
Emission calculator of the ICAO will be used as a main tool to calculate emission of certain routes that will be used in order to analyze possible competitive effects of the ETS. The calculator is also used to evaluate how the ETS can have adverse effects, or in other words, how the market might react to the ETS by possibly using less efficient routes in order to avoid falling under the ETS and therefore cause carbon leakage. A few case studies for various market conditions will be conducted in order to get a better picture of possible effects of the Aviation Directive on competition. Impact Assessment from the Commission and impact assessment from Ernst and Young and York Aviation will be used as guidance in the economic part of the thesis.

2. Climate Change

Global warming or climate change is a massive problem in modern world and can be described as one of the most frightening phenomena that people on the Earth are facing nowadays. Global warming is caused by various factors, both natural- and man-made (Filho, 2011). According to the UNFCCC, greenhouse gases (GHG) refer to carbon dioxide (CO₂), nitrous oxide, methane, ozone and chloro-fluorocarbons resulting from both production and consumption from human activities. Emission of such gases causes the greenhouse effect which is also known as global warming (Simeonova, 2005).

2.1. Environmental effects of GHG

Greenhouse gases such as CO₂, nitrous oxide and methane are classified as long-lived greenhouse gases. They are chemically stable and can persist in the atmosphere for decades or even centuries. Due to their long lifetime they become well mixed throughout the atmosphere and are difficult to remove. CO₂ is an extremely persistent type of gas because it is continuously cycled between the atmosphere, oceans and land biosphere (Solomon, et al., 2007). According to a report from the Intergovernmental Panel on Climate Change (IPCC), emission of GHG to the environment can have severe effects on climate change and other aspects of the environment. The IPCC working group claims that “Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases” (Bernstein, Bosch, Canziani, & Zhenlin, 2007, p. 31).
The group also presented few examples in their report of how natural systems are affected by climate change:

- Enlargement and increased numbers of glacial lakes
- Increasing ground instability in permafrost regions, and rock avalanches in mountain regions
- Changes in some Arctic and Antarctic ecosystems, including those in sea-ice biomes, and also predators high in the food chain
- Increased runoff and earlier spring peak discharge in many glacier- and snow-fed rivers
- Warming of lakes and rivers in many regions, with effects on thermal structure and water quality
- Earlier timing of spring events, such as leaf-unfolding, bird migration and egg-laying
- Poleward and upward shifts in ranges in plant and animal species (Solomon, et al., 2007).

Figure I: How emissions of GHG affect Climate Change

Source: (Solomon, et al., 2007)

2.2. How do Aircraft affect climate change

Aircraft emit GHG such as CO₂, methane and nitrous oxide directly into the upper troposphere and lower stratosphere where they have serious impact on the composition of the atmosphere. Emission of such gases triggers formation of contrails which eventually might lead to cirrus cloudiness and therefore climate change (Penner, Lister, Griggs, & et.al., 1999).
According to the Commission, emission of GHG is estimated to be 70% higher than 2005 level by 2020. Nevertheless, fuel efficiency on new aircrafts is estimated to increase by 2% per year (European Commission, 2013). Therefore it will be quite difficult for aircraft manufacturers to follow increased emissions with improvements in fuel efficiency of aircrafts. And even though aircraft manufacturers will be able to increase fuel efficiency by 2% each year it does not mean that airlines will be equipped with the newest aircraft types. It is a huge investment for airlines to renew their fleet with the newest and most energy efficient equipment and not many airlines are financially capable of such dealings.

3. UNFCCC

The United Nations Framework Convention on Climate Change (UNFCCC) was adopted at the Rio Earth Summit in 1992. Countries joined an international treaty to cooperatively find a way to limit average global temperature increases and climate change. The UNFCCC entered into force on 21st of March 1994 and currently 195 countries have ratified the Convention (United Nations, n.d (a)). The main objective of the UNCCC is stabilization of GHG emissions to the atmosphere at a level that would prevent dangerous effects on the climate system. According to article 2 of the UNFCCC the aim of the parties is to establish a system that can achieve GHG emission reduction within a sufficient timeframe in order to allow ecosystems to adopt naturally and enable economic development to continue in a normal way (United Nations, 1992).

3.1. The UNFCCC Parties

The UNFCCC divides countries into three main groups based on their differing commitments to the convention.

- **Annex I**: Parties included in this category are the industrialized countries that were members of the OECD in 1992 along with countries with economies in transition (EIT) such as the Russian Federation, the Baltic countries and several central- and Eastern European states.

- **Annex II**: Parties included in this category consist of the OECD members of Annex I. but the EIT countries are excluded. Those parties are required to assist the
developing countries to undertake GHG emission reduction under the convention by providing financial resources. They are also supposed to take all practicable steps to promote the development and transfer of knowledge such as environmentally friendly technologies to the EIT and developing countries.

- Non-Annex I: Parties included in this category are mostly developing countries. The Convention recognizes certain groups of developing countries as being really vulnerable to adverse effects of climate change. The Convention recognizes the needs of these vulnerable countries and emphasizes on given special assistance to these countries by providing investment, insurance and transfer of technology.

The United Nations classifies 49 countries as least developed countries and they are given special consideration under the Convention as they have limited resources to respond to climate change and react to the adverse effects (United Nations, 1992).

According to article 3 of the convention, “The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities”. Thus the developed countries are supposed to lead the battle against climate change as they have better resources to deal with climate change than countries in the non-Annex I category of the Convention (United Nations, 1992).

3.2. Kyoto Protocol

In 1995 parties of the UNFCCC recognized that emission reduction provisions laid down in the Convention were inadequate. They wanted more effective solution to fight climate change. They entered negotiations in order to strengthen the global fight against climate change and the Kyoto Protocol was the outcome after two years of negotiations (United Nations, n.d. (b)). The Kyoto Protocol is an international agreement that commits its parties to reduce emission of GHG in the atmosphere. Currently there are 192 parties, thereof 191 States and 1 regional economic integration organization, the EU. The Protocol was adopted in Kyoto, Japan in December 1997 and came into force early 2005. The agreement is linked to the UNFCCC and sets binding emission reduction targets on its parties. The implementation plan of the protocol was adopted in
Marrakesh, Morocco in 2001 and is known as the Marrakesh Accords, and there the decision was made to start the first emission commitment period, from January 2008 to December 2012. In Doha, Qatar in December 2012 the Doha Amendment to the Kyoto Protocol was issued for the commitment period, 2013 to 2020. The main change of the Protocol was new commitments of Annex 1 parties of the protocol and a revised list of GHG to be reported by the parties of the commitment (United Nations, n.d. (b)).

3.3. Mechanism

Under the Kyoto Protocol parties are supposed to meet their emission targets on national grounds. Nevertheless the protocol also gives the parties a chance of additional external participation. The protocol offers three ways of market based mechanism:

- **International Emission Trading:** According to article 17 of the Kyoto Protocol, countries that have emissions units to spare or unused allowances are allowed to sell the excess allowances to countries that have exceeded their own targets. This is now known as the carbon market where a new commodity has been created (United Nations, 1998).

- **Clean Development Mechanism (CDM):** According to article 12 of the Protocol, countries that have an emission reduction or emission limitation commitment under the Kyoto Protocol are allowed to implement emission reduction projects in the developing countries. The Mechanism gives the industrialized countries the opportunity to establish projects in the developing countries and hence meet their responsibility in the UNCCC and at the same time stimulate development and emission reduction in developing countries (United Nations, 1998).

- **Joint Implementation (JI):** According to article 6 of the Kyoto Protocol, countries that have emission reduction or emission limitation commitment under the Kyoto Protocol are allowed to implement emission reduction projects in other countries in the same category, Annex B. The JI option gives countries the chance of fulfilling their targets of the Convention in a flexible way and the host country will benefit from technical transfer as well as foreign investment (United Nations, 1998).
3.4. The EU and the UNFCCC

The EU joined the UNFCCC in 1993 after the Council’s approval with Decision 94/96/EC. The ultimate objective of the Convention is to achieve stabilization of GHG emission to the environment at a level that prevents dangerous effects on the climate system (Directive 2003/87/EC, 2003). On 31st of May, 2002 the EU ratified the Kyoto Protocol with Decision 2002/358/EC (European Council, 2002). Under article 4 of the Kyoto Protocol parties are allowed to fulfill their emission target commitments under article 3 jointly acting in the framework of a regional economic integration organization (United Nations, 1998). According to UNFCCC, article 6, definition 6, “Regional economic integration organization” means an organization constituted by sovereign States of a given region which has competence in respect of matters governed by this Convention or its protocols and has been duly authorized, in accordance with its internal procedures, to sign, ratify, accept, approve or accede to the instruments concerned” (United Nations, 1998). All 27 member states of the EU meet internally to agree on common negotiation topics before conferences of the UN parties. Then the country that holds the EU presidency speaks on behalf of the EU and its member states as a regional economic integration organization. The EU member states only have votes, the EU as such does not have a separate vote in the UNFCCC as per article 22 (United Nations, 1998).

3.5. The ICAO and the United Nations

GHG emissions from domestic aviation operations fall under national allowances according to the UNFCCC and the Kyoto Protocol. On the other hand, international flights are within the competence of ICAO. According to article 2 of the Kyoto Protocol “The Parties included in Annex I shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively” (United Nations, 1998).

On the 36th session of the ICAO Assembly in September 2007 the Assembly recognized the critical importance of providing leadership to international civil aviation on limiting its emission that contribute to global climate change. In response to this awareness the ICAO established a group on international aviation and climate change (GIACC). The
group established a program of action to reduce the impact of GHG emissions from international aviation. Their main objective is to emphasize on fuel efficiency, technology development, improved air traffic management and infrastructure use, market base measures and regulatory measures. They will also facilitate access to assistance, especially for developing countries. However the program of action does not put any specific obligation to individual states (ICAO, 2009).

4. EU Emission Trading System

The EU emission trading system is the key tool of the EU to comply with their part of the Kyoto Protocol agreement. The ETS was launched in 2005 with Directive 2003/87EC (The ETS Directive) as a cap and trade principle and is the world’s first international company-level cap and trade system. It covers approximately 11,000 heavy energy consuming installations in power generation and manufacturing (European Commission, 2009).

![Figure II: Total greenhouse gas emissions by sector in EU-27, 2009](source)

The EU ETS was initially divided into three phases, the first phase ran from 2005-2007 and was a pilot phase of learning by doing. Infrastructure for monitoring, reporting and verifying actual emission was established and emission data were used to set basis for phase 2. The second phase from 2008-2012 was the first commitment period under the
Kyoto Protocol. In this period the EU and its member states had to comply with Directive 2003/87/EC and surrender allowances for their emission of GHG. For the second phase the Commission reduced the volume of emission allowances permitted to 6.5% lower than the 2005 level. The third phase started on the 1st of January 2013 and runs throughout 2020. The main aim in this phase is to encourage long term investment in emission reduction and strengthen and extend the ETS to achieve EU’s climate and energy targets before 2020 (European Commission, 2009). The ETS is built on the philosophy that creating a price for carbon generates the most cost effective way to achieve reduction in emission of GHG that is needed in order to prevent climate change reaching dangerous level. The ETS is based on four fundamental principles:

1. It is a cap and trade system
2. Participation is mandatory for businesses in the sectors covered
3. It contains a strong compliance framework
4. The market is EU wide but accepts credits from emission saving projects carried under the Kyoto Protocol’s Clean Development Mechanism (CDM) and Joint Implementation (JI) Instrument.

Source: (European Commission, 2009)

4.1. Aim of the ETS

The main objective of the ETS is to fight against climate change by reducing the emission of certain GHG and reach EU’s member states’ targets in the Kyoto Protocol. The EU is committed to reduce its emission of GHG by at least 20% of 1990 levels before 2020. The ETS is also supposed to promote usage of renewable energy and their aim is to get 20% of EU’s energy from renewable sources by 2020 (European Commission, 2009). Within the ETS, factories, power plants and other emitters receive emission allowances every year and they can sell excess allowances to other companies which need more in order to have allowance to cover all of its emission. The aim is to help the EU member states to achieve their commitments to reduce emissions in a cost effective way. By allowing companies participating in the ETS to buy and sell emission allowances, emission cuts can be achieved at least cost. And by implementing the ETS and putting price in each tonne of CO₂ emitted the scheme is driving investment in low carbon technologies. Company boards have been forged to pay attention to the cost of emissions and therefore they seek to find innovative and least cost ways to fight climate
change. If companies do not have enough allowances to surrender their emission at the end of every year, heavy fines are imposed, €100 per tonne of CO₂ emitted (European Commission, 2009). By implementing this system the EU is trying to reduce emission of greenhouse gases into the environment by encouraging EU emitters to reduce pollution by operating in a more environmental way. It is quite necessary for companies to take the ETS seriously and do whatever they can do reduce emission because the number of allowances under the ETS will be reduced over time.

4.2. The ETS Directive

When the EU and it’s member states ratified the Kyoto Protocol in 2002 they had committed to reduce emission of GHG by 8% in 2008-2012 calculated on emission levels of the countries in 1990. The ETS Directive was established to help the member states to reach the commitments made in the Kyoto Protocol. In article 1 of the Directive it is stated that the scheme is established “In order to promote reduction of GHG in a cost effective and economically efficient manner” (Directive 2003/87/EC, 2003). In Annex II GHG included in the scheme are defined as, Carbon dioxide, Methane, Nitrous Oxide, Hydrofluorocarbons, Perfluorocarbons and Sulphur Hexafluoride. When the EU ETS came into force on January 1st, 2005 all activities listed in Annex 1 of the Directive had to comply with the ETS. The sectors listed in Annex 1 were, the energy sector, iron and steel production and processing, the mineral industry and the wood pulp and paper and board industry. Companies in these sectors and emitted specific GHG related to their activity had to receive permit from the competent authority for their emissions. According to article 10 of the ETS Directive, 95% of allowances were allocated for free between 2005 and 2008, but the free proportion was reduced to 90% from 2008 to 2013 (Directive 2003/87/EC, 2003). In sectors other than power generation the ETS is increasingly moving towards auctioning of allowances. Allowances that are not allocated for free will be auctioned. The European Commission is aiming to stop free allocation of allowances by 2027 the latest. Auctioning is the default method in allocation of allowances within the ETS and in 2013 more than 40% of all allowances will be auctioned (Memo /10/338/EC, 2010). Under article 9 of the Directive each EU member state is required to come up with a National Allocation Plan (NAP). In these plans, member states need to set out the number of allowances they intend to allocate at a given period of time and how the
country will allocate the allowances. NAP’s need to be submitted to the Commission at least 18 months before the start of each commitment period. The Commission can reject or accept the plan but if accepted each country can install the plan via its national Emission Trading Registry (Directive 2003/87/EC, 2003).

As mentioned above the ETS was initially divided into three phases: from 2005-2008, 2008-2012 and finally 2013-2020. In December 2008 the 2020 Climate and Energy Package was agreed by the Council and the Parliament. The package included revision of the ETS Directive with focus on the 3rd ETS phase, from 2013 to 2020. Directive 2009/29/EC (The revised ETS Directive) was agreed in December 2008 and finally adopted in April 2009. The revised ETS Directive brought significant changes to the ETS as from start of the third phase. The main change in the revised ETS Directive was introduction of centralized EU wide cap on emission where allowed emission of GHG would decline over time in order to delivering a reduction of GHG emission by 21% of 2005 level by 2020. According to article 9 of the revised ETS Directive, the quantity of allowances issued each year onwards from 2013 shall decrease in a linear manner or annually by 1,74% of the allowances issued by member states in the 2nd phase of the ETS, from 2008-2012. The revised ETS Directive brought more harmonized rules on free allocation with the aim to move towards higher proportion of auctioned allowances. According to article 10, Member States shall auction all allowances which are not allocated for free. The revised ETS Directive also introduced new GHG and included new sectors, such as aviation to the scheme, however aviation was brought to the scheme with Directive 2008/101/EC (Directive 2009/29/EC, 2009).

4.3. The Linking Directive

According to article 30(3) of the initial ETS Directive, it is desirable and important to include Joint Implementation (JI) and the Clean Development Mechanism (CDM) with the ETS in order to reduce GHG emissions and increase the cost effectiveness of the ETS. Therefore the emission credits from both JI and CDM will be recognized as part of the ETS, operators are allowed to use credits from project based mechanism to fulfill their obligations under the ETS. The use of such mechanism will be supplemental to domestic action as stated in articles 6 and 12 of the Kyoto Protocol as described in chapter 3.2 above (Directive 2003/87/EC, 2003). Directive 2004/101/EC, hereafter the Linking Directive was adopted in 2004 in order to allow use of credits from Kyoto
Protocol’s project mechanism in the ETS. In preamble of the Linking Directive the objective is defined as to promote a win-win situation. This option will give member states the opportunity to reduce the compliance cost of the Kyoto Protocol by using JI and CDM. On the other hand the developing countries (host countries) will receive foreign investment and knowledge transfer in form of know-how when they participate in CDM. The developed countries will be able to assist the developing countries to promote a sustainable development in reduction emission of GHG (Directive 2004/101/EC, 2004).

4.4. The Aviation Directive

In 2005 the EU policy makers turned their attention to the aviation sector and started preparing including aviation to the ETS. However at that time aviation only accounted for less than 3% of global emission of CO₂. The EU had realized that aviation carbon emission had increased extremely between 1990 and 2006, or approximately by 98%. They also forecasted that aviation emission would grow by 667% from 2006 to 2050 (IETA, n.d.).

Figure III: Relative (%) change in emissions by sector in EU-27, 1990 -2010

Source: (European Environment Agency, 2012)

The EU policy makers realized how fast the aviation sector was growing and that they would need to react in order to reduce emission from aviation by encouraging airline operators to find more efficient ways of operation. In November 2008 Directive 2008/101/EC (The Aviation Directive) was adopted. The Aviation Directive was amendment of the initial ETS Directive so as to include aviation activities in the scheme for greenhouse emission allowance trading. The Aviation Directive came into force
January 1st 2012. From beginning of 2012 operators should have surrendered one allowance for each tonne of CO₂ emitted on flights to, from and within the EU. According to Annex I of the Aviation Directive, “Flights which depart from or arrive in an aerodrome situated in the territory of a Member State to which the Treaty applies”. According to the de-minimis clause in Annex 1 of the Aviation Directive, commercial air transport operators that fly fewer than 243 flights per period for three consecutive four month period or have total annual emission lower than 10,000 do not need to surrender allowances. Flights such as military flights, search and rescue flights, transport of Government Ministries Operators are also excluded from the Aviation Directive (Directive 2008/101/EC, 2008).

4.5. Allocation of allowances

The EU used historical annual aviation emissions of CO₂ from 2004-2006 to calculate a baseline for allocation to aviation under the ETS. The baseline was published in March 2011 and the outcome was 221 million tonnes of CO₂ (IETA, n.d.). The cap of allocation allowances in aviation in 2012 was set at 97% of the historical baseline. For the period from 2013 the allocation level was lowered to 95% of the historical baseline (Directive 2008/101/EC art. 3c). According to article 3(d) of the Aviation Directive, allowances are handed out to operators according to transport data of their operation in 2010. This baseline data will determine the number of allowances handed to operators for period of nine years, 2012-2020. Operators get 85% of their historical transport data from 2010 for free in 2012. In the period 2013 to 2020 the proportion will be reduced to 83%. In 2012 and 2013 15% of the allowances shall be auctioned and the percentage might increase as a part of a general review of the Directive (Directive 2008/101/EC, 2008). A small proportion of allocated allowances or 3% will be set aside in a special reserve for aircraft operators. E.g. operators that starts operation of aviation activity that is listed in Annex 1 of the Aviation Directive. By adding this clause to the Directive, the EU is apparently trying to avoid entry barrier effects of the Aviation Directive. Operators that exceed their free allocation limit have the option to buy extra tonnes of CO₂ allowances in order to surrender the appropriate amount of allowances for each year. On the other hand if they have excess emission allowances they can sell it, and that is the reward operators get for reduced emission of CO₂. The majority of airlines that operate to, from and within the EU are required to monitor and report their
emissions, regardless of their origin or base. Operators must then surrender emission allowances to the competent authority according to last year’s emission report (European Commission, 2009).

4.5.1. Non-compliance of operators

According to article 16 of the Aviation Directive, Member States are responsible to publish names of aircraft operators who do not surrender sufficient allowances under the Directive. Member States do also need to make sure that those operators that do not surrender sufficient allowances before the 30th of April for previous year shall pay penalty for excess emission of Co2. Those who do not comply with the Directive face a penalty of €100 per missing allowance in addition to the normal allowance fee. If the aircraft operator fails to comply with the Directive and does not surrender the appropriate amount of allowances nor pay the penalty it´s member state may request the Commission to impose an operation ban on the aircraft operator concerned (Directive 2008/101/EC, 2008).

This is a clear example of how legislators can initiate legislation in order to achieve set goals. Cooter and Thomas claimed in the book Law and Economics that “law is an obligation backed by state sanction. People respond to more severe legal sanctions by doing less of the sanctioned activity” (Cooter & Ullen, 2012). That is exactly how legislators manage to reach their goals, by putting severe enough sanctions on non-compliers.

4.6. Non-EU operators

When the EU issued amendments of the ETS Directive with the Aviation Directive substantial changes were made to article 3(b)(r). In the Aviation Directive it is stated that all aviation activities which depart from an aerodrome in the territory of an EU member state and those which arrive in the aerodrome from a third country fall under the ETS. This is called attributed aviation emissions (Directive 2008/101/EC, 2008). That means that the ETS not only includes EU airlines, non-EU operators that operate to, from and within the EU are also included in the scheme. The Directive is meant to be non-discriminatory according to section 9 of the preamble and treat all airlines, EU and non-EU in the same way (Directive 2008/101/EC, 2008).
4.6.1. Opposition from Non-EU operators

Due to attributed aviation emissions under the ETS the scheme has faced a lot of opposition among non-EU countries that operate to/from or within the EU and are hence supposed to comply with the ETS. India, China, USA, Russia and dozens of other major countries have opposed the EU ETS, both on policy and legal grounds. Martin Craigs, the chief executive officer of the Pacific Asia Travel Association (PATA) claims that the debate over the ETS is not about the amount of money as the charges of the ETS are not that high “It is all about sovereignty, it is not about the money” (Gao & Deschamps, 2012, p. 8). Some of the countries are even taking serious actions against the EU. The Chinese government has refused to allow Hong Kong Air to buy 10 Airbus A380s with a list price of USD3.8 million and orders for 45 Airbus A320s from several Chinese carriers have been suspended. According to Aude Lebas, Airbus spokeswoman “There is a growing threat of retaliatory action against European aviation business, this is a real threat for us” (Dron, 2012, p. 56). China might also retaliate by limiting EU carrier overflying rights, restriction on aircraft types used on certain routes (Airbus) and refusal on traffic rights. According to Geert Sciot, spokesman of the Association of European Airlines such measure could have serious effects, “such measures would create serious economic strains between the EU and China” he also claims that aviation emission is a global issue and should therefore not be addressed with a local European initiative (Gao & Deschamps, 2012, p. 8). Lufthansa one of the biggest EU airline has also faced serious problems due to the ETS. According to its spokesman, Aage Dunhaupt, Lufthansa has already been refused to use its A380 aircrafts by a non-EU nation on a route and he adds that “If that refusal spread to other destinations we have a big problem” (Dron, 2012, p. 56). Nevertheless there seems to be a big difference in calculated effects of ETS on Chinese airlines. Chine Air Transport Associate estimates the ETS will cost Chinese airlines USD 123 million in 2013 and more than three times as much in 2020. On the other hand the European Commission claims that such calculations are overestimated and the cost of complying with ETS would be closer to USD2.5 million in 2012 (Gao & Deschamps, 2012). The US Congress seems to be very upset with the Aviation Directive as well, and according to Ray LaHood, secretary of the US Department of Transportation, the Secretary of State Hillary Clinton is looking into some enforcement measures. Such measures might forbid US operators to comply with the ETS (Dron, 2012). The implementation of ETS to aviation has apparently
caused a serious debate in the aviation sector and some might say that eventually this
debate could lead to a trans-Atlantic trade war (Faber & Brinke, 2011).

4.7. Case 366/10

In beginning of 2011 the legal validity of the EU ETS applied to aviation was
challenged. The case was instigated by the Air Transport Association of America (A4A)
and supported by few other aviation parties, such as IATA and NACC. A4A and their
alliances brought the case to the High Court of Justice of England and Wales against
UK’s Secretary of State for Energy and Climate Change to challenge the
implementation of the Aviation Directive in UK. A4A claimed that the Aviation
Directive that included international aviation activities in the ETS, infringed certain
principles of customary international law and several provisions of the Kyoto Protocol,
Chicago Convention and the Open Skies Agreement. They also stated that the ETS
infringed sovereignty of airspace of non-EU countries and it added an unlawful charge
of fuel tax in breach of the Chicago convention. To test the legal validity of the
Directive, and to ascertain if it infringed international law, the High Court of Justice of
England and Wales referred the case to the European Court of Justice (ECJ). In
December 2011 the ECJ issued a judgment concluding that Directive 2008/101EC as
concerns aviation included in ETS is valid. The ECJ found that application of ETS to
aviation infringes neither international law at issue nor the Open Skies Agreement (Case
366/10/EC, 2011). Above conclusion of the ECJ is really important and will act as a
precedent case for other parties that oppose the Emission Trading System applied for
aviation. The judgment has a significant meaning for competition. Now non-EU
airlines are supposed to comply with the ETS in same way as EU-airlines. That means
that all airlines that operate to, from and within the EU are sitting by the same table and
therefore the ETS will not have redistributive allocation effects. The European Union’s
competition policy is all about increasing and protecting consumer welfare standards.
The policy’s main objective is to protect effective competition that brings benefits such
as lower prices, higher quality, wider selection of goods and services and innovation to
consumers (Drexl, Joel, & Idot, 2009).
4.8. International part of ETS on ice

On the 12th of November 2012 the European Commission issued memo/12/854 announcing the intention to put on hold the inclusion of the international aspect of the ETS until after the ICAO General assembly in September 2013 (European Commission, 2012(c)). The reason for putting the inclusion of international flights on hold is that at the ICAO council’s meeting 9th of November 2012, a significant progress was made in finding a global market based measure through a high level ICAO group. The EU hopes that at the 2013 ICAO assembly a global market based measure with a realistic timetable and roadmap will be agreed upon. A framework is needed that will urge States to avoid market distortions, limit administrative complexity and promote effective coverage of international emissions (European Commission, 2012(b)). The proposal of the European Commission to defer the inclusion of international flights in the ETS is definitely due to high opposition in the global aviation industry. However the Commission stated in their announcement, that inclusion of international flights in ETS was deferred due to substantial progress at the ICAO table. But even though they were forged to stop the clock on international flights in the ETS they managed to open up the discussion and forge ICAO members to come up with a global framework.

5. Law and economics

The phrase law and economics refers to economic analysis of law. Modern law and economics dates from 1960’s when the Nobel Prize winner Ronald Coase published The Problem of social cost (Rubin, Law and Economics, n.d.). Law and economics was acknowledged as a subfield of the science of economics in 1993 when the Journal of Economic literature classified the subject as an official field of economics (Cooter & Ullen, 2012). The general theory explains that law is best viewed as a social tool that generates economic efficiency and economic analysis are an ideal tool to guide legal practice. For the last three decades law and economics was mainly used in North America but in last decades it is rapidly increasing in Europe as well (EALE, n.d.).

5.1. Economic analysis of law

Law and economics can create a framework that predicts legal outcomes with economic tools and how legislation should be used to improve market conditions (Butler, 2011).
The use of economics in analysis of law has provided scientific behavioral theory to predict how people respond to law and what effect legal sanctions will have on behavior. Economists can also bring a good value to legislation-setting by predicting the distribution of income. They can predict who really bears the burden of alternative taxes (Cooter & Ullen, 2012). The connection between law and economics is a very important factor when it comes to evaluating the ETS: How such emission taxes can affect efficiency, and how redistributive allocation effects can occur. However, such analysis will be evaluated later in the thesis. When legislators are designing new- or making amendments to current law they need to have economics in play. They should try to let their decisions promote Pareto improvements in order to avoid distorting competition. A Pareto improvement makes at least one person better off without making anyone else worse off (Butler, 2011). However there are many policy areas where a large and diversified population is affected. The Pareto criterion assumes no negative externalities and has therefore significant limits as a normative concept (Solum, 2012). The Kaldor-Hicks criterion was developed to address this limitation. Kaldor-Hicks improvement is a situation where the so-called winners of the policy change would be able to compensate the losers of the change and still be better off and therefore fulfill the Kaldor criterion. However, the losers should not be able to bribe the winners in order to avoid the change and therefore fulfill the Hicks criterion (Reckon, 2010). Even though economists can predict efficiency and distribution of certain policies, their role should be limited when it comes to policy-making. Richard Posner a legal theorist and an economist who has brought great contribution to the law and economics discussion, has defined the limitation of economist’s role in policy-making. He claims in the first edition of his book, Economic Analysis of law, that “Despite the use of terms like value and efficiency, economics cannot tell us how society should be managed”. He also adds that economists can certainly tell us something about distributive consequences of various policies but the bottom line is that consumer satisfaction should be the dominant value of society. Therefore economist’s contribution to legal system should be limited to predicting the effect of legal rules on grounds of distribution of income and wealth (Posner R., 1973).
5.2. The Three enterprises of law and economics

Specialists in law and economics have defined three closely related aspects of economics analyses of law.

5.2.1. Positive Economics

First, positive economics, or the prediction of what economic effects particular legal rules will have. Positive economics is a major part of economics that uses assistance from empirical tools and mathematical models in order to understand the connection between various variables and how change in one variable can affect the other. A good example of such connection is the supply and demand model where connection between price and demand is elaborated (Friedman M., 1984). Policy makers at the EU level must, at least to some extent, have used positive economics in their analyses. They should have thought of what effect the ETS can have on competition in the aviation industry and how the system might have adverse effects, i.e. lead to a carbon leakage. The policy makers also had to forecast who will bear the burden of the tax: will it be passed on to consumers, or will the airlines take the hit and reduce their own profits. If they pass the tax on to consumers, demand for their service might decline, but if the airline take the hit and possibly accept reduced profits, they will have less money to invest in more efficient fleet or technology to reduce CO$_2$ emission and therefore the system might have adverse effects. Economic analyses help people to understand the consequences of both legislation-setting and legal decisions. Some effects are not obvious beforehand and therefore economic analyses are an important tool in order to describe possible economic effects. In chapter 6, positive economics will be used to assess possible economic effects of the Aviation Directive. Assumptions will be made and used as means to try to understand how airlines might react to the Aviation Directive, and how competition between EU and non EU airlines might be affected.

5.2.2. Descriptive Economics

Second, economic analyses can be used to explain why particular rules exist, that is called descriptive economics. In descriptive economics the aim is to describe legal rules using language of economics. The main focus is on description rather than prediction, e.g. description of common law as an efficient set of rules (Rubin, Why is the Common Law Efficient?, 1977).
The EU needs to be able to use Descriptive economics to justify the ETS. Not only to justify reduction of emission of GHG, most of the participants of the ETS agree with the fact the reduction of emission of GHG is needed. However the EU needs to be able to justify that by implementing aviation to the ETS they will reduce emission of GHG without distorting competition, and without causing carbon leakage. Operators might switch to alternative airports in order to avoid paying for GHG emissions, but such practices might cause more emission of GHG and therefore carbon leakage. This field is also known as public choice theory. Public Choice refers to economic analyses of people’s actions in the marketplace as a response to active rules and legislation. Legislators need to able to justify why legal rules exist in order to explain to the public the benefit of particular rules (Shaw, 1993).

5.2.3. Normative Economics

The third enterprise of economic analyses of law described by Friedman, 2010 relates to the decision of what legal rules should exist, this concept is also known as normative economics. The method is applied to assess alternative solutions, and tell us the possible outcome (Caplin & Schotter, 2008). In order to perform a normative analysis there has to be a normative objective. The main normative objective in modern economics is efficiency. The main efficiency groups in economics are maximization of utility, maximization of wealth and Pareto optimality (Coleman, 1998). Is there another way of reducing emission of GHG than using ETS? Would it be more efficient to find a worldwide solution through ICAO? Would such a solution reduce the transaction cost and bring all participants to the same level? This is not only a question about sovereignty, this is a question of reducing emission of GHG in an efficient and effective way. That is how normative economics should be used as a critical tool to come up with ideas of more efficient methods to reach the objectives. When economists assess current rules, they need to build on critical thinking. They need to be able to suggest to legislators how different laws could increase economic efficiency. The term economic efficiency is a crucial factor in legislation setting. In this context economic efficiency refers to a situation in which every possible Pareto improvement is being exploited (Hall & Lieberman, 2012).
5.3. The Coase Theorem

Every “player” in a real life market faces the possibility of being affected by externalities. E.g. your neighbor has an old noisy car that wakes you up at 6 o’clock every morning when he goes to work. A suggestion of a solution to this kind of externalities called the Coase Theorem was written by Ronald Coase in the chapter *The problem of social cost* in *The Journal of Law and economics* in 1960 (Mankiw, Principles of Economics, 2008). Coase argued that the market should deal with externalities by bargaining over allocation of resources at no cost. He claimed that the private market will always solve the problem of externalities and allocate resources efficiently. The market should be able to do that without intervention from the legal system (Coase, 1960). If we go back to the example of the noisy neighbor, you should find a solution to the problem with your neighbor without legal intervention. As the noise of your neighbor’s car is a negative externality for your sleep you could pay your neighbor to fix his car and solve the problem. Let’s say that you value the benefit of sleeping one hour longer to 500$, while the cost of repairing your neighbor’s car is 350$, and he has no money. You should be glad to pay for the repair, and your reward is to enjoy an extra hour of sleep every morning. The problem is solved and everybody is happy. Unfortunately, life is not always as easy as in above example. The Coase Theorem has a weakness, it only applies when interested parties manage to reach an agreement. However, for various reasons, private individuals often fail to solve externality problems. Sometimes they fail due to high transaction cost, i.e. cost that parties incur in the bargaining process (Mankiw, Principles of Economics, 2008). This could occur e.g. if your neighbor is a foreigner and doesn’t speak the native language. You would than not be able to present your offer to him without getting a translator. Than the transaction cost in this case is the cost for getting a translator. The cost might exceed the 500$ benefit of the extra hour in the mornings and therefore you might choose to go back to waking up at 6 o’clock in the mornings.

5.4. Tragedy of the Commons

“The population problem has no technical solution, it requires a fundamental extension in morality”. These words by Garrett Hardin are the forewords in his article *The Tragedy of the Commons*, published in Science, December 1968 (Hardin, 1968, p. 1243). The tragedy of the commons occurs when a good that does not belong to anyone,
is used by the commons until nothing is left of it. Imagine a pasture that is open to everybody. All the herdsmen will use the opportunity and bring their cattle to the common pasture. For short term i.e. for few years the pasture has sufficient carrying capacity for all the cattle. However in the long term this might not work. The herdsmen will become greedy and want to maximize their use of the pasture. They will add more and more animals to their herds, but eventually, the pasture cannot carry the growing heard of all the herdsmen; the day of reckoning takes place and tragedy of the commons occurs. The reason is simple, as the good, in this case the pasture, does not belong to anybody, so no one has an incentive to act and utilize the resource in an efficient way with a long term efficiency in mind (Hardin, 1968). Climate change is a good example of tragedy of the commons, if all inhabitants living on the earth are allowed to pollute as much as they want, to maximize their utility, the day of reckoning might take place. The reason is that the atmosphere is a common good so to speak, no one owns it and therefore no one has the incentive to reduce emission of GHG. In order to avoid this outcome, some measures need to be taken and that is where the command and control principle might be the solution.

5.5. Coasean bargaining

When countries face the potential risk of tragedy of the commons, the obvious solution is to give someone the ownership of the good. However, in the case of the environment, that can be quite complicated. Another possible solution is to give someone the right to i.e. pollute, or even allocate usage right of the pasture as in the example described above. Such practices have been described as internalizing externality (Mankiw & Taylor, Economics, 2006). The Coase theorem concludes that the best way to regulate externalities such as pollution is to allow for bargaining between the polluter and the victim of the pollution. The Coase theorem is applicable to emissions of GHG where polluters (the companies) and victims (the inhabitants affected) are easily defined. Coase claims that if property rights are defined in an appropriate way, it is best to deal with externalities with a so called Coasean bargaining. Indeed it does not matter from an efficiency point of view, who has the rights over the externality, the market itself will decide who will end up holding that right. The party that values most the right of the externality, or even the right to be free of the externality, will end up having the right. In case of pollution, the polluter and the victim will bargain, and the one that values the
right the most will end up compensating the other party. Therefore the allocation of property right determines who compensates whom (UK Dissertations, n.d.). Imagine a factory in a small town where pollution from the factory affects all the inhabitants in that town, but the factory has the right to pollute. In theory the factory would be willing to reduce pollution as long as they are compensated properly. The factory would limit or even stop its emissions if marginal profits are lower than the compensation offered. The inhabitants could pay the factory money to stop emitting GHG or invest in less polluting equipment as long as their cost of paying the factory is lower than the marginal benefit they get from breathing clearer air (UK Dissertations, n.d.). The main problem in the bargaining between the factory and the inhabitants arises when the transaction cost gets too high. As we saw in the example in chapter 3.3, a person that is affected by a noisy neighbor would be willing to compensate the neighbor to fix his car in order to reduce the noise and be able to sleep one more hour in the morning. However due to the fact that the noisy neighbor did not speak the native language the person affected would have needed to hire a translator. Due to the cost of hiring the translator the transaction cost got too high and negotiations broke down. The same applies to the pollution case: if the bargaining process between the factory and the inhabitants is time consuming and expensive, the population might exceed its marginal benefit from the bargaining and negotiations would stall. The EU has a solution for keeping the transaction cost of Coasean bargaining low. By establishing the ETS they created a market where polluters can negotiate and buy the right to emit GHG. The ETS is a market based system in form of a cap and trade scheme. The upper limit of pollution is defined by the EU. Polluters are given some amount of free allowances and if they need more they can buy it on auction. If however they do not use all the allowances they got for free they can sell the excess allowances or even bank it until later. The scheme is supposed to control emission of GHG by providing economic incentives for the polluters to limit their emission of GHG (Directive 2003/87/EC, 2003). The ETS reduces the Coasean bargaining as the governments of the EU have been given the right of the pollution allowances, which means they can control the amount of allowances on the market. This situation can be defined as a command and control principle (UK Dissertations, n.d.). In a modern world, the Coase theorem does not always apply for various reasons. Participants on the market cannot always solve issue between them by compensating the other party, life is not always black and white and therefore a legal intervention is
required. Governmental interference in pollution is a fundamental factor in decreasing pollution in an effective and efficient way and reduce Coasean bargaining. This is a clear example of the importance of connection between law and economics.

5.6. Limitations of law and economics

For decades some economists have been criticized for ignoring the importance of value judgments in economics and for using highly abstract economic models with limited connection with real life. Even though the use of law and economics has been in existence for decades and the most common terms of economics are fairly simple, many legal scholars find the economic approach hard to accept (Hsiung, 2006). There are many Nobel Laureates who have made significant contributions to the field of law and economics, but nevertheless it has been observed that the majority of law school teachers make no use for economics. The reason for that might be the language of modern economics. Nowadays mathematics is the main language of economics. For many legal scholars, a mathematical way of reasoning might make the field of law and economics too difficult to work in, and therefore they do not find the relevance of law and economic discussions (Posner R. A., 1993). Alex Seita, a Japanese law professor stated in his paper, Common Myths in the Economic Analysis of Law that economic analysis of law is inherently subjective due to its dependence upon value judgments. Value judgments are about what is good and what is bad e.g. beliefs, views, ideas and opinions. Such judgments are never statement of facts and therefore economic analysis cannot always be an objective process (Seita, 1989). However, in order to begin analyses of human endeavor, some kind of assumptions are necessary. And because the human spirit has tendency to judge, create and improve, economists almost always make value judgments in their analysis. If an economist wants to move from economic statistics to economic analyses he needs to be able to go beyond observations into assumptions of behavior, and, at that stage, value judgments enter the play (Heilbroner, 1973). Even proponents of economic analysis of law are aware that assumptions are a fundamental factor in economic analysis. Professor Hansmann has however remarked that in order to keep theories from being far away from reality, empirical tests of the theories are an essential factor. He also claims that this is an area of weakness for scholars of law and economics. And if we are going to rely on models due to their formal elegance, then a great deal more effort is needed in testing of the models (Seita,
Seita claims that economics are often trying to resolve issues that are far out of the league of traditional microeconomics which normally focus on consumers, firms and movement of traditional goods and services, with regard to monetary incentives. His conclusion is that if economics move from issues where the costs and benefits can be quantified in terms of dollars then more difficult it will be to achieve objective analysis (Seita, 1989).

5.7. The invisible hand
Legislators have quite a powerful tool in their hands: with law they can tell the society what is-, and what is not allowed. Than they protect their law with severe legal sanctions for non-compliers, and thereby force the people to some extent to comply. However legislators must keep another dimension in mind. Human nature has the ability to find gaps in law and work around it. The economist Adam Smith described this as a self-regulating behavior of the marketplace, known as the invisible hand (Marroquiín, 2002).

The compliers to the Aviation Directive could for example switch to alternative transport modes to avoid paying for CO₂ emission. They could switch to airports just outside the EU or switch to routes to the developing countries and let them operate the route from there to the EU as developing countries are exempted from Directive 2008/101. This is a factor that is critical in legislator’s ex-ante assessment of legislation.

In this chapter, possible economic effects of the Aviation Directive will be assessed. As mentioned above, the international part of the ETS was put on hold in November 2012, therefore two types of analyses will be performed. Initially the Aviation Directive included all flights to/from and within EU and the first part of the assessment will focus on the initial set up of the Aviation Directive. If a global solution will not be found at the ICAO level in 2013, the EU has threatened to start the clock again. According to memo 12/854 “It goes without saying that in the unlikely event of the ICAO Assembly failing to move forward the EU ETS legislation would be applied in full again from 2013 onwards” (European Commission, 2012(c)).
In the second part of the assessment only flights within Europe will be taken into account, that is to say, the current set-up of the Aviation Directive that will be in use until the ICAO assembly in September 2013. The main focus of the economic analysis will be on how the Aviation Directive can affect and distort competition between EU and non EU operators. As the objective of the ETS Directive according to article 1 is to reduce emission of GHG in an effective and economically efficient manner, the assessment will also include how the Aviation Directive can have adverse effect in form of a carbon leakage.

6.1. Markets affected

The Aviation Directive can affect market conditions on several markets. The ETS can affect operators that operate various routes that go to/from or within the EU. The ETS could affect market conditions, mainly competition on the following three markets:

- Flights between two non EU countries where no direct flights are available
- Flights between an EU hub and non EU hub where no direct flights are available
- Travel within the EU

In the first market there are flights between two non EU countries with at least one connection flight. Let’s consider a route where no direct flights are available, e.g. from Denver, Colorado to Kuala Lumpur. Travelers can choose between various travel options, however all options are with at least one connection flight. Some connection flights are in Europe, e.g. Frankfurt, Germany while other travel options might have connection flights outside of Europe e.g. Tokyo, Japan.

The second market is on flights between a country within EU and a country outside of the EU. Let’s say between Barcelona, Spain and New York, USA. On this market we assume there are no direct flights available and travelers can choose between connection flights within the EU or at a non EU hub.

The third market is travel within the EU. Let’s say a traveler wants to go from Rome, Italy to Berlin, Germany. The traveler has various travel options: he can go by airplane, train, or car.
6.2. Case studies

In above chapter three markets were defined. All these markets can be heavily affected by the ETS. However there is a huge difference between market conditions as per the initial Aviation Directive and after the EU Commission issued memo 12/854. Initially all flights to/from and within the EU fell under the scheme. Currently only flights within the EU fall under the scheme after the EU Commission issued memo 12/854. Due to different market conditions, two types of case studies are required. The case studies will be performed for each of the three markets above both as per the initial Aviation Directive and then by current set up of the Aviation Directive. In order to simplify the case studies no such things as ticket prices, on-board services, timetables travel time, aircraft type and other specific factors will be taken into account. Carbon emissions calculator hosted by the ICAO will be used to calculate emissions on the routes in the case studies. Aircraft vary in configuration and there can be quite a difference in equipment used to operate various routes. Therefore there can be quite a difference of emissions of CO$_2$ per kilometer between aircraft types as is reflected in the difference in fuel consumption. Due to this fact it is not an option to used fixed number of emission of CO$_2$ per kilometer in the case studies. The ICAO carbon calculator however takes into account the emission of CO$_2$ per kilometer of aircraft type as they know what kind of aircraft types are used on all routes. Currently the price per tonne of CO$_2$ stands at 7,50€ according to the European Energy Exchange (EEX, 2013). However that is not a realistic price for long term calculations. According to Thomson Reuters Point Carbon, the leading provider of market intelligence for environmental markets, the price of each tonne of CO$_2$in the third phase of the ETS, from 2013-2020 will be in an estimated average of 22€ (Thomson Reuters Point Carbon, 2011). In the studies below we assume that airlines that fall under the scope of the ETS have reached the limit of free emission allowances and need to buy additional allowances on the carbon market at the price of 22€ per tonne to comply with the Aviation Directive. The aim of the case studies is to show black on white how the Aviation Directive can affect competition on the market by shifting the competitive balance to some extent.
6.2.1. Market Conditions with initial Aviation Directive in play

The first part of the case studies will elaborate how the initial Aviation Directive can affect competition between EU and non EU airlines on all three markets defined above. In the initial Aviation Directive, all flights to/from and within the EU were included in the ETS.

6.2.1.1. Flights between two non EU countries where no direct flights are available

*Figure IV: Flight between New York and St. Petersburg with one stop*

<table>
<thead>
<tr>
<th>Leg 1</th>
<th>Leg 2</th>
<th>Total both legs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Distance</td>
<td>Co2 Emitted*</td>
</tr>
<tr>
<td>Via Keflavik</td>
<td>4.162 km</td>
<td>321,22 kg</td>
</tr>
<tr>
<td>Via Dubai</td>
<td>10.992 km</td>
<td>930,99 kg</td>
</tr>
</tbody>
</table>

*Co2 Emitted by passenger, *Cost € per passenger of emitted CO2

Source: (ICAO, 2013).

In above case, there are two options for the traveler who wants to go from New York (JFK) to St. Petersburg (LED). There are no direct flights available and therefore he needs to choose whether to have a connection flight in Keflavik or in Dubai. Remember, ticket price and travel times are not taken into account. If the traveler flies with Icelandair via Keflavik, the airline needs to surrender allowances for the emission on the route as Keflavik airport falls under the ETS. Keflavik is located within the European Economic area and the Aviation Directive is with European Economic Area relevance (Directive 2008/101/EC). Therefore Icelandair needs to surrender 569.91 kg of CO2 allowances per passenger for the route New York – Keflavik – St. Petersburg. If the CO2 price per tonne is 22 € the total cost of CO2 per passenger is 12,54 €. If, on the other hand, the traveler goes via Dubai with Emirates and emits 1237.37 kg of CO2 there will be no cost for emitted CO2 as the route does not go via the EU. In this case, Icelandair, an EU airline is put at a competitive disadvantage compared to Emirates which is a non-EU airline. This might eventually lead to a diversion of air traffic to routings via hubs outside of the EU. It is also very interesting to see how ineffective the Aviation Directive was initially. An airline that emits 569.91 kg of CO2 to get one passenger from New York to St. Petersburg needs to surrender allowances for the route. But an
airline that emits 1237.37 kg of CO₂ per passenger between the same destinations with a connection flight outside the EU, does not need to pay anything for its emission of CO₂ even though it emits more than twice as much as the airline that falls under the scope of the ETS. This is a clear example of how the ETS could lead to a carbon leakage and at the same time be a disadvantage for EU airlines.

6.2.1.2. Flights between an EU hub and a non EU hub

Figure V: Flight between Copenhagen and Hong Kong with one stop

<table>
<thead>
<tr>
<th>Leg 1</th>
<th>Leg 2</th>
<th>Total both legs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance</td>
<td>CO₂ Emitted*</td>
<td>Cost*</td>
</tr>
<tr>
<td>Via London</td>
<td>977 km</td>
<td>98.45 kg</td>
</tr>
<tr>
<td>Via Moscow</td>
<td>1,542 km</td>
<td>134 kg</td>
</tr>
</tbody>
</table>

*CO₂ Emitted by passenger, *Cost € per passenger of emitted CO₂

Source: (ICAO, 2013)

In this case a traveler wants to go from Copenhagen to Hong Kong. There are no direct flights available but the traveler has two options. He can choose to travel with Aeroflot and have a connection flight in Moscow or he can travel with Cathay Pacific and catch a connection flight in London Heathrow. If the traveler chooses to travel with Aeroflot, only the first leg of his travel, from Copenhagen to Moscow will fall under the ETS. Aeroflot needs to pay 2.95 € for CO₂ emission for only this specific passenger. The second leg, from Moscow to Hong Kong, is not applicable to the scheme and therefore the total CO₂ emission cost for each passenger is only 2.95 € for both legs.

On the other hand, if the traveler chooses to travel with Cathay Pacific via London Heathrow, the airline needs to pay an emission fee of 2.17 € for the first leg Copenhagen - London and 15 € for the second leg, London – Hong Kong as both legs take place within the EU and do therefore fall under the scope of the ETS. Apparently the airline that has its Hong Kong routes in Europe to/from London Heathrow is put at a disadvantage compared to the airline that uses hubs just outside the EU for its Hong Kong routes. It is also worth noticing that Cathay Pacific’s route Copenhagen – London – Hong Kong is more than twice as long as Aeroflot route via Moscow. In addition to higher fuel costs due to longer route, Cathay needs to pay
approximately 14 € more than Aeroflot for CO$_2$ emission per each passenger. It might be worthwhile for Cathay to reconsider their routes from Europe to Hong Kong and switch to hubs just outside the EU in order to reduce the emission cost. If their market share on flights between Copenhagen and London Heathrow is low, it might be better to step away from the market and operate the same route as Aeroflot: Copenhagen – Moscow – Hong Kong.

6.2.1.3. Travel within the EU

*Co2 Emitted by passenger, *Cost € per passenger of emitted Co2

<table>
<thead>
<tr>
<th></th>
<th>Distance</th>
<th>Co2 Emitted*</th>
<th>Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct flight</td>
<td>2.060 km</td>
<td>163.67 kg</td>
<td>3.60 €</td>
</tr>
<tr>
<td>By train</td>
<td>2.498 km</td>
<td>133.5 kg</td>
<td>n/a</td>
</tr>
<tr>
<td>By car</td>
<td>2.490 km</td>
<td>398.4 kg</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Sources: (ICAO, 2013), (Fleet News, 2013), (Transport Direct, 2013)

When a traveler wants to travel within EU he has various travel options, let us imagine a traveler who wants to go from Copenhagen and Madrid. He can choose to go by air, train, car or even a boat, if that is an option. For most travelers, the first preference is to go by air. By choosing that option he would emit 163,67 kg of CO$_2$ which would cost the airline 3,60€. If the airline ticket is too expensive when the cost of CO$_2$ has been added to the ticket price, the traveler might want to use other options. The second option is to go by train, if the traveler went for that option he would emit 133,5 kg of CO$_2$ on his way. This option is highly supported by the ETS as train travelers emit much less of CO$_2$ than those who travel by an aircraft. The WWF has even established a campaign to help companies fly less. They encourage companies to use video conferences instead of “in person” meetings or go by train instead of flight if that is an option (World Wildlife Fund, n.d.). The third option for the traveler from Copenhagen to Madrid is to go by car. If the traveler thinks that is the most suitable option for some reason he will emit 398,4 kg of CO$_2$ on his way if he uses Hyundai Santa Fe family car that emits 160g/km (Fleet News, 2013). If in this case, the airfare is too expensive with CO$_2$ emission cost included, and the traveler does not want to travel by train, or if there is no availability, he might take the private car. Then the ETS will cause adverse effects and CO$_2$ emission of this specific traveler will be 143% more than if he travels by air.
6.2.2. Market conditions with current ETS in play

Market conditions for both EU and non EU airlines changed suddenly when the European Commission issued memo 12/854 in November 2012. The Commission decided to defer the implementation of the international aspects of the Aviation Directive by deferring the obligation to surrender emission allowances from air traffic to and from the EU by one year. The EU is convinced that a global solution will be found at the ICAO assembly in September this year. However there is still an obligation for all airlines that operate within the EU to comply with ETS as the change suggested in Memo 12/854 only concerns flights to/from Europe (European Commission, 2012(c)). Currently, the market conditions on the three markets defined in chapter 6.1. look very different from the conditions analyzed in case studies in chapter 6.2.1.

6.2.2.1. Flights between two non EU countries where no direct flights are available

*Figure VII: Flight between New York and St. Petersburg with one stop*

<table>
<thead>
<tr>
<th>Leg</th>
<th>Distance</th>
<th>Co2 Emitted*</th>
<th>Cost*</th>
<th>Distance</th>
<th>Co2 Emitted*</th>
<th>Cost*</th>
<th>Distance</th>
<th>Co2 Emitted*</th>
<th>Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Via Keflavik</td>
<td>4.162 km</td>
<td>321,22 kg</td>
<td>n/a</td>
<td>2.704 km</td>
<td>248,69 kg</td>
<td>n/a</td>
<td>6.866 km</td>
<td>369,91 kg</td>
<td>n/a</td>
</tr>
<tr>
<td>Via Dubai</td>
<td>10.992 km</td>
<td>930,99 kg</td>
<td>n/a</td>
<td>4.316 km</td>
<td>306,38 kg</td>
<td>n/a</td>
<td>15.308 km</td>
<td>1237,37 kg</td>
<td>n/a</td>
</tr>
</tbody>
</table>

*Co2 Emitted by passenger; *Cost € per passenger of emitted Co2

Source: (ICAO, 2013)

As stated previously, the market conditions are bit different today compared to market conditions under the initial set up of the Aviation Directive. Memo 12/854 introduced that the international aspect of the Aviation Directive would be deferred until after the ICAO assembly 2013 (European Commission, 2012(c)). In chapter 6.2.1.1. an analysis was made on how the initial Aviation Directive could possibly affect competition between EU and non EU airlines. However, since the EU Commission decided to defer the international aspect, the current set up of the Aviation Directive will not affect competition between EU and non EU operators on grounds of international flights. Flights that enter and exit the European Union have been temporarily removed from the ETS and therefore the current set up will not have the same effect as presented in above mentioned case.
Airlines that use EU hubs for destinations or connection hubs will not fall under the scope of the Aviation Directive as long as they only stop at one location within the EU. If an airline that enters EU’s aerodrome, lands at an EU airport as a connection stop and then carries on towards another EU airport the leg between the two EU airports will fall under the scope of the ETS (European Commission, 2012(c)). When the airline departs from Europe again that flight is excluded from the scheme. The current set up of the Aviation Directive does not have as much effects on airlines that have a connection hub in the EU on flights between two non EU airports. Therefore the current set up will not drive those airlines away from EU hubs and therefore the EU hubs are in much better competitive position under current set up of the Aviation Directive then under the initial set up. As described in case 6.2.1.1 airlines that operated between two non EU airports might seek hubs outside of the EU in order to avoid paying for its CO₂ emissions.

6.2.2.2. Flights between an EU hub and non EU hub

*Figure VIII: Flight between Oslo and Cairo*

<table>
<thead>
<tr>
<th></th>
<th>Leg 1</th>
<th>Leg 2</th>
<th>Total both legs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Distance</td>
<td>Co₂ Emitted*</td>
<td>Cost*</td>
</tr>
<tr>
<td>Via Amsterdam</td>
<td>917 km</td>
<td>122.24 kg</td>
<td>2,68 €</td>
</tr>
<tr>
<td>Via Istanbul</td>
<td>2,448 km</td>
<td>232.69 kg</td>
<td>n/a</td>
</tr>
</tbody>
</table>

*Co₂ Emitted by passenger, *Cost € per passenger of emitted Co₂

Source: (ICAO, 2013)

Under the initial set up of the Aviation Directive, airlines had to surrender emission allowances for both international flights to/from the EU, and for all flights within the EU. Under the current set up of the Aviation Directive airlines only need to surrender allowance on routes within the EU. Therefore the market conditions for flights between EU hub and non EU hub with a connection flight have changed slightly. Under the initial set-up, airlines had the incentive to use connection hubs just outside the EU in order to avoiding emission cost on the route between the non EU connection hub and final destination. As shown in case 6.2.1.2 some operators used Moscow as a connection hub on their routes Copenhagen – Hong Kong. By using Moscow as a connection hub, operators do not need to surrender allowances from Moscow to Hong Kong. However, those operators that used London as a connection hub on the route
Copenhagen – Hong Kong had to surrender allowances for the whole route as the flight London – Hong Kong fell under the scope of the international aspect of the ETS.

Since the European Commission issued Memo 12/854, operators might still find the incentive to use non EU connection hubs on their routes between EU and non EU hub, the incentive might even be stronger than under the initial set up of the Aviation Directive.

As shown in Case 6.2.2.2 above, a traveler who wants to go from Oslo, Norway to Cairo, Egypt has two options. There are no direct flights available and therefore he can choose between connection flights at an EU hub; in this case Amsterdam and a non EU hub; Istanbul. If the traveler chooses to travel via Amsterdam that airline needs to pay 2,68€ for CO2 emissions per passenger for the route Oslo – Amsterdam. The second leg of his travel, from Amsterdam to Cairo is considered an international flight and does therefore not fall under the scope of current set up of the Aviation Directive. If the travel chooses the other option and uses Istanbul as a connection hub that airline does not need to pay any emission cost for the traveler as the route is an international flight which is currently exempted from the ETS. Even though the current set up of the Aviation Directive, where the international aspect is on hold, has less effect on competition between EU and non EU operators, there is still a significant chance of distortion of competition. Non EU operators that have their operational network at non EU hubs are put at a competitive advantage over the EU operators that have their main network within the EU. If EU airlines use a pass-through method and include the ETS compliance cost in their ticket prices travelers might prefer to use non EU operators that use non EU connection hubs where there is no ETS compliance cost included in the prices.

6.2.2.3. Travel within the EU

When it comes to travels within Europe, there is no difference in market conditions under the initial Aviation Directive and under the current set up of the Aviation Directive. Routes between two EU hubs still fall under the scope of the Aviation Directive, according to memo 12/854 and therefore airlines face increased competition from other travel options available in Europe, i.e. trains and cars (European Commission, 2012(c)). No further assessment will be made on this market under current set-up of the Aviation Directive as the market conditions are the same as described in case 6.2.1.3 above.
7. Consequence based arguments

Consequence based arguments are an important element in legislation setting and judgments in general. If judges and legislators only use rule-based arguments, justifications could not be based on direct and explicit reference to consequences. Such setting would limit the efficiency and effectiveness of legislation and judgments (Cserne, 2010). Consequence based arguments is a rapidly used judicial reference to public policy. Judges often find it appropriate to deviate from legal rules for reasons of public policy. They might find alternative rulings by referring to more general purpose of the law such as the proper functioning of the judicial and political system. Sometimes judges compare those values against the initial purpose of the particular rule which they should interpret. In such cases the public policy represents a compromise between various values the law has to serve (Bell J., 1995). When it comes to consequence based legal reasoning it is important to draw a distinction between propositions of law and proposition about law. Dennis Patterson an American law professor argued that the distinction between the two refers to the sort of claims that can be legitimately put forward in the two cases. He claims that proposition of law should be justified by arguments within law while proposition about law should be arguments from other disciplines, such as economics, social psychology and philosophy. Patterson emphasized that legal discourse is fully autonomous and sets its own standards for what are the relevant or legitimate arguments in law. He claims that if the distinction is not kept in mind, and legal scholars use tools of other disciplines to justify proposition of law, then the academic debate is on crossroads where arguments are used in an illegitimate way (Patterson, 1993). It is important that the legal theory clarifies the nature of legal arguments, what are acceptable arguments and what arguments are not acceptable. Legal reasoning can be described as “an activity conducted within more or less vague or clear, implicit or explicit normative canons” (Cserne, 2010, p. 5). Tony Honoré, a British lawyer described these criteria as the canon of acceptable arguments. The canon arises where social practice is used in the legal community. In such cases the legal community is allowed to deal with ordinary situations in a particular technical way and use a specialized linguistic terminology (Honoré, 1973). The canon limits decision makers on both institutional and psychological grounds, by requiring them to fit within the framework (Bell J., 1986).
7.1. What kind of consequences matter?

Setting of new legislation and decisions by judges in specific cases can have various consequences. There are as many possible versions of consequence based reasoning as there are many normative standards. For instance, a legislator who focuses only on one type of considerations, let’s say reduction of GHG emission, would choose the interpretation that serves his goal the most. His method is called single-factor consequence-based reasoning (Cane, 2000). On the other hand there is an act-utilitarian decision maker that uses the standard of the whole social utility. His method is much more difficult to work with as there are so many factors to consider. He would need to assess all alternative options and assess their consequences and finally chose the interpretation that serves the society the best. When it comes to establishing an emission trading system, an act-utilitarian policy maker would consider the effects the system would have on the whole society. He would not only focus on emission reduction as there are many other factors that need to be considered. Such a policy maker would consider effects on factors such as competition, hubs, consumers and the whole economy. Such aggregative reasoning about consequences is almost impossible to make for a human being, even though he has unlimited resources in form of time and money. Real world policy systems therefore constrain legislators and policy makers in their choice of normative standards as types of consequences relevant for their decisions (Cserne, 2010). Consequence based arguments are quite often used by judges and policy makers who are trying to elaborate their arguments and decisions. This method is called slippery slope argument, or, where will it all end up. By using this method, judges and policy makers can draw attention to what consequences could occur if an alternative option were chosen. Thereby they can explain the superiority of the decision they support (Cane, 2000). Legislators and judges need to have behavioral consequences in mind in their decisions. That is, what human behavior the rule will induce or discourage (Luhmann, 2008). When policy makers use behavioral consequences they are making guess how certain groups would react to certain law or decisions. Policy makers and judges are thereby using assumptions of how the law influences human behavior (Cserne, 2010).
7.2. When should Consequence Based Arguments be used

When it comes to using consequence based arguments in judicial reasoning it is important that those who favor, promote or defend this method are able to demonstrate that such judicial reasoning is conceivable, feasible and desirable (Cserne, 2010). A three step procedure of optimization can be represented for consequence based arguments. That procedure can help a fully informed rational decision maker to solve the problem in an optimal way. When the EU was assessing whether or not to include aviation activities to the ETS they could have used a three step procedure to evaluate what kind of consequences would follow by the implementation of aviation activities to the scheme.

*Figure IX: Three-step procedure of optimization under uncertainty*

<table>
<thead>
<tr>
<th>Step</th>
<th>Questions to be answered by the decision-maker</th>
<th>Difficulties</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Identification</td>
<td>Which consequences (effects) matter?</td>
<td>Operationalization</td>
</tr>
<tr>
<td>2. Measurement</td>
<td>What is the impact of the decision in these dimensions?</td>
<td>Information</td>
</tr>
<tr>
<td>3. Evaluation</td>
<td>Which decision has better consequences overall?</td>
<td>Trade-offs</td>
</tr>
</tbody>
</table>

*Source: (Cserne, 2010)*

In the first step the decision maker needs to identify the relevant consequences of his or her decision. Some of the consequences are easy to identify and are quite clear to the decision maker. However there are also some consequences that are difficult to measure such as impact on legal values e.g. predictability, legal certainty or coherence (Hensche, 1998). In this step the EU had to evaluate what consequences matter to them. The main consequence they cared about was reduction of emissions. By adding aviation activities they should be able to reduce GHG emission to a greater extent. However, they also wanted to reach that objective in an efficient way. Therefore they should have been concerned with consequences that could affect airline operators, such as increased cost, distortion of competition, shift of traffic to non EU hubs, price elasticity of consumers etc.
In the second step the decision maker needs to measure the impact each decision will have in all dimensions identified in the first step. In the second step the uncertainty comes into play. The decision maker does not have sufficient information about relevant variables. The information he has access to are not always reliable or verifiable. Even though the decision maker might have the relevant and accurate information, he might not have the resources, such as time and human capital with appropriate know-how to analyse the available data. In this step the EU should have assessed the impact both decisions could cause (to include- or not include aviation in ETS), and relate to the consequences identified in the first step.

Decision 1: If the EU had excluded aviation activities in the ETS they would probably not reach the same reduction in emission of GHG as if aviation were included in the ETS. Therefore the environmental consequences of decision 1 would be negative. Nevertheless, aircraft operators would be delighted with this decision. Airlines would not need to pay for their emissions and competition between EU and non EU operators would not be distorted.

Decision 2: If the EU had included aviation activities in ETS (as they did eventually by issuing the Aviation Directive) they would be able to further reduce emissions of GHG. But it remains to be seen by how much the reduction of GHG emissions will be. It is still a question if aircraft producers will be able to produce much more efficient aircraft that pollute less. But decision 2 is definitely environmentally friendly. On the other hand, decision 2 could distort competition as the scheme would affect EU and non-EU operators in a different way. This decision could also move aircraft traffic away from EU hubs as airlines might take measures to avoid paying for emissions of GHG.

In the third step the decision maker needs to choose between alternatives. He has to be able to evaluate the overall consequences of possible decisions and choose the best option. In this step the decision maker can face some problems as the tradeoff between the decisions can be huge (Cserne, 2010). In this step, the EU had to evaluate all options and choose the decision that brings better consequences. Are they willing to distort competition, or even reduce air traffic on EU hubs and encourage airlines to operate via hubs just outside the EU as a tradeoff for reduced emissions of GHG. Are they willing to choose decision 2 even though they do not have scientific evidence that it will actually reduce emissions of CO₂. This is a decision that the EU had to choose and
based on their assumption they chose option 2. Even though Cserne, (2010) states in his paper that decision should not solely be based on rule-based arguments, he does not conclude that modeled consequence based arguments should be given too much value. He claims that if judges were supposed to assess the general social consequences of their decisions they would face various problems. Empirical research on judicial behavior has shown that even though decision makers face lack of information, time and technical knowledge their decision are still consequence based. However they do not use fancy optimization models to back up their decisions, instead they use the rules of thumb. This technique is commonly used in real life with good success. By only thinking of consequences and data collection the process could have adverse effect as the decision maker might provide plausible arguments in favor of his or her decision (Cserne, 2010).

7.3. Ex ante evaluation and Policy making in legislation

In the last few decades the developed countries have used ex ante evaluation, or regulatory impact analysis to support their policy setting. Many countries have even implemented mandatory consequence based control of their legislative measures (Pfaff & Guezelian, 2007). Legislators are much better equipped in terms of resources such as information and technical expertise than the judiciary. Therefore legislators should be able to use consequence based arguments in their ex ante evaluation of legislation. It is also necessary to make deep ex ante evaluation of policy making as many policy settings and changes are supported by lobbyists who have a vested interest in specific policies and are willing to spend resources in order to pursue what suits them the best. By strenghtening the ex ante evaluation, and make policies less political and more technocratic, the legislation process could improve a lot (Cserne, 2010).

Pierre Larouche has identified six rationales for ex-ante evaluation in legislation setting:

1) It is a mechanism for collection of evidence
2) It improves the quality of decision making
3) It increases transparency and openness
4) It makes decision making more democratic by allowing for participation of stakeholders
5) It contributes to justification by explaining publicly why the proposed action is necessary and appropriate
6) It increases accountability by highlighting the trade-offs being made by the decision maker

The first two rationales are result oriented while the last four are process oriented (Larouche, 2008).

8. Consequences of the Aviation Directive

Directive 2008/101EC is the cornerstone in the implementation of ETS to aviation. When the Commission wrote the Directive and decided its content they had to make some comprehensive analysis of the effects of the Directive. Knowing what effects rules have is a critical factor in understanding the current rules and which rules should really be used (Friedman D. D., 2000). The Commission had to evaluate the advantage the Directive brought to consumer welfare standards vs. disadvantages by initiating the Directive. That is where economic analysis comes in with all its analytic power. Economics can be used as an instrument to reach policy objectives and are supposed to predict who really bears the burden of alternative taxes. (Cooter & Ullen, 2012). The economist and legal theorist, Mr. Richard also emphasizes in his thesis that if we want law to be an efficient tool for society, economic analysis should determine what the law should be (Friedman D. D., 2000). One of the most significant factors in the Aviation Directive was that the Commission included non-EU airlines that operate to, from and within the EU in the ETS. That kind of decision was not taken without evaluating its consequences. Competition policies have the main aim to focus on negative effects that certain measures have on competition and trade. Then policy makers must make a balance with actions that have potential positive effects. In modern economics such actions should be based on economic analysis combined of economic theory and empirical verification (Drexl, Joel, & Idot, 2009) When the Commission decided to include non-EU airlines in the ETS they definitely made ex-ante economic analysis, at least to some extent. Before they issued the Aviation Directive they established a working group to make an impact assessment of the inclusion of aviation activities to the ETS. In the assessment report SEC(2006) 1684 the working group did not put much focus on possible effects on competition between EU and non EU operators. But if the
EU was going to issue that Directive anyway, they had to include non-EU airlines in the international aspect of the scheme in order to follow their competition policy. If they had excluded non-EU airlines from the scheme, those airlines would have been given competitive advantage in form of cost advantage. On the other hand, EU airlines would need to add the CO₂ emission cost into their pricing model and most likely pass it on to passengers in form of a higher ticket prices. The International Centre for Trade and Sustainable Development has calculated that ticket price would increase in the range of 1,3 to 6,5 percent depending on the allowance prices at each time (Faber & Brinke, 2011). If only EU airlines needed to comply with the international part of ETS, they would need to include the allowance cost in their pricing model, and that is not easy. For long term ticket price calculations, the allowance calculations have various uncertain factors, such as price and supply of allowances. Therefore by only including EU airlines in the scheme, the Directive could cause a supply switch from EU airlines to non-EU airlines as the aviation sector is a very low margin sector and is therefore extremely sensitive to increased variable cost. Calculations have showed that estimated operating cost of airlines could increase by 3,1 to 5,4 percent which is amount that would push many weak players on the market over the edge (Faber & Brinke, 2011).

8.1. EC Impact Assessment

In December 2006 the EU Commission issued impact assessment (SEC (2006)1684) of the inclusion of aviation activities in ETS. This was an accompanying document to 2006/0304(COD), the proposal for amendment of the ETS Directive to include aviation activities in ETS (European Commission, 2006(a)). According to the impact assessment made by the European Commission, the inclusion of aviation activities to the ETS will not have adverse effects on aircraft operators based on three assumptions:

a. Aircraft operators would be able to fully pass on the cost of participating in the ETS to consumers
b. Demand would not decrease substantially as a result of the inclusion of aviation in the ETS (price elasticity is low)
c. Aircraft operators will benefit from wind fall profits as majority of allowances are granted for free (European Commission, 2006(a)).
8.1.2. Opposition from European aircraft operators

The main associations of European aircraft operators did not fully agree with the impact assessment made by the European Commission. They thought that the assessment was imperfect and simplified. Therefore they commissioned Ernst and Young and York Aviation to analyze the assumptions made by the European Commission and re-evaluate the impact of the proposed inclusion of aviation in ETS, based on revised assumptions (Ernst and Young & York Aviation, 2007).

8.1.2.1. Pass through of ETS cost to consumers

The concept of cost pass through rate is defined as the rate of cost, either increase or decrease, that is passed on to consumers (Ernst & Young and York aviation, 2007). As mentioned above the European Commission claims in their impact assessment that airline operators can pass through almost the full amount of the cost of participating in ETS to consumers (European Commission, 2006(a)). According to the assessment made by Ernst & Young and York aviation, pass through of ETS cost is not that easy for airline operators. They claim that the cost of ETS cannot entirely be passed on to consumers due to the nature of competition between airlines. The aviation sector is characterized by high degree of liberalization with few competitors on each route due to high fixed cost. They also add that it is impossible to assess the impact to airline operators with perfect competition in mind (Ernst & Young and York aviation, 2007). There is quite a difference between market conditions at uncongested airports and congested airports. According to Oxford Economic Research Associates (OXERA) it is an essential factor in impact assessment to distinguish between those two.

A: Uncongested airports

At uncongested airports the demand is not sufficient to maximize the utility of the capacity available. The allowance prices at airlines that operate at uncongested airports would be passed through to ticket prices. That means that airlines that increase the ticket prices to offset the cost of the allowances will most likely experience a decrease in ticket sales (OXERA, 2003).
If airlines that operate to/from uncongested airports will add the emission cost to their ticket prices they will experience decreased sales of tickets. The price will increase to $P_1$ and the demand will drop to $q_1$. The lines $S_1$ and $S_0$ represent the supply curve of airline seats and therefore by increased ticket prices where the emission cost has been included the supply of available seats will shift up to $S_1$.

B: Congested airports
At congested airports the demand is greater than the capacity of the airport. Due to high demand, airline operators can include the emission cost on flight to/from such airports. The price of the tickets reflects the actual cost of the flight and inclusion of emission cost in ticket prices would not affect demand.

Source: OXERA, 2003
As mentioned above, the demand exceeds the capacity at congested airports. Airlines keep the prices quite high, as per \( p_0 \) and \( p_1 \) due to the fact that demand is much higher than the capacity. As per the figure above, airlines at congested airports are able to pass 100% of the emission cost on to passengers. However, the airlines at congested airports are already pricing at the highest possible level and therefore the cost of allowances will only reduce profit margins.

As stated by OXERA (2003), the pass through rate varies between types of competition. Therefore the assumption made by the European Commission that all airlines can fully pass on the cost by participating in ETS onwards to consumers is wrong.

*Figure XII: Cost Pass through Rates by type of competition*

<table>
<thead>
<tr>
<th>Competition</th>
<th>Cost pass-through rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congested airports</td>
<td>0%</td>
</tr>
<tr>
<td>Monopoly</td>
<td>50%</td>
</tr>
<tr>
<td>Small oligopoly (3)</td>
<td>75%</td>
</tr>
<tr>
<td>Large oligopoly (9)</td>
<td>90%</td>
</tr>
</tbody>
</table>

*Source: OXERA, 2003*

According to OXERA (2003), they estimate that the pass through rate depends heavily on type of competition. They classify competition into three groups.

- Monopoly
- Small oligopoly (with three airlines)
- Large oligopoly (with nine airlines)

### 8.1.2.2. Price Elasticity of consumers

On most markets any increase in price will lead to a decrease in demand. The connection between increase in price and decrease in demand is called price elasticity. When a goods- or service provider increases the price of his goods or services, it will be reflected in a decrease in quantity demanded for that good or service. If a price increases by 1% followed by demand decrease by 2% the price elasticity would equal to 2 (2% / 1% = 2). Any number above 1 is interpreted as relatively elastic demand, but if the number is between 0-1 the price elasticity is considered relatively inelastic (Ernst & Young and York aviation, 2007). The European Commission claimed in their impact assessment in 2006 that inclusion of aviation activities to the ETS would only have limited effect on demand (European Commission, 2006(a)).
The impact assessment made by Ernst & Young and York aviation (2007) has different assumptions than the European Commission. They claim that the market is relatively price elastic, especially in the leisure segment where price elasticity could be around 1.5%.

*Figure XIII: Price Elasticity of market segments*

<table>
<thead>
<tr>
<th></th>
<th>Business</th>
<th>Leisure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network airlines (short haul)</td>
<td>-0.8</td>
<td>-1.5</td>
</tr>
<tr>
<td>Network airlines (long haul)</td>
<td>-0.8</td>
<td>-1.0</td>
</tr>
<tr>
<td>Low fares airlines</td>
<td>-1.5</td>
<td>-1.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Express</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cargo airlines</td>
<td>-0.8</td>
<td>-1.6</td>
</tr>
</tbody>
</table>

*Source: Ernst & Young and York aviation, 2007*

### 8.1.2.3. Windfall profits of airline operators

Windfall profits can be defined as a sudden unexpected profit uncontrolled by the profiting party (Financial Dictionary, n.d.). When companies receive CO₂ emission allowances for free it cannot be considered as truly paid cost but rather as transfer of a lump sum subsidy or economic rent enhancing the profitability of the companies (Gulli, 2008).

Airlines can charge consumers for the allowances, even though they get it for free and therefore gain in form of windfall profits. The third assumption made by the European Commission in their impact assessment was that Aircraft operators will benefit from windfall profits as majority of allowances are granted for free (European Commission, 2006a). Once again Ernst & Young and York aviation do not agree with the assumptions made by the Commission. In their assessment they claim that the Commission did its assessment with the electricity sector in mind. When the EU electricity sector was included in the ETS Directive it lead to a windfall profits for the sector as they managed to fully pass through the cost of participating in ETS to consumers (Sijim, Neuhoff, & Chen, 2006). Ernst & Yong and York aviation (2007), claim in their assessment that there will be no such thing as windfall profits for the airlines when aviation activities are included in the ETS. They also add that the airline industry is highly liberalized, which means that prices are already fixed at a level that maximizes profits for the airlines. Therefore all additional cost such as ETS compliance cost will lead to a decrease in profits. On the other hand, the EU electricity sector has
regulated pricing and when the sector was included in the ETS, regulators increased the maximum prices which lead to higher profits. So the conclusion of Ernst & Young and York aviation is that the electricity sector got higher profits after the sector was included in ETS due to increase in maximum price levels, not due to grandfathering of free emission allowances (Ernst & Young and York Aviation, 2007).

8.2. Consumer surplus

Each and every consumer wants to maximize his utility when buying goods or services. Consumer surplus is an important term in order to understand consumer behavior. Therefore it is worth noticing when assessing economic effects of the inclusion of aviation activities in ETS how the emission cost can affect consumer surplus. The term can be defined as the difference between the cost that consumers pay for a good or service, and the amount they are actually willing to pay (Ernst & Young and York aviation, 2007). If a traveler who wants to go from location A to location B by air pays 80€ but is willing to pay 120€ for that travel, his consumer surplus would be equal to 40€. If airlines use the pass through method and include the emission cost in their ticket prices, the consumer surplus decrease as the value of the travel has reduced due to increased cost. Some travelers might even no longer afford to use that travel option.

*Figure XIV: Impact of the Aviation Directive on consumer surplus*

![Impact of the Aviation Directive on consumer surplus](image)

*Source: Ernst & Young and York aviation, 2007*
The figure above illustrates how increased prices on airline tickets due to emission cost can affect consumer surplus if airlines use the pass through method. When ticket price increases from $P_{no\ ETS}$ to $P_{with\ ETS}$, the market will find a new equilibrium. The supply curve will shift upwards and demand will reduce from $Q_{no\ ETS}$ to $Q_{with\ ETS}$. That means that loss of consumer surplus equals to the area marked with blue. Under many market conditions, loss in consumer surplus means increase in producer surplus. However that is not the case when it comes to aviation activities under the ETS. In above figure the loss of consumer surplus does not increase producer surplus. The positive surplus in this case goes to the financial institutions that trade in carbon allowances (Ernst & Young and York aviation, 2007). The amount of loss in consumer surplus is of course related to emissions allowance prices on the market. Ernst & Young and York aviation (2007) have come up with a forecast of loss in consumer surplus in few scenarios. They assess the possible impact on consumer surplus related to allowance prices. Loss in consumer surplus can be huge as seen below if allowance prices will increase over time.

**Figure XV: Estimated loss of consumer surplus**

<table>
<thead>
<tr>
<th>Year</th>
<th>Low Allowance Cost ($6-15tCO_2$) (€Mill.)</th>
<th>High Allowance Cost ($30tCO_2$) (€Mill.)</th>
<th>Extreme scenario ($60tCO_2$) (€Mill.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>55.9</td>
<td>123.7</td>
<td>220.1</td>
</tr>
<tr>
<td>2012</td>
<td>396.3</td>
<td>875.9</td>
<td>1,568.1</td>
</tr>
<tr>
<td>2013</td>
<td>184.5</td>
<td>967.2</td>
<td>1,812.0</td>
</tr>
<tr>
<td>2014</td>
<td>208.6</td>
<td>1,120.6</td>
<td>2,059.3</td>
</tr>
<tr>
<td>2015</td>
<td>235.1</td>
<td>1,248.2</td>
<td>2,311.0</td>
</tr>
<tr>
<td>2016</td>
<td>261.1</td>
<td>1,374.0</td>
<td>2,567.2</td>
</tr>
<tr>
<td>2017</td>
<td>267.8</td>
<td>1,504.0</td>
<td>2,827.7</td>
</tr>
<tr>
<td>2018</td>
<td>314.4</td>
<td>1,638.2</td>
<td>3,092.7</td>
</tr>
<tr>
<td>2019</td>
<td>341.7</td>
<td>1,770.5</td>
<td>3,362.1</td>
</tr>
<tr>
<td>2020</td>
<td>369.5</td>
<td>1,907.1</td>
<td>3,635.8</td>
</tr>
<tr>
<td>2021</td>
<td>397.6</td>
<td>2,045.8</td>
<td>3,913.9</td>
</tr>
<tr>
<td>2022</td>
<td>426.2</td>
<td>2,186.6</td>
<td>4,196.3</td>
</tr>
</tbody>
</table>

*Source: Ernst & Young and York Aviation, 2007*
9. Global solution for aviation emissions

As global warming is a global problem, a global solution is needed. As described in above chapters the EU ETS has faced serious opposition from both EU and non-EU operators. Most of the developed countries are aware of the fact that a reduction of emissions of GHG is definitely needed but they agree that the solution should be at the international level. The ICAO is the venue where such a global solutions should be established, a solution without borders where sovereignty is not mistreated. In November 2011 the ICAO council urged the EU and its member states to refrain from including international flights to the ETS. The paper was backed by 26 of 36 members of the ICAO, thereof 8 EU member states (ICAO, Inclusion of the International Civil Aviation in the EU ETS and its impact, 2011). Although the paper was not legally binding, it reflected the strong opposition of ICAO members of the inclusion of international flights to the ETS. The main content of the paper from the ICAO council reflects the opposition to the ETS due to violation of the preamble of the Chicago convention. In article 1 of the Chicago convention it is stated that “the contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its territory” (Chicago Convention, 1944). The ICAO council also claimed in the paper that implementation of EU ETS without ICAO’s concurrence would undermine the ICAO and its leading role in reduction of aviation emissions (ICAO, Inclusion of the International Civil Aviation in the EU ETS and its impact, 2011). The ICAO also claimed that the EU neglected ICAO Assembly resolution A37-19 where it was stated that the Council should structure a framework for market based measures for aviation emissions. The resolution includes set of guiding principles for international framework of aviation emissions and members of the ICAO were urged to respect these when designing market based measures for international aviation (ICAO, Resolution A37-19, n.d.).

9.1. ICAO´s Jurisdiction

It seems to be quite clear that in order to create a global solution for aviation emissions, an international body with exclusive rights is needed to come up with an international framework. Even though the ICAO has certain powers to oversight regarding aviation emissions under the Chicago Convention and UNFCCC, it apparently does not have
exclusive stewardship. Member states are nonetheless allowed to work within and outside the ICAO to develop a framework to reduce emission of GHG even though it is stated in ICAO’s resolution A37-19 that ICAO should be the leading body in developing a global solution for aviation emissions (ICAO, Resolution A37-19, n.d.). And stated in article 2(2) of the Kyoto Protocol that Annex 1 parties should work through ICAO in reduction of emissions of GHG. Nevertheless it seems like the ICAO is not totally in charge of aviation emissions (United Nations, 1998). ICAO’s resolutions have been defined as soft law as they only put forward guiding principles for airlines to comply with the Chicago convention (Goldsmith & Posner, 2003). Due to the fact that ICAO’s resolutions are guiding principles there will be no conflict if parties of the Kyoto Protocol negotiate an emission reduction bilateral or unilateral treaty outside the ICAO as long as they comply with rules set in the Chicago Convention. The ICAO definitely needs exclusive rights over aviation emissions in order to create an efficient framework. The current set up of the ICAO is not powerful enough to deal with emissions of GHG in the most effective way. If the international aspect of the ETS would be permanently set aside and an ICAO framework would be established, competition between EU and non EU operators would not be affected on the markets defined in chapter 6.1. as the geographical location of connection hubs would not matter.

The matter of sovereignty seems to be the biggest issue among the members of the ICAO and therefore a global solution is needed at that level. The ICAO needs to be able to issue legally binding type of hard law to create an effective reduction of aviation emissions as effective and transparent as possible.
Discussion

Many people only think that laws do only exist to promote justice. However people who understand the role of law, and people with a background in economics conceive laws as tools to reach policy objectives, such as efficiency and distribution. They also realize that law can be used as an incentive to change behavior of people in order to reach the policy objectives (Cooter & Ullen, 2012). Law varies among the countries in the world, the main reason is different objectives that laws are supposed to promote. Those countries are not all as efficient and perhaps the reason is differentiation in economic analyses of law in those countries. The relation between law and economics has come more and more in to play in the developed countries the last few decades. Unfortunately many of the developing countries are not as successful in this respect. Many poor countries do not have efficient legislation systems, but improving the effectiveness of law is a fundamental factor towards economic development (Cooter & Ullen, 2012). Due to the increasing demand for a relation between law and economics to reach policy objectives, we have reached a stage where lawyers and economists need to have a mutual understanding. Mutual understanding is a crucial factor for efficient and effective policy setting. Lawyers need economists to understand behavioral consequences, and economists need lawyers to understand the operation of markets. Economists and lawyers should therefore adopt techniques from each other. Economists can teach lawyers how to make quantitative reasoning based on empirical research. On the other hand lawyers can teach economists how to persuade ordinary people. They can also describe facts to economists in general wording as economists often lack knowledge of legal language. If economists obtain such knowledge they will find their economic models drawn closer to what people really care about (Cooter & Ullen, 2012).

It seems like the European Union is aware of the importance of economic analysis of law and consequence based arguments in policy setting. In regards to the Aviation Directive, the European Commission made impact assessment (SEC (2006)1684) but it appears that their assessment was inadequate. As pointed out in chapter 8.1. Ernst & Young and York aviation (2007), made another assessment of the Aviation Directive in coordination with associations of European aircraft operators. Their assumptions were a bit different from the impact assessment from the Commission, and the conclusion was that the impact of inclusion of aviation activities to the ETS would have much more
severe effects than the Commission claimed in their report. The EU Commission states in chapter 1.3 in their impact assessment report that the Commission invited stakeholder organizations to participate in the working group for inclusion of aviation activities in the ETS (SEC(2006) 1684). Therefore it seems quite odd that impact assessment based on Commission’s assumptions and impact assessment made on behalf of associations of European aircraft operators lead to such different conclusions. Even though the EU Commission wants to avoid lobbyism from stakeholders in the aviation sector they really should have designed the Aviation Directive in cooperation with associations of European aircraft operators to get their point of view, as they have much better understanding of the characteristics of aviation than the Commission.
Conclusion

The present thesis examined what economic impacts might follow the inclusion of aviation activities in EU ETS. The main focus was on what kind of impact the EU ETS might have on competition between EU operators that have their operational network mainly within the EU, and non EU operators that have an operational network mainly outside the EU. To begin with, it is important to understand the concept of climate change. Greenhouse gases are one of the main contributors to global warming. Gases such as CO₂ are long lived and can persist in the atmosphere for decades, even centuries. A working group on behalf of the IPCC has presented how natural systems are being affected by climate change. They claim that they have evidence from all continents and most oceans that many natural systems are affected, mainly because of increased temperature.

In 1992 the UNFCCC was adopted at the Rio Earth Summit. It is an international treaty with the main objective to limit average global temperature increases and climate change. The UNFCCC came into force in 1994, and 195 countries have ratified the Convention. Members of the Convention are divided into three groups based on their differing commitments. The developed countries have the main responsibility under the Convention and they are supposed to assist the developing countries to undertake GHG emission reduction. In 2005 the Kyoto Protocol came into force after a few years of negotiation between the members of the UNFCCC. The parties realized that provisions laid down in the UNFCCC were inadequate and a more effective framework was needed. The Kyoto Protocol sets binding emissions targets for its 192 parties and offers three types of market based mechanism that members can use, IET, CDM and JI. The EU joined the UNFCCC in 1993 and ratified the Kyoto Protocol in 2002. The EU is the only regional economic integration organization under the Protocol and EU member states are therefore allowed to fulfill their emission target commitments under article 3 of the Protocol jointly. In 2005 the EU launched the ETS Directive in order to comply with its commitments as a regional economic integration organization under the Kyoto Protocol. The ETS was established to support EU member states to reach their commitments under the Protocol in a cost effective and economically efficient manner. Member states are allowed to use same methods as stated in the Kyoto Protocol to reach their emission targets, EIT,CDM and JI.
In 2008 the Aviation Directive was adopted as an amendment of the ETS Directive to include aviation activities in the ETS, but such activities were excluded in the initial ETS Directive. According to Annex 1 of the Aviation Directive the Treaty applies to all flights that depart from, or arrive in an aerodrome within the EU, regardless of the origin of the operator. The international aspect of the Aviation Directive has faced a huge opposition, especially by non EU nations. Countries such as China, Russia and USA strongly condemn the Directive and claim the EU is reaching far out of its sovereignty.

The A4A challenged the legal validity of the Aviation Directive in 2011 by bringing a case to the High Court of Justice of England and Wales which referred the case to the ECJ. In December same year, the ECJ issued a judgment concluding that the Aviation Directive is valid. At the ICAO assembly in September 2012 a significant progress was made in finding a global market based framework for aviation emissions. In November the same year the Commission issued memo 12/854 announcing to put the international aspect of the Aviation Directive on hold for the time being, or until the ICAO assembly in 2013. Even though the Commission decided to put the international aspect on hold, the ETS will remain the same for flights within the EU.

The second part of the thesis emphasizes the relation between law and economics. It is essential to understand the relation between the two in order to be able to perform an economic analysis of the Aviation Directive. Economic analysis of law can be useful in order to predict how people respond to law, and what effect legal sanctions will have on behavior. Three aspects of economic analysis of law were introduced: positive-, descriptive- and normative economics. All three aspects are important to define what economic effects laws have, and how law should be shaped to promote efficiency and reach the intended objectives of the law. Tragedy of the commons is a situation that can occur when a good that belongs to no one is used by the commons until nothing is left of it. The environment is a good example of a common good which all habitants on earth have unlimited access to. In order to avoid a tragedy of the commons with the environment, some measures need to be taken. Mankiw and Taylor claim the best solution to avoid tragedy of the commons taking place is to internalize the externality. That is to say, to give someone the right to pollute in regards to emission of GHG. The EU has chosen to go down that road by using command and control principle to reduce emissions and avoid the tragedy of the commons to take place.
Even though economic analysis of law is an essential tool for effective policy making, there are some limitations to its use. In order to predict economic outcomes of law there are always some assumptions needed. Assumptions are however the fundamental factor in economic analysis, but at the same time, one of the weakest points of this method.

The third part of the thesis focuses on economic analysis of the Aviation Directive. Two versions of analyses were performed. First economic analysis of the initial set up of the Aviation Directive, and secondly, economic analysis of the current set up of the Directive, where the international aspect has been put on hold. Case studies were conducted for three markets under both versions above: For flights between two non EU countries where no direct flights are available; for flights between an EU hub and non EU hub where no direct flights are available; and for travel within the EU where various travel options are available. With the initial Aviation Directive in play, all three markets mentioned above were affected. In the first case study the route from New York to St. Petersburg with one connection flight was analyzed. In this case Icelandair, an EU airline, had a connection flight out of Keflavik and had to pay emission allowances for both legs. On the other hand Emirates, a non EU airline, had its connection flight out of Dubai. No part of their route entered the EU aerodrome and therefore no emission cost was incurred. In this case Icelandair, an EU airline, is put at a competitive disadvantage compared to Emirates as Icelandair needs to pay 12,54€ for each passenger on this route. Even though Emirates does not need to pay for its emissions for this route via Dubai, they emit more than twice as much as Icelandair that has its route via Keflavik. In this case a carbon leakage can occur if travelers choose to fly with Emirates.

In the second case study the market for flights between an EU hub and a non EU hub were no direct flight is available was analyzed. The route between Copenhagen and Hong Kong was used as an example. A traveler could use an airline that has a connection flight in London. For that route the airline would need to pay approximately 17€ for CO₂ emissions as both legs fall under the scope of the ETS. On the other hand, if a traveler choses an airline that has a connection flight in Moscow, only the first leg of his travel, between Copenhagen and Moscow falls under the scope of the ETS and the airline needs to pay 2,95€ for emissions of CO₂. In this case the airline that has its network within the EU is again put at a competitive disadvantage compared to the non EU airline that has its operational network on hubs just outside the EU.

In the third case study the market for travel within the EU was analyzed. If airlines use
the pass through method and include emission cost in their ticket prices, travelers might choose alternative travel options. They could travel by train, which is the most environmentally friendly travel option; but travelers could also choose the private car instead of going by train, causing a huge carbon leakage to occur. The price elasticity on travels within EU is quite high and due to various travel options, travelers can easily switch from airlines over to other travel options if airfare prices increase.

Since the Commission issued memo 12/854 the market conditions for the markets defined above have slightly changed. The memo announced that the international aspect of the Aviation Directive is put on hold. The first case study of the current set up of the Aviation Directive in chapter 6.2.1.1. is made for flights between two non EU hubs where no direct flight is available. The market conditions have changed in a significant way on this market. Now airlines can have a connection flight within the EU aerodrome without paying emission cost, as long as they only have a connection flight at one EU hub per route. This means that the ETS will not act as an incentive for non EU airlines to bypass EU hubs and use non EU hubs as connection hubs on their international flights.

In chapter 6.2.2.2, market conditions under the current set up of the Aviation Directive are analyzed for flights between an EU and non EU hub where no direct flight is available. On this market, airlines can avoid paying emission cost for their route if they exit the EU aerodrome and have a connection flight at a non EU airport. If airlines use EU hubs for the connection flight, they need to surrender allowances, as show in this case, for flight between Oslo and Cairo. Once again, EU operators that have their operational network within the EU are put at a competitive disadvantage compared to non EU operators that use non EU connection hubs on their routes and do therefore bypass the EU ETS.

The last case study under the current set up of the Aviation Directive was made in chapter 6.2.2.3, for travel within the EU. The market conditions on this market have not changed after the Commission issued memo 12/854 as flights within the EU are still included in the ETS and therefore no further impact assessment was made for this market.
The last part of the thesis focuses on consequence based arguments. It can be quite difficult for policy makers to define what kind of consequences matter. Policy makers need to be able to act as act-utilitarian decision makers in order to increase welfare for the whole society, not only for certain interest groups. Consequently, policy makers often use the “where will it all end up” method in their consequence based assessment to choose between various structures of policies.

In 2006 the Commission published working document SEC(2006)1684 as an impact assessment of the inclusion of aviation activities in ETS. The working group came to the conclusion that including aviation to ETS would not have adverse effects on aircraft operators. They based their impact assessment on the three following assumptions. Operators can fully pass on ETS compliance cost to consumers, demand will not decrease and operators can benefit in form of windfall profits. Associations of European aircraft operators did not agree to Commission’s assumptions and commissioned Ernst and Young and York Aviation to perform another impact assessment. They came to the conclusion that all assumptions made by the Commission were wrong due to the special characteristics of aviation. They claimed that the Commission used far too simplified assumptions in their impact assessment.

Even though Ernst and Young and York Aviation claim that the ETS can have various effects on aircraft operators and consumers, a solution for aviation emissions is still needed. Emission from aircraft needs to be reduced but it seems to be quite clear that the EU is not the ground for an international solution. The ICAO needs to come up with a transparent framework that respects sovereignty of its member states. By issuing such framework all aircraft operators need to comply with the same law, and competition between EU and non EU airlines will not be disturbed.
Bibliography

Articles:


Books:


**Legal Material:**


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**Reports:**


