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State Aid & Competition – The TAP Case

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Sumário

Esta tese tem como principal objetivo providenciar uma melhor compreensão de todo o processo de Ajudas de Estado. Usando com exemplo a recente operação de Ajuda de Estado aprovada pela Comissão Europeia com fim de dar ajudar a companhia aérea portuguesa TAP, exploramos como o processo de Ajudas de Estado é executado, quais os seus objetivos, e a maneira como afeta o mercado no qual a empresa que recebe a Ajuda de Estado esta inserida, tanto das perspetivas das empresas e dos consumidores. Para este fim, trabalhamos com dados de voos recolhidos diretamente de fonte oficiais como Google Flights e o website oficial da companhia aérea easyJet. Através dos dados recolhidos, calculamos o Índice Herfindahl-Hirschman (HHI) com o objetivo de medir o nível de concentração de mercado dos mercados em questão. Continuando, discutimos os objetivos gerais das medidas aplicadas assim como a sua implementação e consequências. Concluímos que as medidas mais importantes são bem-sucedidas nos seus principais objetivos de restringir as distorções de competição de mercado causadas pela aplicação da operação de Ajudas de Estado.

Abstract

This thesis aims to provide an insight into the entire process of State aid. Using the recent measure of State aid approved by the European Commission to give support to the Portuguese airline company TAP, we explore how the process of State aid is conducted, what are its aims, and how it affects the market in which the firm on the receiving end of the State Aid operation is inserted, from the perspective of both firms and consumers alike. For this end, we work with flight data gathered directly from official sources such as Google Flights and the official website the airline company easyJet. Using the data collected, we assessed the Herfindahl-Hirschman Index (HHI) in order to measure the market concentration of the markets in question. Furthermore, we discuss the general aims of the applicable policies as well as their implementation and consequences. We find that the most important policies succeed in their main objectives of mitigating the distortions of market competition caused by the application of a State Aid operation.

JEL Classification: D60; L10.

Keywords: TAP; European Commission; State Aid; Competition; Airport Slots.

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1. Introduction

In the wake of the COVID-19 pandemic, the world economy came to a halt. Measures imposed by governments from various countries to try and stop the proliferation of the coronavirus forced many businesses to close doors for what at the time was an indefinite amount of time. While this period was very difficult for the general economy, as of September 2022, it seems to have largely subsided and the days of empty streets without economic activity seems to have become a past memory. Many businesses, however, were not able to reopen doors after having closed them; the many days without revenue and, often, with continuing expenses proving to fatal. This is especially true for smaller businesses such as family-owned shops whose mostly shallower "emergency fund" was not as well-equipped to face an economic crisis compared, for example, to larger businesses or even businesses that did not stop its operations at any given time. Banking institutions, for instance, are a great example of businesses that did not seize operations at any given time during the pandemic, often under the justification of their capital importance to national and global economies alike. Personally, I should know this as I was recruited to work at a banking firm during the darkest days of the pandemic.

The aviation industry was one of the sectors most affected by the pandemic. Because its operations precisely involve the creation of physical connections between humans, since the measures taken by world governments were aimed at mitigating the virus transmission, it comes with little (if any) surprise that the aviation industry would suffer the heaviest hit.

When restrictions were lifted and operations resumed, many questions arose regarding how governments should proceed when it comes to rescuing entire economic sectors on the verge of collapse, including the aviation sector in general, and airline companies in particular. Not only are airline companies responsible for a very important part of the world's economy, from business travel to leisure travel, to the transportation of goods, but it also serves as an employer to many. If the entire airline industry was to collapse under the weight of the economic crisis instigated by the COVID-19 pandemic, the results could prove catastrophic.

For instance, on March 27th, 2020, the United States congress agreed to provide $25 billion USD in financial assistance to airlines with the aim of preserving aviation jobs and compensate air carrier industry workers in the context of the COVID-19 pandemic. [35]

These numbers give a glimpse of the magnitude of the crisis inflicted by the pandemic on the airline industry, and the enormous amounts associated with the mitigation of the consequences.

Similar funds were approved at the EU level in the context of the COVID-19 pandemic. Several types of aid are comprehended in these funds, among them tax credits, loan guarantees and direct grants. For instance, in July 2020, Spain approved a EUR 10 billion state aid fund to companies, among them IAG airlines and Iberia-Vueling; Corsair (an airline whose hub is located at the Paris-Orly airport) received EUR 106 million, while Aegean airlines (from Greece) received EUR 120 billion in direct grants. [11]

TAP Air Portugal is a Portuguese airline company and of the most prominent in the country or Portugal, as well as other Lusophone countries. It too suffered greatly at the expense of the economic downturn caused by the pandemic. In this context, to address TAP's financial situation, a restructuring programme was proposed by the Portuguese government and on the 21st of December 2021, the European Commission made public its approval of such programme. [12]

In this paper, we will discuss TAP's restructuring programme and the European Commission's decision on the subject. We will also look at, more broadly, how state aid affects market competition and economic activity in general. We will study the consequences of the restructuring plan relevant to the literature, as well as to the parties involved. Among the more important points of analysis is the market's state of competition (i.e., whether or not the restructuring programme contributes to a more competitively distorted market, and what are the potential steps taken by the European Commission and other parties involved to tackle potential consequences) and the resulting outcome of the restructuring programme for the relevant markets in terms of the degree of concentration. In particular, the present thesis computes the Herfindahl-Hirschman Index (HHI) – a common measure of market concentration – before and after the slot reallocation in a set of routes/markets in which TAP had to forgo its slots following remedies imposed by the European Commission in the state aid decision. Lastly, we provide a policy discussion based on relevant literature to assess the efficiency of the measures associated with the state aid decision and how these measures impact the most important aspects to the literature, namely market concentration and social welfare.

We show that the degree of concentration decreased following the slot reallocation in the relevant markets, as expected in the decision of the European Commission. The measure

of Slot Reallocation led to the introduction of new competitors in selected routes operated by TAP which had previously benefited from a high market concentration (in the specific routes in question). As a consequence of the Slot Reallocation measure, TAP's market share decreased from 65% to 55%. This event led to a reduction of market concentration, contributing, therefore, to a more competitive market, one of the key aims of the European Commission when implementing the measure, with the general goal of reducing the market asymmetries caused by the state aid operation.

Moreover, the introduction of new competitors as a consequence of the Slot Reallocation measure led to the opening of new routes from the Lisbon airport, routes that were not being operate by any airline previously. In turn, this event constitutes a net positive for consumer surplus and social welfare, two measures prevalent in the literature.

2. State Aid Regime and TAP's Restructuring Plan

The European Union (EU) is a political and economic union between 27 different European states (as of the time of writing). The European Commission (EC) is the EU's politically independent executive arm, serving as the institution responsible for proposing new European legislation and implementing it. It functions include proposal of new laws, management of EU policy and allocation of EU funding, enforcement of EU law, and representing the EU on the international stage. [1]

The **Treaty on the Functioning of the European Union** (TFEU) refers to one of two treaties that form the constitutional basis of the European Union. [2] Within the TFEU[1], Articles 101 to 109 form what is the basis for **European Competition Law**. [3]

In this chapter, we will briefly address the State aid regime under the EU and the guidelines on State aid for the airports and airlines and the state aid regime that came into force during the COVID-19 pandemic given its relevance to the topic of the present thesis. We will also assess the TAP's restructuring plan and the European Commission's decision on the subject.

2.1 State Aid Regime

Article 107 of the TFEU deals with the delimitation of boundaries between what is and what is not compatible with the internal market, serving as a tool to define state aid that is incompatible with the internal market. [3]

For a measure to be classified as State aid under Article 107 of the TFEU, the following cumulative criteria must be met:

   i.   The use of State resources;
   ii. The aid must confer an advantage to the beneficiary;
   iii. The advantage conferred must be selective;
   iv. The measure must distort competition; and
   v.   Trade between Member States must be affected. [17]

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[1] In particular, in Title VII – Common Rules on Competition, Taxation and Approximation of laws, Chapter 1 – Rules on Competition, Section 1 – Rules Applying to Undertakings and Section 2 – Aids Granted by States.

Article 108 deals with regulation, review, and policing of State aid policies, while **Article 109** deals with the implementation of Articles 107 and Article 108. [3]

In addition to the TFEU, in 2014, the EC issued the **Guidelines on State aid for rescuing and restructuring non-financial undertakings in difficulty**. [4] This document constitutes a supplement to the relevant articles in the TFEU (i.e. soft law), aiming to provide a more detailed framework from which State aid policy might be carried for non-financial undertakings. The following statement evidences this:

"*In these guidelines, the Commission sets out the conditions under which State aid for rescuing and restructuring non-financial undertakings in difficulty may be considered to be compatible with the internal market on the basis of Article 107(3)(c) of the Treaty on the Functioning of the European Union.*" [4]

According to the guidelines, an "*undertaking in difficulty*" is an "*undertaking*" (i.e., entity; company) which "*without intervention by the State, it will almost certainly be condemned to going out of business in the short or medium term*". The EC provides a list of circumstances that, if at least one is met by a given undertaking, that same undertaking is considered to be an *undertaking in difficulty*. [4]

In addition, the EC defines three distinct types of State aid:

i. **Rescue Aid** – design to be served in urgent and temporary situations to "*keep ailing undertakings afloat*" while a broader restructuring plan is conceived;

ii. **Restructuring Aid** – which aims to restore the "*long-term viability of the beneficiary*", while allowing for "*burden sharing and limiting the potential distortions of competition*";

iii. **Temporary Restructuring Support** – which consists of "*liquidity assistance*" so the beneficiary can implement future actions to "*restore its long-term viability*". [4]

In the context of European state aid law, in the particular case when the state aid operation is targeted at non-financial undertakings in difficulty, the European Commission designates certain stipulations that must be implemented by the recipient party of the state aid operations. Stipulations of particular importance are **Own contribution** and **Burden Sharing**.

i. **Own contribution** serves as a measure to ensure the aid beneficiaries as well as its shareholders and creditors contribute towards the restructuring costs. Broadly speaking, an adequate own contribution amounts to 50% of the restructuring costs. [4]

ii. **Burden sharing** serves to prevent "*protecting shareholders and subordinated creditors from the consequences of their choice to invest in the beneficiary*" after the beneficiary's equity position has been elevated due to the adoption of the State aid package. Burden sharing typically means that the entities mentioned (i.e., shareholders and subordinated creditors) must fully absorb the losses. [4]

The **"One time, last time" principle** refers to a principle which states that only one restructuring operation should be given to the same undertaking in difficulty. The European Commission states that a persistent need of an undertaking in difficulty for a recurring restructuring operation indicates that the problems with the undertaking in question are lingering or that these same problems were not addressed correctly in the previous restructuring operation. This principle aims to inhibit repeated State interventions in order to prevent problems of moral hazards and distortions of competition. Despite this, however, the "One time, last time" principle is not absolute and is subject to exceptions. [4]

Notably, the "One time, last time" principle is not affected by changes in ownership of the beneficiary following a restructuring operation, nor by any sort of judicial or administrative action that has bettered the financial health of the undertaking in question. As long as the undertaking who benefited from a previous restructuring operation is the same undertaking that is continuing in business, the "One time, last time" principle is applicable. [4]

Generally speaking, *Own contribution*, *Burden sharing* and the "One time, last time" principle, serve as devices to mitigate moral hazard. [4]

In addition to this, the European Commission emphasizes the importance of taking measures to **limit distortions of competition** resulting from the implementation of a State aid restructuring operation. These measures intend to minimize adverse effects on trading conditions and to ensure that positive effects outweigh negative effects. These measures are divided into:

i. **Structural measures** – aimed to reduce the beneficiary's expansion of its business activities as a result from the state aid operation. These include (i) the undertaking which the restructuring aid is aimed at, being required divest assets and reduce capacity or market presence, limiting the undertakings' increased market position; and (ii) promoting the entry of new competitors and the expansion of small competitors in the given market. [4]

ii. **Behavioral measures** – aimed to ensure the aid is exclusively allocated towards mending the long-term viability of the beneficiary and not extend market structure distortions. These measures include having the beneficiary abstain from (i) acquiring shares in other companies to ensure the aid is not allocated to financing external investments or the beneficiary's expansion into different markets; and (ii) disclosing publicly having received State aid and using said disclosure as marketing tool to promote their goods and services to gain a competitive advantage. [4]

Under exceptional circumstances, the beneficiary may be required to halt any commercial behavior offering terms that cannot be matched by the competitors not on the receiving end of State aid. These more resolute measures are only to be applied when other less severe measures, structural or behavioral, cannot adequately tame the market and competition distortions caused by State aid. [4]

iii. **Market opening measures** – aimed at promoting an open and competitive market. [4].

Furthermore, after the decision to grant State aid has been taken, Member States of the EU are required to publish a comprehensive picture of the State aid operation, disclosing approval aid schemes, identities of granting authorities, identities of the beneficiaries, form and amount granted in the State aid package, dates of granting, as well as clearly mapping allocated amounts to beneficiaries, beneficiaries' locations, and economical activities. [4]

There is a **general prohibition** of State aid by the EU, considering the negative effects caused to the internal market namely, to prevent companies doing business in the internal market to receive selective advantages that distort competition. Despite this general prohibition, in some circumstances, government intervention in the form of State aid can be considered critical for a healthy economy to neutralize a market failure.[6]

Even with the side effects still lingering, taking the previous courses of action into consideration, State aid is considered to be a "necessary evil".

State aid procedures

The process of State aid implementation starts with the **notification** of all new aid measures to the EC. Before the State aid operation can be carried forward, Member States must wait for the EC decision to approve the State aid operation, save for a few exceptions:

i. Aid that complies with a Block Exemption (this type of aid, if comprehended within a specific range of measures defined by the European Commission, is automatically approved);

ii. *de minimis* (i.e., trivial) aid that does not exceed 200.000€ per undertaking over a period of 3 fiscal years;

iii. Aid granted under an aid scheme already approved and authorised by the European Commission. [6]

Block Exemptions defined by the **General Block Exemption Regulation** ("GBER") constitute exceptions to the otherwise obligatory notification procedure to the EC in the context of State aid operations. [7]

After the notification process is sent out by Member States to the EC the process a **preliminary investigation** commences. The EC may request complementary information to the respective Member States if it feels the original information supplied is insufficient. If the respective Member State fails to comply with the EC's request during the limited period prescribed, the original notification is considered notwithstanding. From the time a completed notification has been received, the EC has two months to deliberate over whether:

i. The measure can be implemented;

ii. The aid is compatible with EU rules because its positive effects outweigh its negative effects;

iii. There remain serious doubts as to the compatibility of the notified measure with EU State aid rules, which would bring about an in-depth investigation, i.e., a formal investigation procedure (see next page) – that until concluded, halts the further implementation of the State operation. [6]

A simplified procedure may be applicable to more straightforward cases under certain categories of aid. [6]

If the EC identifies a case of **aid afforded without prior warrant**, the European Commission is complied to analyze the case without delay. If the aid was afforded without prior warrant, a preliminary investigation is launched and if needed, an in-depth investigation. Consequently, the EC may use directives to extract information from associated Member States, cease any further granting of aid and inflict clauses of provisional recovery obligation on the subject Member State. [6]

In accordance with Article 108(2) of the TFEU, the EC must carry out a mandatory **formal investigation procedure** when there are serious doubts regarding the aid's

consistency with EU State aid rules. This decision is transmitted to the subject Member State, outlining the basis of the investigation. [6]

After the formal investigation procedure is concluded, the EC must adopt a **final decision**. There is no legal deadline to complete the investigation given its length may be affected by various external sources, such as the quality of information available and the level of coordination with the Member State in question. In general, the final decision can take three different shapes:

i.   Positive Decision – the aid is suited and in agreement with laws in vigor;

ii.   Conditional Decision – the measure is considered compatible, but not without conditions expressed in the decision;

iii. Negative Decision – the measure conflicts with laws in vigor and must not be administered. [6]

In the case where the EC has taken a negative decision when **aid has been administered already**, the Member State is required by law to recover the aid with interest from the beneficiary (if such recovery does not go against EU law). The EC opens a "*recovery case*" to impose the decision and if the Member State in question does not abide by the decision in the provisioned time frame, the EC may summon the European Court of Justice to mediate the dispute. [6]

This "*recovery case*" is design to undo the unwarranted advantage granted to a company and to reinstate the market to its prior state before the aid was administered. The period of recovery is limited to ten years. [6]

During the whole process of State aid procedures, the resolutions and conduct of the European Commission are subject to judicial review by the General Court and the European Court of Justice. [6]

2.2 Guidelines on State aid for the airline sector

In this thesis, we will study the state aid provided to **TAP Air Portugal**, a Portuguese airline company, during the COVID-19 pandemic, as a case study. Portugal, as part of the EU since 1986, is governed by the same principals of competition law as other EU member states, including the regulatory framework chartered by the EC regarding State aid policy.

Considering the case study of this thesis, the **Guidelines on State aid for airports and airlines** are of particular interest for our intents and purposes. Much like the **Guidelines on**

State aid for rescuing and restructuring non-financial undertakings in difficulty, the **Guidelines on State aid for airports and airlines** is a document governed by the articles set forth by the TFEU. [5]

In the guidelines, the EC presents a notion of the State aid operation, defining economic activity, the use of State resources, and other relevant information. It gives a broad scope of the State resources that may be transferred in the form State aid, including: (i) direct grants; (ii) tax rebates; (iii) soft loans; and (iv) other types of preferential financial conditions. [5]

The guidelines also provide information on the set of cumulative conditions that must be met in order to State aid measures be fulfilled with the internal market in congruence with Article 107 of the TFEU. These conditions are:

i. Subscription to a clear goal of common interest – these are outlined in accordance with Article 107 of the TFEU;

ii. Need for State intervention – especially in a situation where the market cannot correct itself without it;

iii. Suitability of aid package – this must be targeted at addressing the objective of common interest;

iv. Incentive effect – changing the behavior of the subject undertaking, having it engage in additional activity, which would have not been engaged in otherwise, or not to the same degree;

v. Proportionality of the aid – the amount prescribed in the aid is limited to the minimum value required to prompt the economic stimulation in the area concerned;

vi. Restrain of negative effects – minimizing the negative effects on competition and trade between Member States caused by the prescription of the State aid operation, ensuring the overall balance of the measure is a net positive;

vii. Transparency – clear and concise information about the State aid operation to all parties involved directly and indirectly, including the interested public. [5]

Finally, without suitable incentives airlines may refrain to expand their operations towards routes and airports whose yielded profits may not be attractive enough. In contrast to State aid which aims to promote long-term viability of an undertaking, in this specific case, an airline company, and to address the situation mentioned previously, the European Commission provisioned **Start-up aid to airlines** to serve as an incentive for airlines to open new routes from neglected airports. Start-up aid to airlines must also abide to the principles

above. For instances, in the case of contributing to the clear goal of common interest, this could mean the Start-up aid to airlines fosters regional development in remote areas. [5]

2.3 State Aid Regime in times of COVID-19

As national governments tried to stop the proliferation of COVID-19, many businesses found themselves forced to cease operations during an indefinite amount of time. The measures taken to mitigate the public health risk of COVID-19 had an immediate impact on both supply and demand therefore, affecting undertakings and employees, both financially healthy and not. Economic activity dropped dramatically which made undertakings struggle to pay their suppliers and employees.

To combat the economic hardships resulted from the COVID-19 pandemic, the European Commission provided a **temporary framework** for State aid measures, complementing the already available State aid options. This temporary framework is characterized by more flexible State aid rules. This temporary framework is directed particularly at small businesses aiming to help them to preserve their capacity to keep operating, or to suspend operations for the moment without hindering future growth prospects. This temporary framework was subject to various revisions throughout the COVID-19 pandemic. [8]

2.3.1 Temporary Framework for State Aid

In the **Temporary Framework for State aid measures to support the economy in the current COVID-19 outbreak**, the European Commission affirms that Member States can reimburse businesses (i.e., undertakings) that operate in sectors that have been particularly hit the pandemic outbreak – transport, tourism, and hospitality, to name a few. In this scenario, the principal of "One time, last time" is exceptionally not applicable. This means Member States can compensate the damages caused directly by the pandemic even if the undertakings in question as received aid previously. [9]

The EC considers the aid provisioned in the temporary framework is compatible with the internal market, citing Article 107 (3)(b) of the TFEU as justification, denoting the aid provisioned in the temporary framework as a tool to "*remedy a serious disturbance in the economy*". Hence, the State aid provisioned in the temporary framework is justified. [9] More specifically, the temporary State aid measures take the form of:

- Grants, repayable advances or tax advantages;

- Guarantees on loans;
- Subsidized interest rates for loans;
- Guarantees and loans channeled through credit institutions or other financial institutions;
- Short-term export credit insurance. [9]

As it was stipulated in the EC press corner of May 2022, given the positive development of sanitary conditions in Europe and the gradual fading of restrictive measures, the temporary framework for State aid in the context of the COVID-19 pandemic is not to be lengthen beyond the cessation date of June 30th, 2022, for most provisions provided. Specifically, investment and solvency support packages may still be put on place beyond the stipulated date. [10]

2.3.2 Response to COVID-19 in the Aviation Sector

In theory, the legal foundation for the temporary framework of State aid in the context of the COVID-19 pandemic is supported by the Articles 107 (2)(b) & 107(3)(b) of the TFEU which state, respectively, that "*aid to make good the damage caused by natural disasters*" and "*aid (...) to remedy a serious disturbance in the economy of a Member State*" are and may be, respectively, compatible with the internal market. [3]

Despite this, however, the EC distances the legal foundation of the temporary framework from Article 107 (2)(b), choosing instead to justify such legal foundation of the shoulders of Article 107 (3)(b). [11]

This is because Article 107 (2)(b) of the TFEU must realize the basis of causality: the aid is targeted only at the damage caused by natural disasters. The European Commission explains that the article does not deal with, for instance, damages caused by the sudden drop in demand, consequence of the customers' own decisions of, for example, practicing social distancing (causing the aforementioned drop in demand). Blame for such damages cannot be placed (at least not directly) on the COVID-19 pandemic and consequently, it cannot be placed on natural disasters, rendering the article redundant. Hence, the restrictive position the European Commission has taken when using Article 107 (2)(b) of the TFEU as a legal justification for the temporary framework of State aid exclusively in the context of the COVID-19 pandemic. This does not mean that Article 107 (2)(b) of the TFEU has not been

invoked at all, it just means that using Article 107 (3)(b) of the TFEU as a legal foundation for the temporary framework is favored overusing Article 107 (2)(b) of the TFEU. [11]

Past application of the provisions of Article 107 (3)(b) of the TFEU took place to mitigate the post-2008 economic crises. Like in the banking crisis in 2008, the European Commission considers that the economic downturn of the COVID-19 pandemic classifies as a "*serious disturbance to the economy*". Hence, Article 107 (3)(b) of the TFEU can be more flexibly used as a legal justification for the temporary framework, in comparison to Article 107 (2)(b) of the TFEU. [11]

TAP – the Portuguese flag carrier airline – was not granted aid under the temporary framework. Instead, its aid was classified as **restructuring aid**, justified by Article 107 (3)(c) of the TFEU as well as the Rescue and Restructuring Guidelines. This is because TAP was already in financial difficulty prior to the outbreak of the pandemic. [11]

Critics have pointed out the hazards that Member States may exploit the current situation to support airlines that were problematic before the pandemic. In addition to this, it has been acknowledged that Member States with greater economic clout could benefit disproportionally from the loosening of State aid regulations. For this reason, the European Commission should establish the awarding of State aid in a fashion that lessens the distortions of competition. [12]

Ryanair, in particular, has been a vocal player, challenging State aid directed at competitor air carriers, filing numerous actions for annulment of State aid before the European Court of Justice. These opinions may be justified given the fact that "national" air carriers or partially state-owned air carriers seem to have been favored by Member States when the allocation of State aid is concern, to the detriment of other air carriers. [11]

State aid support has mainly been allocated to individual airlines with a few exceptions, namely, schemes made available for all national carriers or all operating carriers in a given Member State. [11]

2.4 European Commission's Assessment of TAP's Restructuring Plan

On June 10th, 2021, Portugal notified the European Commission of its plans to grant **restructuring aid** valued at EUR 3.2 billion towards Transportes Aéreos Portugueses SGPS S.A. ("TAP SGPS") and its sister company Transportes Aéreos Portugueses, S.A ("TAP Air Portugal"), both currently under the control of the Portuguese State. [12]

Prior to this notification, a rescue loan of EUR 1.2 billion was attributed to TAP SGPS – "*the initial rescue aid decision*" – to which the EC raised no objection in a decision dated June 10th, 2020. The Portuguese State applied this rescue loan in July 2020 and, thereafter, on December 10th, 2020, submitted a restructuring plan for TAP SGPS. [12]

The General Court annulled the initial rescue aid decision but suspended the effects of the annulment pending the adoption of a new decision by the Commission. The EC raised no objection to the rescue aid in a decision dated July 16th, 2021, requesting more information at a later date, including up-to-date information about the slot holdings in the Lisbon airport, to which Portugal promptly obliged. [12]

On the 21st of December 2021, the EC made public its decision regarding the State aid operations directed at TAP SGPS, TAP Air Portugal, and their respective subsidiaries.

The rest of this section will spell out the context of the EC's decision of December 21st, 2021.

2.4.1 TAP: Background

TAP SGPS, a holding company incorporated in 2003, and TAP Air Portugal, the Portuguese flagship airline were created in 1945. The Portuguese State assumes a majority position (72.5%) of the share capital and respective economic rights of TAP SGPS, while HPGB holds 22.5%. Likewise, the Portuguese State hold 92% of TAP Air Portugal, while TAP SGPS holds the remaining 8% as of the time of the European Commission's decision of December 21st, 2021. [12]

TAP Air Portugal is active in the air transport of passengers and cargo. In 2019, TAP Air Portugal operated a fleet of 108 aircraft, serving 92 destinations and 38 different countries in over 130 000 flights, carrying over 17 million passengers. TAP operates mainly from the airports of Lisbon, Porto, and Faro as well as the archipelagos of the Azores and Madeira. Outside of Portugal, TAP's international destinations include several countries in Europe as well as Brazil, Africa, and North America. TAP Air Portugal's operations resolve mainly around the Lisbon airport serving as its main hub. [12]

2.4.2 Report of the restructuring plan and restructuring aid

The next few sections will provide a brief overview of the restructuring plan and the restructuring aid. The restructuring aid accompanies the restructuring plan that encompasses

the period from 2020 until 2025. This is called the "**restructuring period**". The plan covers TAP SGPS and its sister company TAP Air Portugal (including all their controlled subsidiaries) under the exclusive control of the Portuguese State.

In its decision, the European Commission sets down particular objectives of Portugal's restructuring plan aimed to recover the company by 2025 and its cornerstone is set on the following key components:

i. **Concentration on core strategy:** TAP was expected to gradually relinquish all its other ventures that do not consist of their core business, namely their position in M&E Brasil, a Brazilian aircraft maintenance subsidiary; their position in Groundforce, a ground handling services provider; their position in Cateringpor, a catering services provider. [12]

ii. **Adaptation of capacity**: The plan set out as the main objective of restructuring the creation of a more homogenous fleet with the goal of reducing costs associated with different processes of maintenance of different aircraft. The optimization of networks, encompassing cost-efficient route-aircraft matching, reduction of loss-making routes as well as routes considered having a low connectivity value were measures to be implemented. [12]

The restructuring plan focus on TAP's core operations at the Lisbon airport. The European Commission does not expect the competitive structure to change significantly despite TAP reducing its slot holding and the next largest slot holders (Ryanair and easyJet) having preliminarily increased their slot holdings. TAP's slot allocation is set to represent 45-55% of all slots in the Lisbon airport in comparison to 10-20% for Ryanair's and 5-10% for easyJet. Likewise, TAP would deploy the largest fleet in the Lisbon airport with 90-100 aircraft during its restructuring plan, compared to Ryanair's 7 aircraft and easyJet's 5 aircraft. [12]

iii. **Reduction of operational costs:** The restructuring plan aims to reduce TAP's operational costs in three distinct manners. First, through parleying of new contracts with aircraft suppliers and lessors; Second, through reduction of third party costs by means of use of energy-efficient aircraft, better route-aircraft matching and application of fuel optimization software; Third, reduction of labor costs through reduction of headcounts as well as salary reductions. [12]

iv. **Revenue Expansion:** TAP's future annual revenues are expected to steadily increase by the implementation of the restructuring aid operation. [12]

Restructuring Costs & Sources of Financing

The application of the restructuring plan was expected to incur in **restructuring costs** not covered by the expected reduction of operational costs or expected future revenues until the year 2025. Most of the restructuring costs were attributed to the shortfall of costs average until 2025. The European Commission stresses that these costs must be covered for TAP SGPS's not to risk the inability to maintain its operating license. The remaining restructuring costs are accredited to debt reimbursements, acquisition of new aircraft and labor indemnities to staff. [12]

Expected Return to Viability

TAP Air Portugal's expected return to viability is established on the ground of cost reduction measured mentioned before and increased revenue projections associated with the recovery of air traffic in a post pandemic context. The restructuring plan expects fuel savings, assuming exchange rates and fuel prices in congruence with market expectations, as a result of more fuel-efficient aircraft, better route-aircraft matching and application of fuel optimization software. In addition to this, labor costs are expected through headcount reduction measures and contract renegotiations with employees. Moreover, revenue projections stem from passenger air traffic complement by revenues from maintenance, cargo, and mail. These are based on the recovery of passenger air traffic in line with IATA baseline forecasts. [12]

Established Conclusions during the Opening Decision by the European Commission

Under the build of the notification of June 10th, 2021, and the subsequent information provided by Portugal to the European Commission, in an opening decision, the latter rendered the notified State aid support as lawful in conformity with Articles 107(1) and 108(3) of the TFEU. The compatibility of the aid was assessed with the internal market governed by the R&R Guidelines (Guidelines on State aid for rescuing and restructuring non-financial undertakings in difficulty) and, having concluded that numerous conditions of compatibility present in the guidelines appear, at a glance, not to be met, a decision was established to conduct a formal investigation procedure. [12]

The European Commission reached an initial conclusion that TAP SGPS was qualified for restructuring aid. In addition, the European Commission considered the restructuring aid suitable to tackle the associated liquidity and solvency problems. The anticipated profits and returns on equity by the end of the restructuring period are expected to sustain the long-term viability of the beneficiary and make it resilient in the face of future adverse instances, a conclusion shared by the state of Portugal and the European Commission. On the other hand, in a case of no State intervention, the beneficiary (TAP SGPS) and its sister company (TAP Air Portugal) would unavoidably have to withdraw from the market, disrupting the operation of a very important service (i.e., the aviation) creating a ripple of negative effects in the entire Portuguese economy – heavily reliant of the tourism industry. [12]

Continuing, the European Commission cast doubts on a set of subjects. First, it brought into question the proportionality of the aid, making reference to the fact that the majority of own contribution sources came in the form of cost reduction policy as opposed to other instruments, notably the partial reduction of debt lugged by the holders of TAP SGPS's bonds; Second, it called into question the measures limiting distortions of competition in reference to their degree of sufficiency and the opinion of the Portuguese authorities on the subject of slots divestiture as unnecessary and detrimental to the return of viability of TAP Air Portugal, without supplying tangible evidence to corroborate this judgement, considering TAP Air Portugal's heavy presence in terms of slots at the Lisbon airport; Third, while the fleet capacity by the end of the restructuring period is expected to be lesser than that of before the restructuring period, there is no evidence to corroborate that the fleet capacity resulted from the purchase of new aircraft during the restructuring period would not be excessive. [12]

Finally, the European Commission pointed that the plan was set to last longer than 5 years, a period not overseen by the projections made and, consequently, a period of uncertainty regarding the behavior of demand, which could translate into more aid being required. [12]

2.4.3 Third party views on TAP's State aid

As part of its investigation in the context of TAP's State aid, the European Commission reached out to third parties involved, such as competitors and TAP's business partners, and gathered information about their opinion on the subject at hand. It this section, we will outline some of the EC's main findings.

Comments from Competitors - Ryanair

Ryanair expressed disagreement regarding the findings that the restructuring aid subscribes to an objective of common interest. Ryanair argues there is no possibility of disrupting the hard-to-replicate aviation service in Portugal, since TAP's service is currently being replicated by its competitors. The fear that if TAP discontinues certain long haul routes would cause international carriers to place less importance on the Lisbon hub and revert to other hubs (the carriers' respective hubs) in other Member States of the EU is refuted by Ryanair who asserts that key long haul destinations provided by TAP (such as New York, São Paulo and Dubai) are also provided by large international carriers such as American Airlines, LATAM, Emirates, among others, directly from the Lisbon airport, while TAAG Angola Airlines would offer direct flights from Lisbon to Luanda, a route of major importance in the Lisbon airport. Because of this, in case TAP discontinues some routes, Ryanair affirms it would still be possible to fly to the aforementioned locations directly from Portugal without the need to transfer the flights to other major hubs in the European Union. [12]

According to Ryanair, other carriers operate the domestic routes in Portugal, including to the Autonomous Regions of Madeira and Azores, as well as other Portuguese-speaking countries and other countries outside of Europe. Notably, routes from the Portuguese mainland to the Autonomous Regions of Madeira and Azores are operated by Ryanair, easyJet, Transaiva, SATA Air Açores and Azores Airlines. In addition to its, Ryanair claims that the high-speed railway system or intercity bus companies such as Flixbus, provide a competition to TAP's domestic routes, ensuring connectivity in Portugal. [12]

Furthermore, Ryanair conducted a study which concludes that the historical trend of providing support to the traditional "national flag carrier" airlines has not been translated into greater growth or connectivity, asserting that it is the pan-European low-cost carriers that are the true responsible for providing such attributes to their markets. Moreover, as the European airlines emerge from the post-pandemic crisis, the void caused by one airline's loss of capacity would quickly be filled by other airlines eager to take advantage of the opportunity presented and operate at a more efficient level. [12]

With this, it is concluded that other transport providers already play a crucial role in the connectivity of Portugal including providing many of the same services TAP provides. Should TAP exit the market, its services could easily be replaced by more efficient airlines

which already serve the common interest. Tampering with this process by means of TAP's restructuring would, consequently, be detrimental to the common interest, says Ryanair. [12]

Ryaniar is critical of the measures to limit distortions of competition, saying these are inadequate. Ryanair is convicted that letting TAP Air Portugal hold onto slots that it would not be able to operate in case of reduction of air traffic or fleet would translate into stockpiling a valuable resource (i.e., slots) that could be put to good use otherwise. Therefore, TAP's slot divestment should at least be proportional to the reduction of TAP Air Portugal's fleet as to avoid this situation. In addition, the demands for slots by other airlines in the Lisbon and Porto airports would not be lacking. [12]

Comments from Competitors – euroAtlantic Airways (EAA)

EuroAtlantic Airways (EAA, for short) shares the same opinion as Ryanair when it comes to the measures proposed by the Portuguese government to address the distortions of competition caused by the restructuring aid, claiming these are insufficient, supporting the European Commission's concern. Considering the size of the of the aid aimed at TAP Air Portugal, EAA suggests the need for more comprehensive measures to limit distortions of competition. The proposals include reducing TAP Air Portugal's share on routes in which EAA is also present. [12]

EAA claims to have been the only Portuguese operator able to persistently supply direct flights to São Tomé e Príncipe since the year 2008. Furthermore, for 3 years starting in Christmas 2013, TAP Air Portugal suspended its flights to Guinea-Bissau due to security concerns and during this period EAA was the only Portuguese operator carrying the connection between Portugal and Guinea-Bissau and, consequently, to this specific part of the Portuguese-speaking world. EAA also asks for reassurance from the European Commission to guarantee that TAP Air Portugal does not take part in predatory pricing tactics in São Tomé e Príncipe and Guinea-Bissau, markets in which TAP Air Portugal and EAA are direct competitors. [12]

EAA vitalizes the importance that TAP Air Portugal does not use the State aid to open new routes. Furthermore, EAA suggests that TAP Air Portugal's slots on a given set of profitable destinations ought to be reduced by 1/3, making way for other airlines, among them EAA. [12]

Comments from Third Parties

Third parties, in particular TAP's business partners, such as the Porto Chamber of Commerce and the Brazilian Ministry of Tourism, have voiced their opinions in support of the State aid in favor of TAP SGPS, suggesting that TAP Air Portugal does provide important connectivity. Some of the reasons highlighted are the following:

- The volume and importance of passenger air traffic between Portugal and Portuguese-speaking countries provided by TAP Air Portugal;
- The value of TAP Air Portugal in the evolution of the tourism sector and, more broadly speaking, the economy of not only Portugal, but also other countries such as Brazil or Cape Verde;
- The importance of TAP's network to connect the EU with other countries, especially considering the privileged geographical position of its Lisbon hub which allows for the shortening of long-haul flights, attracting customers from other countries to Portugal;
- The significance of the already established relationships between TAP Air Portugal and its members/clients for the progress of the tourism sector as well as the reinforcement of trade and cultural exchange relations between Portugal and other countries;
- The significance of the outlook of stability provided by a national carrier. [12]

Portugal's Comments Regarding Third-Party Comments

Portuguese authorities emphasize that an overwhelming number of opinions from third-parties regard TAP SGPS as a crucial component for connectivity and economic activity, justifying the need to ensure its long-term viability and highlighting that the restructuring aid subscribes to the objective of common interest. [12]

Portuguese authorities refute Ryanair's comments, saying that despite low-cost companies operating long-haul flights, these are limited in frequency and destinations, as opposed to TAP's long-haul flights which are abundant in both terms. Furthermore more, Ryanair and EAA are accused of underestimate the complexity of TAP's operations, namely by comparing low-cost airlines operating only highly profitable flights to operating connections with limited public interest. For instance, in the summer of 2019, destinations

provided by TAP Air Portugal from Lisbon, most of which account for long-haul connections between Africa, North America and South America, were not replicated by any other airlines. In essence, the Portuguese authorities want to make a point of the fact that Ryanair and EAA, the latter being an airline without a relevant position in the Portuguese market and with comparably less operational capacity, could not possibly replace TAP's operations, rendering TAP's restructuring aid essential to **ensure connectivity** and economic development in Portugal and beyond. [12]

The Portuguese government restates that the financial projections of the restructuring plan are adequately supported. The expected returns corroborate the argument that the restructuring plan will bring **long-term viability** for the beneficiary and that these returns are favorable compared with the opportunity costs across other domains of the Portuguese economy. Moreover, the Portuguese authorities submit that the beneficiary searched additional sources of **own contribution** from its stakeholders, acquiring support from debt providers as well as considering the entry of new investors, which it considers to be **burden sharing** from existing creditors of the beneficiary, further balancing the **proportionality** of the State aid operation. In the eyes of the Portuguese authorities, this degree of own contribution is deemed sufficient, especially considering the context of COVID-19 and the subsequent R&R Guidelines which allow for a more malleable deployment of State aid regulations. [12]

2.4.4 Final decision of the European Commission Assessment

In the light of a series of deliberations, the European Commission reached an assessment regarding the proposed restructuring aid aimed to be deploy towards TAP SGPS (i.e., the beneficiary). In particular, the EC reached the following key findings:

- The measures constitute State aid confirming the principal of **existence of State aid**;

- The measures are lawful under the rules of State aid confirming the principal of **lawfulness of the aid**;

- TAP SGPS and TAP Air Portugal (and their subsidiaries) are undertakings in difficulty, and, therefore, eligible for restructuring aid confirming the principal of **eligibility** within the framework of **compatibility of the aid with the internal market;**

- The aid contributes towards the development of economic activity of air transport services connecting to Portugal and it allows for the maintenance of a service that could possibly not be replicated by competitors in its entirety or without severe social hardship in the short to medium term, which could have potential negative consequences for the Portuguese economy as a whole, confirming the principals that the aid **facilitates the development of certain economic areas** and that the aid **avoids the disruption of an import economic service**, both contained within the framework of **compatibility of the aid with the internal market**;

- The beneficiary's restructuring plan is pragmatic, reasoned and reliable, making it fit to restoring the beneficiary's long-term viability without defaulting back to another State aid operation in the foreseeable future, confirming the principal of **return to long-term viability** of the beneficiary contained within the framework of **compatibility of the aid with the internal market**;

- The restructuring aid is necessary for TAP SGPS not to go out of business, confirming the principal of **necessity** contained within the framework of **compatibility of the aid with the internal market**;

- The restructuring aid is appropriate in form, confirming the principal of **appropriateness** contained within the framework of **compatibility of the aid with the internal market**;

- The restructuring aid is commensurable and has appropriate burden sharing, confirming the principal of **own contribution** and **burden sharing** contained within the framework of **compatibility of the aid with the internal market**;

- Portugal commits that TAP SGPS will employ the following clauses during the restructuring period in an effort to **restrain the distortion of competition** caused by the aid. The clauses are (i.) privation of TAP SGPS's presence in non-core business ventures, namely ground handling, maintenance and catering (Groundforce, M&E Brasil and Cateringpor, respectively; divestment in M&E Brasil is not comprehend in the measures of limiting distortions of competition, instead it is comprehended in the measures of returning to long-term viability of the beneficiary, since M&E Brasil has historically been operating at a loss); (ii.) limit of 90-100 total number of aircrafts making up the beneficiary's aircraft fleet; (iii.) shift of up to 18 slots per day to competitors in the Lisbon airport (competitors are subject to eligibility criteria); (iv.)

prohibition of acquisitions; and (v.) prohibition of advertising. The European Commission considers these measures to be suitable for reducing the negative effects of the restructuring aid in the context of the framework of **compatibility of the aid with the internal market;**

- Portugal will make pertinent information regarding the State aid operation readily available on its website - https://portaldiplomatico.mne.gov.pt/sobre-nos/gestao-e-transparencia/documentos-legais - upholding the principal of **transparency** contained within the framework of **compatibility of the aid with the internal market**;

- The European Commission finds that the restructuring aid **does not distort competition at a length that goes against the common interest**;

- The European Commission requires Portugal to **issue regular reports regarding the deployment of the restructuring plan** every six months until the end of the restructuring period. [12]

Final Decision of the European Commission Concerning the State Aid Operation

On the 21st of December 2021, the European Commission made public its decision regarding the State aid operations directed at Transportes Aéreos Portugueses SGPS S.A., its sister company Transportes Aéreos Portugueses, S.A. and their respective subsidiaries. The decision, governed under the context of the Guidelines on State aid for rescuing and restructuring non-financial undertakings in difficulty**,** is as follows:

Article 1 deals with the broad spectrum of the deployment of the state aid operation. The state aid operation is valued at EUR 2550 million and is aimed to the benefit of the economic unit comprising Transportes Aéreos Portugueses SGPS S.A., its sister company Transportes Aéreos Portugueses, S.A, and their respective subsidiaries, under the control of the Portuguese State. This operation is compatible with the internal market and is subject to **Article 2**. [12]

Article 2 deals with the conditions that must be implemented by the economic unit recipient of the state aid operation. These conditions stipulated by the European Commission's decision aim to restrict distortions of competition and their compliance must be supervised and enforced by the Portuguese Republic. These conditions are:

a) TAP's full divestment in non-core business ventures (i.e., business ventures that do not comprise aviation, even if they are complementary to TAP's core business of aviation);

b) Limiting TAP's fleet to 90-100 aircraft in total;

c) Slot reallocation to competing airlines in the Lisbon airport;

d) Prohibition of acquiring shares from other companies except when essential to secure TAP's long-term viability and always subject to the approval of the European Commission;

e) Prohibition of using the state aid operation received as an advertising tool in order to gain a competitive advantage over other players in the market. [12]

Furthermore, the Portuguese Republic is obliged to provide the European Commission with updated information regarding the state aid operation's deployment. These updates must be sent every six months from the date of adoption of the European Commission's Decision until December 31st, 2025, the date of the end of the restructuring period. [12]

Article 3 says that the Portuguese Commission has a period of two months starting from the day this notification was sent to let the European Commission know what future actions are to be taken to carry the European Commission's decision forward (i.e., if the Portuguese Republic accepted the terms of the European Commission's decision). [12]

Article 4 affirms that the European Commission's decision is addressed towards the Portuguese Republic. [12]

2.5 TAP's Restructuring Plan – Award of Slots at Lisbon Airport

On June 16th, 2022, the European Commission issued a press release in which it announced that easyJet was the selected air carrier to be awarded the 18 daily slots at the Lisbon airport following the application of the EC's measures aimed at restricting distortions of competition in the context of TAP's restructuring plan. easyJet is expected to be in a position to establish new routes of operation as of October 30th, 2022, allowing it to expand its current position further in the congested Lisbon airport to the benefit of consumers. [13]

In order to have been eligible to receive the slots, air carriers must (i) have had a valid Operating License (OL) issued by the European Union Member State and not have had connections with TAP; (ii) not have had received COVID-19 refurbishment of more than EUR 250 million; and (iii) must commit to the operation of the number of aircraft proposed

to the slots made available until the end of TAP's restructuring period (December 31st, 2025). In addition to this, the European Commission gave preference to the air carriers that could offer the largest seat-capacity on their Lisbon-based aircraft as well as serve the greatest number of destinations departing from Lisbon. [14]

2.6 TAP's Restructuring Plan – COVID-19 Damages Compensation

In addition to the restructuring plan, the European Commission also approved a measure of compensation as a direct consequence of the COVID-19 pandemic. Portugal considers that the COVID-19 pandemic and its consequent travel restrictions enacted by national governments had a severe impact on the aviation sector with TAP having suffered greatly. This measure of aims to compensate losses incurred by TAP due to damages directly caused by the COVID-19 pandemic restrictions imposed between January 1st, 2021, and June 30th, 2021. [15]

Much like the restructuring aid mentioned before, this measure is subject to a series of clauses that must be met in order for the measure to be enacted. These clauses fall into the general guiding principles of State aid law in the EU, among them transparency, proportionality, lawfulness of the measure, and compatibility with the internal market. [15]

According to the European Commission, this measure is to be enacted under Article 107(2)(b) of the Treaty on the Functioning of the European Union (TFEU) and for that, the context in which the measure is established must meet the notion of exceptional occurrence under the same article. Due to the TFEU not providing a precise definition for an exceptional occurrence, the European Commission suggests three cumulative criteria to define it. To this end, in order to be classified as an exceptional occurrence, an event must be: (i) unforeseeable or difficult to predict; (ii) significant in scale or economic impact; and (iii) extraordinary (i.e., greatly divergent from the typical conditions under which the market usually operates). The European Commission considers that the coronavirus pandemic was unforeseeable and clearly did not fall under the normal circumstances in which the market typically operates. Because of this, the European Commission considers the COVID-19 as an exceptional occurrence under the definition of Article 107(2)(b) of the TFEU. Furthermore, a direct link is required between the damages incurred and the exceptional occurrence in order for the aid measure to be deployed. Indeed, the European Commission concluded that such a link does exist. [15]

In conclusion, the damage compensation, governed under Article 107(2)(b) of the TFEU, provided to TAP is only targeted at compensating damages directly resulting from travel restrictions due to the COVID-19 pandemic, as opposed to the rescue aid, which is part of TAP SGPS's restructuring plan and is targeted at covering different costs. The COVID-19 damage compensation directed at TAP amounts to a total of EUR 71,374 million. [15]

3. Literature Review on Airline Competition

3.1 Main Strands of the Literature

In this section we will approach the Literature Review of the thesis. We will touch upon the most relevant aspects of the Literature. We will further analyze how these aspects are germane to the policy discussion in later sections of the thesis.

3.1.1 Social Welfare

Flight frequency and scheduling decisions are paramount factors in the aviation industry and are deeply connected to slot allocation. The decision to transfer slots of the Lisbon airport from TAP to other competing airlines in the context of the state aid operation, and its respective consequences ought to be interpreted using a theoretical framework, allowing the reader to better understand the process and its results. Authors Jan Brueckner & Yimim Zhang explore the general consensus that a hub-and-spoke network provides a greater flights frequency as opposed to a fully-connected network. Coming across finds such as that despite a lower cost per passenger incurred by an airline company in the context of a hub-and-spoke network, the greater flight frequency provided by the hub-and-spoke network permits the airline to charge a higher price to its passengers; likewise, in the context of the welfare analysis, it finds that an airline provides excessive flights frequency and that the proper network type may not be selected, undermining the social optimum. [20]

The literature places great emphasis on the assessment of consumer welfare. Authors David Gillen & Victor Valdes build a model of several parameters, including the impact of slot control, flight frequency and market structures of airfares, to try to assess measures of consumer welfare based on slot reallocation between a legacy air carrier and a low-cost air carrier. The model demonstrates that slot reallocation does have a significant impact on consumer welfare, which can either take a positive form or negative form. The model also sheds light on the common misconception that simply moving slots to a low-cost carrier always leads to an increase in consumer welfare; it shows that, in fact, such action runs the risk of decreasing consumer welfare. [23]

Moreover, the literature points out fundamental differences between private and social incentives and how each one affects efficiency. General suggestions have been made regarding allocation (or reallocation) of finite operational licenses, such as broadcasting licenses or airport slots, and how this allocation leads to efficient use. Author Severin Borenstein (1988) provides proof that such asset allocation, by means of auctioning, selling or reselling of rights, does not necessarily translate into market efficiency, pointing at the fundamental differences private and social incentives; whereas social incentives would set a criterion with the ultimate goal of maximizing social benefit, private incentives plan and execute decisions with profit in mind. This divergence suggests that there is no strong correlation between operational resources allocation and maximizing social benefit. [24]

3.1.2 Market Competition

In terms of fair market competition, slotting allowances and fees in a hot topic of debate in the literature. Different sources present different perspectives on the subject matter. The two biggest opposing ideologies are that slotting allowances and fees improve distribution efficiency, and that slotting allowances and fees serve as a tool to concentrate market power and undermine market competition. Authors Paul N. Bloom, Gregory T. Gundlach, & Joseph P. Cannon probe over the views of practicing managers towards the different schools of thought presented. Their finding suggest that slotting fees limit the risk the introduction of new products and help assign the demand and supply of new products. [21]

Furthermore, the literature tries to assess what would be the consequences of market deregulation in the contest of the European aviation markets. Authors Joseph Berechman & Jaap de Wit conduct a simulation in which an airline with the economic objectives of profit maximization and market dominance operates in a deregulated market. The model mimics the expected profits a given airline might be subject to in case it chooses to adopt a hub-and-spoke network and settles outputs and prices with the intent of maximizing profits dissuade potential competitive firms from entering the market. [22]

3.1.3 Efficiency and Resource Allocation

The question of optimal slot allocation remains. Author Ian Gale (1994) illustrates an auction of slots between two aircraft carriers in order to analyze competition over limited operational

licenses. The author demonstrates that the equilibrium allocation of said operational licenses, in this case airport slots, is often asymmetric without becoming monopolistic. This is because as the number of slots becomes more concentrated on a single aircraft carrier, the price the leading aircraft carrier must pay for the incremental addition of slots, rises. This find suggests that fright regarding airport monopolization is not necessarily justified. [25]

Discussions regarding management of airport congestion also play an import role when it comes to the literature. In a scenario in which airlines are asymmetric, different optimal congestion tolls between carriers combined with uniform requirements on airport charges is a recipe for distortion of carrier flight choices, making flight volumes too low for larger aircraft carriers and too high for smaller aircraft carriers. This problem is tackled with the allocation of a fixed number of slots by the airport authority, which can provide the slots either via a free distribution or put them at auction. This process will lead to carriers considering total flight as fixed, and therefore congestion will be fixed as well. As long as the number of slots is optimally chosen by the aircraft carrier, and efficient outcome will be produced. [26]

Elaborating on the topic of airport congestion, the literature suggests a set of explanations for this phenomenon. The hubbing effect is the most notable explanation in a practical sense. Hub carriers tend to cluster their flights within short timespans of each other, providing their passengers with as many potential connections as possible while minimizing the passenger's potential waiting time. With this is mind, applying a congestion tax may not have the intended deterring effect on flight patterns, given the potential increment in customers the hubbing effect could provide may be too enticing for the airline carriers to ignore. [27]

Nonetheless, congestion price policy remains a prominent tool. Ordinary congestion price formulations charge airlines without considering whether the delayed flights caused by congestion are operated by the airline company whose aircraft caused the delay or by competing airlines. The literature suggests the optimal congestion pricing strategy should charge air carriers only for the delay imposed on other air carriers. [28]

Use-or-lose provisions are already commonplace in airports, specifically when it comes to its operational resources (its slots). The often-stated principal objective of these provisions is to prevent resource hoarding. The literature agrees with the provision's implementation citing the importance of the increase in aggregate output and welfare that comes as a result. Across all markets that have operational resources (not just the airline market) the literature

finds that when the dominant firm (i.e., airline company) is more efficient than its competitors, the application of a use-or-lose provision leads the dominant firm to acquire capacity from its competitors, which results in a decreasing aggregate output. On the other hand, when the dominant firm (airline company) is less efficient than its competitors, aggregate output tends to increase. Total surplus may increase or decrease in both scenarios described. [29]

3.2 Relevant Models from the Literature

After deliberating over the most important aspects of the literature, such as market competition, market efficiency, consumer surplus, and social welfare, we will present a detailed look of the two models we felt we relevant for the thesis.

We will choose to focus on the following models because these are the models which present the most relevant aspects in the final analysis for the purposes of this thesis. This is because the following models approach the key aspects of the literature, namely market concentration, consumer surplus and social welfare. Furthermore, we considered these metrics to be the most relevant when approaching the case of TAP's State Aid. This is because TAP's State Aid is focused heavily on the applied measures during the State Aid operation and their future consequences. For instance, the measure of Slot Reallocation is a great example of a measure that is put in place in the context of TAP's State Aid, and whose introduction raises important questions regarding the metrics described: what will be the consequences in market concentration? How will the introduction of new competitors affect social welfare and consumer surplus? These are questions we hope to answer in the later discussion.

3.2.1 Berechman & Shy Model

A trend of deregulation of the aviation industry escalated the use of **Hub-and-Spoke** model. In the context of the aviation industry, the Hub-and-spoke model refers to when an airline has a central airport as its *hub* serving as the center of its operations and connects its routes from the *hub* airport to its various destinations – the *spoke*. Today, the majority of major airlines operate on a hub-and-spoke model in which their route network is oriented from a central hub airport. [18]

When it comes to the emergence of the hub-and-spoke model in the aviation industry, the literature justifies it on cost considerations resulting from **cost savings**, on one hand, and **economies of aircraft-size** given demand of elasticities, on the other. The former defends that a transition a hub-and-spoke network results in cost savings to the airline company from passenger density-economies and aircraft-size economies, while the latter focuses on demand conditions, primarily passenger preference in comparison with price and frequency of flights; this is because the greater frequency of flight operations in a hub-and-spoke network in comparison to the flight operations between non-hub locations, serves as compensation to the passenger for having to fly via a hub. [18]

The Berechman & Shy Model demonstrates that for a given set of passenger's demand elasticity regarding frequency and willingness to pay for flying directly, an airline company will choose to operate with a hub-and-spoke network model. On the demand side there are two groups of passengers who are segregated based on their respective value of time: a group with a higher value of time, for instance, business travelers who would maximize their utility by flying directly to their destination from their point of origin; and a group with a lower value of time, for instance, leisure travelers for whom flying directly or indirectly to their final destination is less of a concern. While most of the literature assumes that the application of a hub-and-spoke network model is based primarily on the grounds of cost reduction, the Berechman & Shy Model illustrates how the hub-and-spoke network model can be applied as a plan of action by the incumbent airline when it is faced with another airline entering its zone of operations. [18]

Fundamental Model Assumptions

The Berechman & Shy Model considers three cities: city A, B, and C. Each pair combinations that can be made between these three cities is connected by an airline route represented by i, with $i = 1, 2, 3$. Therefore, a given route i represents a connection link of specific pair of the cities mentioned. The model assumes A-B as route $i = 1$, B-C as route $i = 2$, and A-C as route $i = 3$. A passenger can fly directly from one city to the other, or he can make a stopover at the third city (B); this third city is designated as a hub. The model presents to distinct types of operational networks: a Fully-Connected network (FC) where all passengers flight directly from their city of origin to their destination (i.e., without a stopover in the hub); and a Hub-and-Spoke network (HS) where every link between the passenger's city of origin and

destination is also linked with the hub (i.e., every flight has a stopover in the hub), making so that under the HS network there are no direct flights, except when the passenger's origin or destination is the hub itself. [18]

The Berechman & Shy Model assumes that for each route i, $i = 1, 2, 3$ there are two distinct kinds of passengers who are segregated based on their value of time. (i) $n > 0$ passengers with a higher value of time who acquire extra utility d ($d > 0$) from taking a direct flight from their origin to their destination without making a stopover the hub; and (ii) $n > 0$ passengers with a lower value of time who are considered to be indifferent between direct and indirect flights to their destination. To illustrate, business travelers and leisure travelers, respectively, can be considered to fit the types of passengers described. [18]

Having p_i representing the price of route i, the utility of a passenger with a higher value of time can be represented as the following:

$$U_i^H = \begin{cases} \beta + d - p_i & \textit{if flies directly to destination} \\ \beta - p_i & \textit{if flies to destination via hub} \\ 0 & \textit{if does not fly at all} \end{cases} \tag{1}$$

On the other hand, the utility of a passenger with a lower value of time on route i is only affected by the price of the route, and can be represented as the following:

$$U_i^H = \begin{cases} \beta - p_i & \textit{if flies directly or indirectly} \\ 0 & \textit{if does not fly at all} \end{cases} \tag{2}$$

where β ($\beta > 0$) is the basic value of the service of being transported from a city of origin to a city of destination attributed by the passenger. [18]

Considering c ($c > 0$) as representing the cost the airline is subject to per flight on any route i. This cost is measured per flight, not per passenger, and the model refers to it ACM Cost (Aircraft Movement Cost). In addition to this, considering K as representing the aircraft's capacity (i.e., the maximum number of passengers that can be flown on a single aircraft). The model assumes the premise that $\beta > 2c/K$ to ensure that hub-and-spoke network services are economically valuable, meaning the passenger's personal valuation for an indirect flight is greater than the cost per passenger of routing a passenger via a hub. [18]

An airlines company's monopoly

Consider an airline company which operates in a regulatory regime (i.e., a regime which only allows a single airline company to supply services to all cities). This regime can be noticed in various countries in which only one airline company is permitted to supply all domestic flights. Because of this, the model assumes the firm which is allowed to conduct operations behaves like a monopoly. [18]

In a Fully-Connected (FC) network (i.e., only direct flights from origin to destination), on each operating route, the airline that possesses the market monopoly is faced with the following options: (i) charge a low price for both kinds of passengers, effectively so that $p_i = \beta$; or (ii) serve only the passengers with a higher value of time and, therefore, $p_i = \beta + d$. [18]

Considering π_i as representing the airline profit from carrying out its operations on route i, $i = 1, 2, 3$ and π as representing the monopoly airline's profit from operating the entire network. Essentially, $\pi = \pi_1 + \pi_2 + \pi_3$. When the price of the flight is lower $p_i = \beta$ the number of flights on each route is given by $2n/K$ and the profit on a given route will be $\pi_i = 2n(\beta - c/K)$. On the other hand, when the price of the flight is higher, that is $p_i = \beta + d$, the number flight on each route will decrease to n/K and the profit on a given route will be $\pi_i = n(\beta + d - c/K)$. Therefore, we have:

$$p_i = \begin{cases} \beta + d & if\ d > \beta - c/K \\ \beta & if\ d \leq \beta - c/K \end{cases} \tag{3}$$

Hence, in the context of a Fully-Connected network, the airline's profit maximization functions will be:

$$\pi^{FC} = \begin{cases} 3n(\beta + d) - 3nc/K & if\ d > \beta - c/K \\ 6n\beta - 6nc/K & if\ d \leq \beta - c/K \end{cases} \tag{4}$$

The equations presented by the Berechman & Shy Model reveal that the higher the value of time a given passage has (d will take increasingly larger values), the monopoly airline operating in a Fully-Connected network will raise its prices p_i to extract the maximum

possible value from passengers with a higher value of time, alienating the passengers with a lower value of time in the process. [18]

On the contrary, using a Hub-and-Spoke (HS) network, the airline company routes its passengers from origin city *A* to destination city *C* with indirect flights only, always making a connection via the hub city *B*. As a means to reach a conclusion regarding the airline's monopoly prices in the HS network, the Berechman & Shy Model makes the following assumption:

Assumption 1: passengers who purchase a ticket from city *A* to city *C* have a stopover in the hub at city *B* and can get off and on a plane on city *B* at no additional cost, effectively being able to terminate or start their journey in city *B*. [18]

The assumption described above suggests that the price charged by the airline to its passengers on routes 1 and 2 (i.e., *A-B* and *B-C*, both passing through the hub city *B*) cannot be greater than the price on route 3 (i.e., *A-C*, not passing through the hub city *B*). Otherwise, passengers would buy a ticket for travelling on route 3 (*A-C*) and board the plane in the hub city *B*. [18]

With the above assumption in mind, since passengers flying in route 3 (*A-C*) are always flown in via the hub (*B*) in the context of the HS network, if the monopoly airline placed a high price $p_i = \beta + d$, it effectively alienates all route 3 passengers from the market (i.e., passengers with lower value of time, because only passengers with a lower value time would fly in route 3 to begin with, considering passengers with a higher value time would prefer to fly on direct flights). The model presents the following equations for the monopoly airline's price under the HS network:

$$p_i = \begin{cases} \beta + d & if \ d > 2\beta - 3c/K \\ \beta & if \ d \leq 2\beta - 3c/K \end{cases} \tag{5}$$

Hence, in the context of a Hub-and-Spoke network, the monopoly airline's profit maximization functions will be:

$$\pi^{HS} = \begin{cases} 2n(\beta + d) - 2nc/K & if \ d > 2\beta - 3c/K \\ 6n\beta - 8nc/K & if \ d \leq 2\beta - 3c/K \end{cases} \tag{6}$$

Comparing π^{FC} to π^{HS} the model concludes that for a monopoly airline, assuming constant returns to scale airline technology, operating in FC network is more profitable than operating the HS network. This is due to the increase in costs resulting from the increase in the number of flights on routes 1 and 2 in the context of the HS network. [18]

Incumbent airline's strategy when faced with the threat of a competitor's entry

Moreover, the Berechman & Shy model analyses the strategy employed by the incumbent airline when faced with the threat of entry of another airline in its market. For this purpose, the incumbent airline is represented by *I* and the airline that is potentially entering the market is represented by *E*. Under the Partial deregulation regime, an airline can enter in one route only and, since the HS network operation does not provide route 3 (direct flight from A-C, without passing through the hub B), this route (A-C) is the main choice of entry for the entering airline. The model assumes that there is no ex-ante asymmetry between the two airline firms (i.e., both airlines have the same cost and capacity structure). [18]

The model suggests a three-stage game between the incumbent airline and the entering airline. Stage I is defined by the incumbent airline choosing between keeping its FC network or restructuring its operations and switching to a HS network; Stage II is characterized by the incumbent airline choosing the price of its routes p_i^I, $i = 1, 2, 3$; finally, Stage III describes the entering airline choosing its price for the route of choice (i.e., route 3) p_3^E. Continuing, the model aims to resolve the equilibrium price for the two subgames – the FC subgame and the HS subgame - corresponding to their respective network models. [18]

The Fully Connected Subgame

Competition for route 3 reduces both airlines' price to unit cost, hence $p_3^I = p_3^E = c/K$ and, consequently, the incumbent airline is not subject to above normal profit from operating route 3, meaning $\pi_3^I = 0$. In short,

$$\pi^{I.FC} = \begin{cases} 2n(\beta + d) - 2nc/K & if \ d > \beta - c/K \\ 4n\beta - 4nc/K & if \ d \le \beta - c/K \end{cases} \tag{7}$$

The Hub-and-Spoke Subgame

Firstly, assumption 1 forces any price reduction by the incumbent airline on route 3 to be applied into routes 1 and 2 as well. In addition to this, considering the previous conclusion that airline competition on route 3 brings the incumbent airline's profits to zero ($\pi_3^I = 0$), the model reaches the conclusion that the incumbent airline finds it profitable to increase route 3's price to a level in which the entering airline will serve the passengers with a higher value of time, while at the same time the incumbent airline serves the passengers with a lower value of time by operating indirect flights via the hub. Therefore, in the HS subgame, the model concludes that in stage II, if the incumbent airline does not renounce route 3, then its profit-maximizing price function will be $p_i^I = Min\{d + c/K, \beta\}$. In essence,

$$\pi^{I.HS} = \begin{cases} 5n\beta - 6nc/K & if \ d > \beta - c/K \\ 5n(d + c/K) - 6nc/K & if \ d \le \beta - c/K \end{cases} \tag{8}$$

In conclusion, an incumbent airline company that is faced with the threat of an entering airline company on route 3 and does not wish to relinquish its operations on route 3, will choose to base its operations of an HS network, rather than a FC network, assuming $\frac{1}{5}(4\beta - 3c/K) \le d \le \frac{1}{2}(3\beta - 4c/K)$. [18]

Finally, the Berechman & Shy model reaches the unique subgame perfect equilibrium for the incumbent airline to operate in the HS network:

$$p_i^I = Min\{d + c/K, \beta\}. \tag{9}$$

And for the entering airline:

$$p_3^E = \begin{cases} p_i^I + d & if \ p_i^I \le d + c/K \\ p_i^I - \epsilon & if \ p_i^I > d + c/K \end{cases} \tag{10}$$

It should be considered that in some instances the incumbent airline will want to relinquish its operations on route 3 and focus only on serving route 1 and 2 and charge β or

$\beta + d$. Furthermore, in terms of the incumbent airline's profit, maintaining operations in route 3 in a Fully Connected network when an entering company establishes operations in route 3 is the equivalent to relinquishing operations in route 3, since in both cases the profit yield is zero ($\pi_3^I = 0$). [18]

Effectively, this means that an incumbent airline will relinquish its operations in route 3 if faced with an entering airline company in the same route; the incumbent airline with charge a price of $\beta + d$ in routes 1 and 2 if $d > \frac{1}{2}(3\beta - 4c/K)$; or will charge β in routes 1 and 2 if $d < \frac{1}{5}(4\beta - 3c/K)$. [18]

In conclusion, this paper show that the industry wide trend to adopt a Hub-and-Spoke network model is not merely justified by cost-saving measures and economies of aircraft-size as the literature suggests, but it is fundamentally about a strategy on how the hub-and-spoke network model can be applied as a plan of action by the incumbent airline when it is faced with another airline entering into its zone of operations. [18]

3.2.2 Slot Model

Congested airports around the world limit the number of flights by demanding airlines to have a fixed time for departures and landings. This specific time is called the "slot". This not only limits the total number of flights in an airport, but also the number of flights that are offered by an individual airline. This model shows the relationship between the variables that constitute the slot-holding process and its consequences. [19]

Slot holding airline companies have the right to plan their landing and departure operations during the slot's specified timeframe. The literature tends to focus on the question of the allocation of slots as well as the issue of the competitive impact of said allocation, including how an increase in slot holdings conditions the number of routes served, consumer surplus and, more broadly, social welfare. [19]

Authors such as Borenstein (1988), Gale (1994) and Brueckner (2009) give an insight on the efficiency of the slot allocation process and its consequences. Currently, slot holders engage in trading and selling slots between themselves. Furthermore, authors such as Mayer & Sinai (2003) as well as Morrison & Winston (2007) have inspected how the placement of slot restrictions may influence airport congestion and, consequently, consumer welfare, while authors such as Gale & O'Brien (2013) have investigated the impact of the "use-or-lose"

provision which is often applied on landing slots. The latter concluded the provisions described serve as a tool to motivate capacity usage by a ruling airline company that otherwise could deliberately restrict its own output as well as motivate the ruling airline company to obtain capacity from smaller airline companies. [19]

The Model

The model presented assumes that the airlines in question are identical in every metric except for their respective slot allocation. This means they face the same costs and offer the same service on a given route. In addition to this, only direct flights are served (i.e., there are no connecting passengers). The studied unit of output is a "flight" and one flight requires one slot. For simplicity reasons, it is assumed that flights are homogeneous and that they carry the same number of passengers of every route. In addition to this, the costs of operating different routes are also homogeneous.[19]

Model Findings

The model's first proposition is that in a Cournot-Nash equilibrium, if all airlines provide the same routes and there is a further slot allocation between airlines in a way that all airlines continue to operate in the same routes, the slot allocation's effect on flight prices and total number of flights in a particular route is void. This is further supported by the "use or lose" constraint applied to slot holdings; if the "use or lose" constraint was not applicable, in the event of airlines "parking" their slots, a transfer of slots from one airline to the another under the scenario described above could potentially lead to an increase in output and reduced flight prices, even if all the airlines continue to operate on the same routes. Consequently, the bottom line on this proposition is that the reallocation of slots between airline companies will not have considerable effect on social welfare or consumer surplus in the case that airlines are serving the same routes. [19]

In the case that social welfare and consumer surplus were simply defined as an increase in the number of routes served, an increase in the latter (i.e., increase in slot holdings) would certainly translate into an increase in the former. However, an increase in route coverage is translated into fewer flights and higher fares. Logically, prices fall as more slots are allocated to serving a given route. This price decrease leads to a decrease in route-level revenue; as a fixed number of slots is increasingly divided among more airlines, each

individual airline will place greater importance on the absolute differences across routes when choosing which slots and which routes to serve. Hence, if there are more airlines fighting for the same limited number of slots, each individual airline will purpose a higher proportion of its slots on routes where a higher price (i.e., routes with a higher margin) can be charged to the detriment of routes where a lower price (i.e., routes with a lower margin) can be charged, thereby increasing the slot-holding airline's profit margin. [19]

Evidently, this leads to the conclusion that consumer surplus and social welfare are greater with a decrease in slot concentration (i.e., slot concentration in a single airline; finite number of slots is increasingly divided among different airlines) leading to the second proposition of the model which states that a reduction in said slot concentration (i.e., increase in the total number of airlines holding slots) has a positive effect on aggregate social welfare and consumer surplus, even if the total number of routes served may be reduced. [19] Furthermore, the model's third proposition considers a scenario in which different airline's slot-holdings are asymmetrical, which means some airlines are entitled to more slots. It establishes that when there is a *monopoly slot holder* (i.e., an airline that holds more slots than any other airline) serving more than one route with price differences, the reallocation of slots from the *monopoly slot holder* to an entering airline company will influence social welfare and consumer surplus, increasing it, even if that translates into a reduction of the total number of routes served. [19]

In addition, the model's third proposition directly generates the model's fourth proposition which builds-up on the monopoly scenario proposed by the third proposition by suggesting that only two airline companies hold slots; any reallocation of slots from the larger slot holder to the smaller slot holder, provided said reallocation does not result in the smaller slot holder overtaking the larger slot holder's position as the dominant slot holder, either has a positive or null effect of the social welfare and consumer surplus because route outputs and prices are not affected. [19]

Despite the references above, under the right circumstances, the formulated conclusion may be reversed. When route-level fixed costs are considerably large, and airline with a great number of slots, when choosing between using another slot in a high-demand route with a lower marginal revenue, and a lower-demand route with a higher marginal revenue, it may opt for the high-demand route with a lower marginal revenue simply to avoid the high route-level fixed costs associated with adding a new route to its network. This leads to the conclusion that large slot holders which already have its routes solidified tend not to

disperse its slot allocation to new routes in order to avoid high route-level fixed costs. Moreover, the slots resulting from reallocation of slots from a large slot-holding airline company to a smaller slot-holding airline company, or even an entering airline company, may be used on a less demanded route. In this case, the efficiency obtained by purposing the slots on a route with a higher margin may be rendered redundant by the loss of efficiency resulting from additional route-level fixed costs, reducing social welfare in the process. Likewise, total consumer surplus may be reduced as well because of the price increase on the higher-demand route, consequence of fewer total flights on that same route. In short, higher route-level fixed costs incentivize airline companies to solidify their slot allocation on high-volume routes and can have a detrimental effect on social welfare and consumer surplus. [19]

In conclusion, manipulating the use of slots as a means to limit flight operations in order to control congestion is a strategy that has been recurringly employed by airports, which has the effect of limiting the airport's total output (i.e., total number of flights). With different airlines companies consolidating themselves by means of mergers and alliances – which are subject to antitrust immunity – and with the dealing of airport slots between airline companies, it is important to assess the results of such practices including consequences on concentration of slot ownership and on the competitive status of the aviation industry. The authors exhibit that given the right mixture of variables, a rise in the concentration of slot holdings has a negative effect on social welfare and consumer surplus. Likewise, the model suggests that a rise in slot concentration makes it so that airlines choose to deploy less slots on routes with a higher margin and allocate more slots to routes with a lower margin which results in a reduction in consumer surplus and social welfare. This proposition is the inverse of the model's finding that a decrease in slot concentration leads to each individual airline favoring their respective slot allocation on higher margin routes as opposed to lower margin routes. These findings, however, do not stand if an airline is faced with the presence of increasingly higher route-level fixed costs. If this is the case, an airline with a high slot concentration may allocate those slots to a higher-demand route, thereby avoiding the costs of developing a new route of operations (assuming the airline has already its operations established in a higher-demand route). [19]

4. TAP State Aid Case: Concentration analysis and discussion

The following analysis aims at studying the degree of concentration in the routes affected by the reallocation of slots from TAP to easyJet following the measures imposed by the European Commission. As mentioned before, this slot reallocation was aimed at mitigating the potential competition distortions created by the aid that TAP received from the Portuguese State.

With the theoretical framework of the literature set out before in mind, we also discuss the likely effects of the slot reallocation in terms of degree of competition, consumer surplus and social welfare.

4.1 Concentration analysis: before and after slot reallocation

In the context of TAP's restructuring programme, as mentioned before, easyJet was subject to the transfer of slots previously owned by TAP in the Lisbon airport. This slot reallocation enables easyJet to enter in routes from the Lisbon airport to a diverse set of destinations, including Barcelona, Bilbao, Birmingham, Zurich, Marrakesh, among others. In addition to this, easyJet will be able to reinforce its already existing operations in selected routes. [32]

For the purpose of the concentration analysis, we will consider each route from the Lisbon airport to a diverse set of destinations a separate market from the consumer's point of view (i.e., a relevant market). This follows the "point of origin/point of destination" pair approach used by the EC. [37]

We consider, however, for simplicity, only direct flights (or non-stop flights) and therefore, not indirect flights. This may not raise significant concerns given that we are interested in the difference of the degree of concentration before and after the slot reallocation.

The following table is the result of collecting information on the total number of weekly flights departing from the Lisbon airport to the respective destination airports concerning the new routes which easyJet will be able to enter in the market, following the slot reallocation. The total number of weekly flights in each route represents the size of the market in that given week.

The data was collected using Google Flights (Google's official flights search engine) and easyJet's very own official website in the months preceding the due date for this thesis

project. This data aims to represent the different frequencies of weekly flights across the various selected routes provided by the several operating airlines in the respective routes, both before and after easyJet is able to establish its operations in these routes resulting from the slot reallocation in the Lisbon airport – which begins on October 30th, 2022. [33]

For the purposes of collecting the data, two weeks were selected as samples of different time periods: the week from October 1st to October 7th, 2022, representing the sample time period before the slot reallocation (i.e., before October 30th, 2022); and the week from November 26th to December 2nd, 2022, representing the sample time period after the slot reallocation (i.e., after October 30th, 2022). In each of the weeks described above, the total number of flights segregated by airline was summed. The results are shown in *Table 4.1* which can be found in Annex A.

Calculating the Herfindahl-Hirschman Index (HHI)

The Herfindahl-Hirschman Index is a simple, baseline calculation that measures market concentration and gives an overview regarding market competitiveness. It is calculated by squaring the market share of each firm present in the market and summing the resulting values. The HHI ranges from 0 (zero) to 10000 and is calculated using the following formula, where s_n represents the market share of firm n, expressed as an integer. [34]

$$HHI \ = \ s_1^2 + s_2^2 + s_3^2 + \ldots + s_n^2 \tag{11}$$

The closer a given market is to a monopoly, the more concentrated the market will be, the greater the HHI will be. For instance, if there was a market with a single firm, that firm would have 100% market share and the HHI would be 10000, indicating a monopoly. In theory, the greater the number of firms present in a market, each individual firm's market share would tend towards zero; this way, the HHI would tend towards zero as well, indicating a market with nearly perfect competition. [34]

Table 4.2 which can be found in Annex B describes the HHI for each individual route out of the new routes that easyJet will commence operations in following the slot reallocation, as well as the HHI for all routes combined. In order to produce the HHIs present in *Table 4.2*, the data from *Table 4.1* was used.

To find the HHI for each individual route, the data from *Table 4.1* was first segregated by destination. Once this was done, the number of flights in each destination was segregated by airline, producing the total number of flights provided by the different operating airlines to the destination in question ($T_{airl;dest}$). The produced values (i.e., total number of flights by each airline to the specific destination - $T_{airl;dest}$) were summed together, producing the total number of flights to the specific destination provided by all airlines.

$$\Sigma(T_{airl;dest}) = T_{dest} \qquad (12)$$

Each value of total flights provided by the different airlines to the specific destination $T_{airl;dest}$ was then divided by the total number of flights to that destination T_{dest}, multiplied by 100 and **rounded to zero decimal cases** to produce an integer. The results produced constitute the **market share per airline** of the specific destination.

$$S_{airl;dest} = \frac{T_{airl;dest}}{T_{dest}} * 100 \qquad (13)$$

Finally, each market share $S_{airl;dest}$ was squared and summed with the remaining squared market shares, resulting in the HHI (see equation number 11). This process was repeated for each destination both before the slot reallocation and after the slot reallocation.

To find the HHI across all destinations the data from *Table 4.1* was first segregated by airline company, resulting in the total number of flights provided by each operating airline company across all destinations.

$$T_{airl} \qquad (14)$$

Then, each value of T_{airl} was summed resulting in the total number of flights across all destinations.

$$\Sigma(T_{airl}) = T_{alldest} \qquad (15)$$

Each value of total flights provided by the different airlines T_{airl} was then divided by the total number of flights across all destinations $T_{alldest}$, multiplied by 100 and **rounded to zero decimal cases** to produce an integer. The results produced constitute the **market share per airline** across all destinations.

$$S_{airl} = \frac{T_{airl}}{T_{alldest}} * 100 \qquad (16)$$

Finally, each market share S_{airl} was squared and summed with the remaining squared market shares, resulting in the HHI (see equation – number 11). This process was repeated for the data both before the slot reallocation and after the slot reallocation

4.2 Analysis of Results

From the data displayed in *Table 4.2*, we can conclude that the HHI measuring market concentration by airline carrier across all routes decreased from 4722, before the slot reallocation, to 3606 after the slot reallocation. This is expected as the slot reallocation brought about the establishment of a new competitor (easyJet) across the selected routes. With easyJet's introduction, TAP's market share decreased from 65% to 55%. The route Lisbon-Birmingham was the only newly introduced route by easyJet, having not been operated by any other competing airline (departing from Lisbon) before the slot reallocation.

The literature classifies the HHI in a qualitative spectrum. If the HHI is lesser than 1500 the market in question is considered competitive; if the HHI is between 1500 and 2500, the market in question in considered a moderately concentrated; and if the HHI is greater than 2500, the market in question is considered a highly concentrated. [34]

As we can assess from *Table 4.2*, all the routes in question, are considered highly concentrated following the criteria described above. This is more prominent, in particular, for the period before the slot reallocation. Despite not formally affecting the classification of the market based on the criteria described above, there is no doubt that easyJet's operational establishment in the routes in question as a result of the slot reallocation in the context of TAP restructuring plan, contributed significantly to the reduction of the HHI in most routes, pointing, therefore, towards a more competitive market in the broader spectrum. This is precisely the European Commission's intent for applying the slot reallocation measure in the

context of TAP's restructuring plan – to apply a measure that mitigates undue potential competition distortions. [12]

We can conclude based on the comparison of the HHI before and after the slot reallocation, that the measure of slot reallocation proposed by the European Commission was successful in terms of reduction of market concentration, which in itself is an indication of likely increase of market competition. Indeed, concentration indices, such as HHI, are commonly used in competition policy enforcement. [36]

To assess whether the measure was successful in terms of consumer welfare through e.g., price reductions, we would need to collect evidence on prices. This was, however, not conducted.

Unexpectedly, however, for reasons that remain unclear, it is evident that TAP increased its total weekly flights in particular routes, such as Barcelona, despite reallocating part of its slots to easyJet. Companies such as Vueling-Iberia and Ryanair also managed to increase its operations in particular routes. This might be explained by each company's strategy in shifting focus from one particular route to another, as the companies mentioned, in addition to expanding operations in particular routes, also decreased operations in other routes. Barcelona, for instance, is the route in which easyJet established the largest number of weekly flights. Possibly, to prevent from falling behind further in such a competitive route, it could make sense for TAP to shift focus to that route in particular (i.e., Barcelona) to the detriment of other routes, hence the increase of weekly flights provided by TAP from Lisbon to Barcelona. Nonetheless, there is a lack of conclusive evidence to sustain this assessment.

In short, easyJet's establishment of operations in new routes resulting from slot reallocation serves one additional route (Lisbon-Birmingham) from the Lisbon airport and contributes to less concentrated markets, and likely, more competitive markets.

4.3 Discussion

According to the Berechman & Shy model, when an incumbent airline is faced with the prospect of a competitor entering its establishing operations in a given route, in some instances, the incumbent airline will choose to relinquish its operations in that given route, in order to focus on serving other routes. Moreover, conforming to the model, in a Fully Connect network (i.e., direct flights to a given destination) a competitor establishing its

operations in a route is the equivalent to the incumbent airline ceasing operations in that route, in the sense that both cases yield a profit of zero ($\pi_3^I = 0$). [18]

After the Slot Reallocation, when easyJet introduce its operations in various routes, the decision made by TAP to stop flying from the Lisbon airport to the Porto Santo airport goes in accordance with the literature. Having had a fully connected network to the Porto Santo, now TAP does not provide more direct flights to the Porto Santo airport

One of the propositions of the Slot Model is that if there are more airlines fighting for the same limited number of slots, each individual airline will allocate a higher proportion of its slots on routes where a higher price can be changer, to the detriment of routes where a lower price can be charged, thereby chasing the increase in the slot-holding airline's profit margin. [19]

This may serve as a justification for TAP's shift in route-level operations: being forced to share their market position in several routes as a consequence of easyJet's introduction, TAP preferred to shift its limited number of available slots from routes where it charges a lower price such as Toulouse, Marseille and Porto Santo, in favor of routes where it can charge a higher price such as Barcelona (a major European city) and Tenerife (a renowned tourist destination). This shift in operations towards higher margin routes (i.e., routes where TAP can charge a higher price) translates into an increase in TAP's overall profit margin.

Regarding social welfare and consumer surplus, the second proposition of the Slot Model, which states that a reduction in slot concentration (in our practical case, this reduction was brought about by the introduction of easyJet in the routes in question) leads to positive effect on aggregate social welfare and consumer surplus. [19]

If this is to be believed, we can conclude that, due to the decrease in slot concentration resulting from easyJet's introduction in the market, the measure of Slot Reallocation has successfully increased social welfare and consumer surplus.

With the results from the concentration analysis in mind, slot ownership and slot allocation raise important policy and economic questions concerning the resulting competitive effects of shifting concentrations of slot ownership on part of the airline carriers.

As the Slot model of the paper of **Reitzes et al (2015)** demonstrates, the increase in concentration of slot ownership on part of the air carriers equates to a negative effect concerning social welfare and consumer surplus, decreasing both. [19]

If this conclusion is to be believed, in a *ceteris paribus* scenario, then the situation resulting from the slot reallocation at the Lisbon airport, by diminishing TAP's slot concentration, has precisely the opposite effect of the situation described above, increasing both social welfare and consumer surplus. Furthermore, the introduction of the Lisbon-Birmingham route by easyJet, consequence of the measure of Slot Reallocation, serves as another factor increasing consumer surplus and social welfare.

One important argument for TAP's significance to justify its restructuring programme suggested during the deliberations was that TAP served crucial connections between Portugal and other Lusophone destinations. None of the new routes opened by easyJet serve as connection to other (foreign) Lusophone countries, which means that TAP's market concentration is this segment was not threatened in this way directly (i.e., not threatened with a new competitor).

This means that for all intents and purposes, TAP's operations in these countries will go unchanged by the slot reallocation measure. However, it is important to note that easyJet did indeed establish its operations, not in a foreign Lusophone country, but in an overseas territory of Portugal: the island of Porto Santo in the Madeira archipelago.

The island of Porto Santo is often overlooked, especially compared to the bigger Madeira Island, and with the slot reallocation measure in place, TAP's presence in this market segment (i.e., direct flights to the island of Porto Santo from the Lisbon airport) will be overtaken by easyJet, with TAP losing a portion of its Portuguese-speaking market segment.

Moreover, the measure of slot reallocation may serve as a steppingstone for a new medium-to-long-term era of the Lisbon airport, an era less dominance by TAP. This expansion of TAP's competitors may serve as the first of its kind. easyJet may use this expansion to attract new customers and through the development of customer loyalty overtime, these customers may opt to fly with easyJet on other routes as well. The point being that if easyJet is successful in this venture, its success may translate into other areas of operation. Possibly, in the future, other airline companies seeing the potential of operating in Lisbon, may develop strategies to increase their own operations. This would serve more competitors in the Lisbon airport, giving consumers more available choices, all the while contributing to the diminishing of TAP's market share and, therefore, to a less concentrated market in the Lisbon airport.

5. Conclusion

Throughout this project we acquired a better grasp and valuable insight on the nature of state aid and of its implementation affects the parties involved. The unprecedented nature of the coronavirus pandemic called for the development of new strategies to combat it. The European Commission's approval of TAP's restructuring programme and all its clauses came as a result of such strategic implementations.

We concluded that, the measures proposed by the European Commission in order to undermine the competition distortions caused by the TAP's restructuring programme proved able in doing so. The slot reallocation did indeed retract from TAP's market share in the selected routes and paved the way for new competitors, making the market in question less concentrated, promoting competition between companies.

If it indeed succeeds in restoring TAP long-term viability and financial health remains to be seen. Furthermore, whether the application of the restructuring programme was justifiable or if it was better to let TAP carry their own burdens alone and let the market run its own course of action, with competitors potentially coming to fill the supply gaps previously provided by TAP in a *Laissez-Faire* approach to the situation, may only be assessed in the future with the benefit of hindsight.

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7. Annexes

7.1 Annex A:

Table 4.1 – Total number of Weekly Flights (direct flights only) from the Lisbon airport to the newly operated destinations by easyJet resulting from Slot Reallocation in the context of TAP's restructuring programme (source: [30] & [31])

Destination	IATA Code	Airline Carrier								
		TAP		Vueling-Iberia		Ryanair		SWISS		easyJet
		BSR	ASR	BSR	ASR	BSR	ASR	BSR	ASR	ASR
Barcelona	BCN	33	42	26	25	4	4			7
Bilbao	BIO	15	15	3	5					2
Fuerteventura	FUE	3	3							2
Gran Canaria	LPA	5	5							2
Tenerife South	TFS	4	5							2
Valencia	VLC	15	15	5		4	3			3
Marseille	MRS	15	12			7	6			4
Toulouse	TLS	16	12			6	4			5
Birmingham	BHX						2			2
Zurich	ZRH	21	21					8	10	4
Milan-Bergamo	BGY					13	16			3
Marrakesh	RAK	12	12			2	2			2
Porto Santo	PXO	4								2

Legend:

- BSR - Before Slot Reallocation (i.e., before October 30th, 2022)
- ASR - After Slot Reallocation (i.e., after October 30th, 2022)

7.2 Annex B:

Table 4.2 – HHI of newly operated routes by easyJet as a result of slot reallocation, as well as HHI of all routes combined, before slot reallocation and after slot reallocation (source: Table 4.1)

Destination	IATA Code	Operating Airlines		HHI	
		BSR	ASR	BSR	ASR
Barcelona	BCN	TAP; Vueling-Iberia; Ryanair	TAP; Vueling-Iberia; Ryanair; easyJet	4421	4046
Bilbao	BIO	TAP; Vueling-Iberia	TAP; Vueling-Iberia; easyJet	7178	5234
Fuerteventura	FUE	TAP	TAP; easyJet	10000	5200
Gran Canaria	LPA	TAP	TAP; easyJet	10000	5882
Tenerife South	TFS	TAP	TAP; easyJet	10000	5882
Valencia	VLC	TAP; Vueling-Iberia; Ryanair	TAP; Ryanair; easyJet	4574	5433
Marseille	MRS	TAP; Ryanair	TAP; Ryanair; easyJet	5648	4078
Toulouse	TLS	TAP; Ryanair	TAP; Ryanair; easyJet	6058	4186
Birmingham	BHX	-	Ryanair;	-	5000

			easyJet		
Zurich	ZRH	TAP; SWISS	TAP; SWISS; easyJet	5968	4562
Milan-Bergamo	BGY	Ryanair	Ryanair, easyJet	10000	7312
Marrakesh	RAK	TAP; Ryanair	TAP; Ryanair; easyJet	7592	5913
Porto Santo	PXO	TAP	easyJet	10000	10000
All Routes				4722	3606

Legend:

- BSR - Before Slot Reallocation (i.e., before October 30th, 2022)
- ASR - After Slot Reallocation (i.e., after October 30th, 2022)