FIRM VALUE AND PERFORMANCE ANALYSIS: IMPACT AND IMPLICATIONS OF IMPLEMENTING SUSTAINABILITY INITIATIVES FOR THE AIRLINE INDUSTRY

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Firm value and performance analysis: Impact and implications of implementing sustainability initiatives for the airline industry

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DOCTORAL THESIS

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DOCTORAL THESIS

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DEPARTAMENT DE GESTIÓ D'EMPRESES
Universitat Rovira i Virgili
Facultat d'Economia i Empresa

FAIG CONSTAR que aquest treball, titulat "Anàlisi de valor i rendiment de l'empresa: impacte i implicacions de la implementació d'iniciatives de sostenibilitat per a la indústria aèria", que presenta Yaghoub Abdi per a l'obtenció del títol de Doctor, ha estat realitzat sota la meva direcció al **Departament de Gestió d'Empreses** d'aquesta universitat.

HAGO CONSTAR que el presente trabajo, titulado "Análisis de rendimiento y valor de la empresa: impacto e implicaciones de implementar iniciativas de sostenibilidad para la industria de las aerolíneas", que presenta Yaghoub Abdi Vergara para la obtención del título de Doctor, ha sido realizado bajo mi dirección en el **Departamento de Gestión de Empresas** de esta universidad.

I STATE that the present study, entitled "Firm value and performance analysis: Impact and implications of sustainability initiatives for the Airline industry", presented by Yaghoub Abdi for the award of the degree of Doctor, has been carried out under my supervision at the **Department of Business Management** of this university.

Reus, 06 de setembre de 2022 / Reus, 06 de septiembre de 2022 / Reus, September 06th, 2022.

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Dr. Xavier Càmara Turull

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Dedication

سوپاس و ستایش بۆ خودای زانا کە تواناو هێزی پێبە خشیم بۆ نوسین و تە واوکردنی ئە م لێکۆڵینە وە یە.

ئەم بەرهەمە پێشکەشە بە دەستەکانی دایک و باوکم. ئەوانەی دونیێیان کردە فیدای ئەمرۆی من. ئەگەر ئەمرۆ گەیش تووم بە پلەیە ئەوەبێگومان ئەوان بوون کە ژیانی خۆیان کرد بە پەیژەی سەرکەوتنی من. هەربۆیە لە ناخی دڵمەوە سپاسیان دەکەم وسەری ڕێز ونەوازشدادەنەوێنم بۆ دڵە گەورەکەیان. هەروەها پێویستە سپاسێ ئە وانی بکە م کە تێ کە ل بە ناخمن خوشک و برا خۆشە ویستە کانم بختیار،هوشیار، سحر، یوسف، فاطمە و عایشە. هەروەها پێویستە سپاسێ ئە و روحانە ی کە هە ردە م هاورێمن حیدر، عابد، خالد، نسرین وپروانە. دیسان پیشکە شی ئە کم بە گوڵە جوانە کان باخی ژینم یسنا، ئایرین، پونە، آرین، یادگار و ڕامان.

هە روها سپاسیکی بێکۆتاییئاراستەی ئەو دۆست و هاوڕێ و خۆشەویستانە بکەم کە یاریدەدەرم بوون بۆ بڕینی ئەم ڕێگایە!

Table of Contents

Table of contents

Table of contents

Table of contents

List of figures

UNIVERSITAT ROVIRA I VIRGILI
FIRM VALUE AND PERFORMANCE ANALYSIS: IMPACT AND IMPLICATIONS OF IMPLEMENTING SUSTAINABILITY INITIATIVES FOR THE AIRLINE INDUSTRY
Yaghoub Abdi

List of tables

Resumen

Esta tesis doctoral se basa en el estudio de la asociación entre el valor de mercado de las empresas aéreas, su rendimiento financiero (FP, siglas en inglés) y las iniciativas de sostenibilidad aplicadas en la industria de transporte aéreo. El valor de la empresa es un de los elementos financieros más importantes para los stakeholders. Se ha comprobado que la contribución de las iniciativas medioambientales, sociales y de gobernanza (ESG, siglas en inglés) funcionan como un componente generador de valor para las empresas y contribuyen a aumentar los beneficios de los accionistas. El transporte aéreo ha sido considerado como una de las industrias en rápido crecimiento más populares, ofreciendo una amplia gama de servicios alrededor del mundo. Sin embargo, la industria aérea también es una de las industrias que afronta más desafíos relacionados con la solución de los problemas medioambientales y sociales ya que el desarrollo de sus actividades produce una importante emisión de CO2 (alrededor del 2% de las emisiones totales de la humanidad) impactando en las personas, tanto a sus consumidores como a sus colaboradores. Sorprendentemente, la bibliografía actual carece de un estudio exhaustivo del tema. El objetivo general de este trabajo es identificar la influencia existente entre las políticas ESG y el valor y rendimiento financiero de las aerolíneas y a su vez demostrar cómo las características de las aerolíneas podrían adaptarse a la implementación de las prácticas ESG.

En el capítulo 1 de la tesis se presentan las principales razones que justifican el estudio. Además, en esta sección se plantean las preguntas de investigación y las hipótesis para abordar los vacíos existentes en la literatura actual. El capítulo finaliza con el esquema y estructura de esta tesis doctoral. En el Capítulo 2, se realiza una revisión sistemática de la literatura relacionada con el valor de la empresa en el contexto de las aerolíneas. A partir de esta revisión, se identifican tanto los trabajos realizados como aquellos aspectos que todavía no han sido abordados en la literatura. La transición de los generadores de valor (value drivers en inglés) a estándares basados en la sostenibilidad aparece como la discusión más reciente y moderna sobre el tema. El resto de la tesis se relaciona con el valor de la empresa y las actividades de sostenibilidad los cuales se desarrollan en los capítulos 3 a 6.

El Capítulo 3 tiene como objetivo examinar cómo la implementación de las prácticas de ESG influyen en el valor de la empresa y el rendimiento financiero de las empresas aéreas. Para ello se realiza un análisis de datos de panel para el que se recopiló una muestra de 36 aerolíneas en todo el mundo. El análisis revela la correlación entre dos términos de FP y las iniciativas de sostenibilidad en este contexto que beneficia a los profesionales de la academia y la industria. El hallazgo más significativo fue hallar una relación positiva entre las políticas ambientales (Env) y las acciones relacionadas con el pilar de gobernanza (Gov), con el ratio de valor de mercado a valor contable (en inglés Market-To-Book Ratio), y la Q de Tobin como indicadores del valor de la empresa y rendimiento financiero, respectivamente. Este hallazgo implica que

un aumento en ambos pilares conduce a un mayor valor de mercado y eficiencia financiera para las aerolíneas investigadas.

El cuarto capítulo explora como las variables tamaño y edad podrían influir en la contribución de la empresa a las actividades de sostenibilidad y como ayudan a una mejor comprensión de la relación ESG-FP. El tema parece muy importante e interesante ya que, al explorar la asociación directa entre las dimensiones sociales y financieras, una variedad de características de las empresas puede potencialmente moderar esta relación y son cruciales para investigar el tema. Para ello, se aplica un análisis de datos de panel a la amplia gama de datos pertenecientes a 38 aerolíneas de todo el mundo. Los resultados destacan que el tamaño de la empresa modera significativamente la relación entre la divulgación de la sostenibilidad, el rendimiento y el valor de la empresa. Sin embargo, la dirección de la muestra es diferente entre las aerolíneas de servicio completo y las aerolíneas de bajo costo, según el tipo de compromisos con los pilares de la sostenibilidad. En particular, se encuentra que el término de interacción entre el tamaño y las dimensiones Env y Gov es significativo y negativo para el panel de aerolíneas de servicios completos.

Además de la línea de investigación principal que se centra en medir la influencia de la implementación de actividades ESG en el valor y el rendimiento de la empresa, también se investiga el impacto del éxito financiero corporativo en la contribución ESG. El Capítulo 5prueba la influencia del desempeño financiero como el factor principal, junto con las características de tamaño y antigüedad relacionadas con la empresa, en la divulgación de la sostenibilidad. El capítulo explora más a fondo el efecto de moderación de las SOE (State Owned Enterprises) en la relación entre el desempeño financiero y la divulgación de ESG. Como principales resultados empíricos, el estudio encuentra que el desempeño financiero de la empresa afecta negativa y significativamente a la divulgación de ESG. El impacto negativo del desempeño financiero en ESG implica que, cuando una aerolínea obtiene rendimientos excesivos, puede dar poca prioridad a la implementación de las ESG. El estudio también encuentra que SOE modera positivamente la asociación entre FP-ESG.

La irrupción de la pandemia de la Covid-19, generó un incremento importante de la incertidumbre en las actividades comerciales de las aerolíneas. La mayoría de los países adoptaron enfoques de bloqueo total o parcial para mitigar la propagación de la enfermedad. Se afirma que la contribución a las prácticas ESG pudo proteger el valor de las compañías aéreas, mientras éstas incurrían en enormes pérdidas en todo el mundo. Por lo tanto, detectar las políticas directivas que ayuden a preservar el valor empresarial representan una gran contribución tanto en la teoría como en la práctica. El Capítulo 6, busca dar respuesta a este problema identificando algunas de estas políticas. En este sentido, se ha demostrado que la adopción de acciones relacionadas con las políticas ESG se correlacionan positivamente con la preservación del valor de la empresa. No obstante, no se ha descubierto qué tan efectivo es para ahorrar valor de la aerolínea

durante crisis industriales como la actual pandemia de Covid-19. Este capítulo, por lo tanto, tiene como objetivo ofrecer las políticas gerenciales que preservan el valor de la empresa durante la pandemia.

La tesis finaliza con el Capítulo 7, en el que se exponen las conclusiones generales, aportaciones conceptuales y prácticas, limitaciones y futuras líneas de investigación. Esta tesis expone las consecuencias de la aplicación de las prácticas ESG en las compañías aéreas y viceversa.

UNIVERSITAT ROVIRA I VIRGILI
FIRM VALUE AND PERFORMANCE ANALYSIS: IMPACT AND IMPLICATIONS OF IMPLEMENTING SUSTAINABILITY INITIATIVES FOR THE AIRLINE INDUSTRY
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Abstract

This doctoral thesis focuses on the study of the association between firm value and financial performance (FP) and sustainability initiatives in the airline industry. Firm value is an important consideration in the financial attitude of stakeholders. It has been claimed that contribution to environmental, social and governance (ESG) initiatives functions as a value driver factor for firms and assist to maximizing shareholders' benefits. Air transport has been considered as one of the most popular and rapidly growing industries, offering a broad range of services across the globe. However, the industry is considered one of the most challenging industries in term of environmental and social issues due to its significant CO2 emission (roughly 2% of total mankind emission) and impact on a broad range of people including its customers and employers. Surprisingly, the current literature lacks the comprehensive study on the topic. The general objective was to address the existing gap in how contribution to ESG practices influence airlines' value and performance and the other way around (how airlines' characteristics could impact its willing to implement ESG practices).

The thesis is introduced in Chapter 1. In this section, the underlying reason that justified the need for conducting the study is presented. Furthermore, the section contains research questions and hypotheses to deal with existing gaps in the literature are provided. The chapter ends with the outline and structure of this doctoral thesis. In Chapter 2, the literature related to the firm value at the airline context has been systematically reviewed. Based on the findings and gaps in the extant literature detected at the literature review, the transition of value drivers to sustainable based standards is appeared as the most recent and modern discussion on the topic. The rest of thesis lie at the nexus of firm value and sustainability activities to conduct the 3rd to 6th chapters.

Chapter 3 (Article 2) aims to examines how implementation of ESG disclosures influence the firm value and financial performance of airline firms. Hence, this article focuses on the main impact of ESG implementing and firm vale and performance of airlines. The study uses panel data analysis to the set of collected data for the sample of 36 airlines worldwide. This study has contributed to unveiling the correlation between two FP and ESG terms at this context which benefits academia and industry practitioners. The most significant finding was exploring the positive relationship between the environmental pillar score (Env) and governance pillar score (Gov), with market-to-book ratio and Tobin's Q as proxies for firm value and financial performance, respectively. This finding implies that an increase in both pillars leads to higher market value and financial efficiency for investigated airlines.

The fourth chapter (Article 3) explores the strategic firm characteristics of size and age which could influence the firm's contribution to sustainability activities and are likely to assist in better understanding

the ESG-FP relationship. The topic seems very important and interesting since when exploring the direct association between the social and financial dimensions, a variety of firm characteristics can potentially moderate this relationship and are crucial for investigating the topic. For this purpose, a panel data analysis is applied to the broad range of data belong to 38 airlines across the globe. The findings highlight that firm size significantly moderates the relationship between sustainability disclosure and firm performance and value. However, the moderation direction is different across full-service and low-cost airlines, depending on the type of sustainability undertakings. Particularly, it is found that the interaction term between size and both Env and Gov dimensions is significant and negative for full-services panel.

In addition to the main research line focusing how implementing ESG activities influence firm value and performance, so called “swimming against the tide” which investigates the impact of corporate financial success on ESG contribution. Chapter 5 (Article 4) tests the influence of financial performance as the main factor together with firm-related characteristics of size and age on sustainability disclosure. The chapter further explores the moderation effect of SOE on the relationship between financial performance and ESG disclosure. As the main empirical results, the study find that a firm’s financial performance negatively and significantly affects its ESG disclosure. The negative impact of financial performance on ESG implies that, when an airline makes excess returns, it may give low priority to implementing an ESG agenda. The study also finds that SOE positively moderates the association between FP-ESG.

The emergence of Covid-19 which induced uncertainty in the airlines’ business activities as most countries adopted complete or partial lockdown approaches to mitigate the spread of the disease. It is claimed that contribution to ESG practices could protect airline firms’ value as they are incurring huge losses across the globe. Therefore, proposing managerial orientations to save firm value would be a great contribution to both theory and practice. Chapter 6 (Article 5), therefore, seeks to answer the question in this context. It has been shown that promoting ESG activities is positively correlated with firm value. Nonetheless, the degree to which it is also effective in saving airline´s value during industrial crises such as current Covid-19 pandemic is yet to discover. This chapter, thus, aims to offer the managerial policies that preserves the firm value during the pandemic.

The thesis ends with Chapter 7, which sets out the general conclusions, conceptual and practical contributions, limitations, and future lines of research. This thesis contributes to clarify the consequences of contribution ESG practices for airline firms and the other way around.

Resum

Aquesta tesi doctoral es basa en l'estudi de l'associació del valor de la signatura empresarial, el rendiment financer (FP, sigles en anglès) i les iniciatives de sostenibilitat aplicades a la indústria de transport aeri. El valor de la signatura empresarial és una consideració important en l'actitud financera dels stakeholders. S'ha afirmat que la contribució de les iniciatives mediambientals, socials i de governança (ESG, sigles en anglès) funcionen com a component generador de valor per a les empreses i contribueixen a augmentar els beneficis dels accionistes. El transport aeri ha estat considerat com una de les més populars indústries en ràpid creixement, oferint una àmplia gamma de serveis arreu del món. No obstant això, la indústria aèria és considerada com una de les indústries més desafiadores quant a la solució dels problemes mediambientals i socials ja que el desenvolupament de les seves activitats produeix una important emissió de CO2 (al voltant del 2% de les emissions totals de la humanitat) impactant les persones incloent els consumidors i col·laboradors. Sorprenentment, la bibliografia actual no té un estudi exhaustiu del tema. L'objectiu general és localitzar la bretxa existent respecte a l'àmbit d'influència de les pràctiques ESG en el valor i el rendiment financer de l'aerolínia i alhora demostrar com les característiques de les aerolínies podrien adaptar-se a la implementació de les pràctiques ESG.

Al capítol 1 de la tesi presenta les raons principals que justifiquen l'estudi. A més, aquesta secció conté preguntes de recerca i hipòtesis per abordar els buits existents a la literatura actual. El capítol finalitza amb l'esquema i l'estructura d'aquesta tesi doctoral. Al Capítol 2, s'ha revisat sistemàticament la literatura relacionada amb el valor de l'empresa en el context de les aerolínies. Amb base a les troballes i les bretxes detectades en la revisió de la literatura, la transició dels generadors de valor (value drivers en anglès) a estàndards basats en la sostenibilitat apareix com la discussió més recent i moderna sobre el tema. La resta de la tesi es relaciona amb el valor de l'empresa i les activitats de sostenibilitat que es desenvolupen als capítols 3 a 6.

El Capítol 3 (article 2) té com a objectiu examinar com la implementació de les pràctiques d'ESG influeixen en el valor de l'empresa i el rendiment financer de les empreses aèries. Per això es va realitzar una anàlisi de dades de panell per al qual es va recopilar una mostra de 36 aerolínies a tot el món. L'anàlisi revela la correlació entre dos termes en aquest context que beneficia els professionals de l'acadèmia i la indústria. La troballa més significativa va ser explorar la relació positiva entre la puntuació del pilar ambiental (Env) i la puntuació del pilar de governança (Gov), amb la ràtio de valor de mercat a valor comptable (en anglès Market-To-Book Ratio), i la Q de Tobin com a indicadors del valor de l'empresa i del rendiment financer, respectivament. Aquesta troballa implica que un augment en ambdós pilars condueix a un valor més gran de mercat i eficiència financera per a les aerolínies investigades.

Resum

El quart capítol (article 3) explora les característiques de l'estratègia empresarial de mida i d'edat que podrien influir en la contribució de l'empresa a les activitats de sostenibilitat i és probable que ajudin a comprendre millor la relació ESG-FP. El tema sembla molt important i interessant, ja que en explorar l'associació directa entre les dimensions socials i financeres, una varietat de característiques de les empreses poden potencialment moderar aquesta relació i són crucials per investigar el tema. Per això, s'aplica una anàlisi de dades de panell a l'àmplia gamma de dades pertanyents a 38 companyies aèries de tot el món. Els resultats destaquen que la mida de l'empresa modera significativament la relació entre la divulgació de la sostenibilitat, el rendiment i el valor de l'empresa. Tot i això, la direcció de la mostra és diferent entre les aerolínies de servei complet i les aerolínies de baix cost, segons el tipus de compromisos amb els pilars de la sostenibilitat. En particular, es troba que el terme d'interacció entre la mida i les dimensions Env i Gov és significatiu i negatiu per al panell d'aerolínies de serveis complets.

A més de la principal línia de recerca que se centra a mesurar la influència de la implementació d'activitats ESG en el valor i el rendiment de l'empresa, també s'investiga l'impacte de l'èxit financer corporatiu en la contribució ESG. El Capítol 5 (Article 4) prova la influència de l'exercici financer com a factor principal juntament amb les característiques de mida i antiguitat relacionades amb l'empresa en la divulgació de la sostenibilitat. El capítol explora més a fons l'efecte de moderació de les State Owned Enterprises (SOE) en la relació entre l'exercici financer i la divulgació d'ESG. Com a resultats empírics principals, l'estudi troba que l'exercici financer de l'empresa afecta negativament i significativament la divulgació d'ESG. L'impacte negatiu de l'exercici financer a ESG implica que, quan una aerolínia obté rendiments excessius, pot donar poca prioritat a la implementació de les ESG. L‟estudi també troba que SOE modera positivament l‟associació entre FP-ESG.

El sorgiment de la pandèmia Covid-19 va generar incertesa en les activitats comercials de les aerolínies, ja que la majoria dels països van adoptar enfocaments de bloqueig total o parcial per mitigar la propagació de la malaltia. S'afirma que la contribució a les pràctiques ESG va poder protegir el valor de les companyies aèries mentre incorrien en enormes pèrdues a tot el món. Per tant, proposar orientacions gerencials per estalviar valor empresarial va ser una gran contribució tant a la teoria com a la pràctica. El Capítol 6 (Article 5), per tant, cerca respondre la pregunta en aquest context. S‟ha demostrat que la promoció d‟activitats ESG es correlaciona positivament amb el valor de l‟empresa. Tot i això, encara s'ha de descobrir el grau en què també és efectiu per estalviar valor a les aerolínies durant crisis industrials com l'actual pandèmia Covid-19.

La tesi finalitza amb el Capítol 7, on s'exposen les conclusions generals, les aportacions conceptuals i les pràctiques, les limitacions i les futures línies de recerca. Aquesta tesi exposa les conseqüències de l'aplicació de les pràctiques ESG a les companyies aèries i viceversa.

Chapter 1.

Introduction

UNIVERSITAT ROVIRA I VIRGILI
FIRM VALUE AND PERFORMANCE ANALYSIS: IMPACT AND IMPLICATIONS OF IMPLEMENTING SUSTAINABILITY INITIATIVES FOR THE AIRLINE INDUSTRY
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Chapter 1. Introduction

Chapter content

Over the past decades, businesses have faced the issue of sustainability. The problem roots in classic firms' approach to make profit as their predominant motivation which lead to environmental issues for planet and risks for human societies. Thus firms are faced with increasing pressure to change their operational strategies to provide an understandable metric of externalities regarding the eco-system and stakeholders (Jensen 2020). They are asked to present an indicator of their commitment to sustainability practices, to adopt such metrics in their strategies and decisions (Taherdangkoo, Ghasemi, and Beikpour 2017). Recently, environmental, social and governance (ESG) criteria have appeared as the most widely used measurement of sustainability standards for holding firms accountable (Howard-Grenville 2021).

Aside from these intentions and motives, introducing sustainability standards have implications for the financial status of firms. These initiatives often entail committing financial resources to procuring eco-friendly equipment, launching high-quality standards for products, and developing safety programs (Park et al., 2017). It has been claimed that, despite these significant short-term costs for corporations, they can then benefit from these sustainability investments by establishing a long-term basis for survival and may enjoy success in promoting products and services (Branco & Rodrigues, 2006). The issue motivates academic scholars to actively attempt to deliver work that addresses the consequences of sustainability initiatives on firm performance and value for the benefit of managers and executives (Park et al., 2017). Specifically, growing number of studies focusing on the topic for tourism and hospitality industry in providing managerial insights to better handle the issue for firms such as airlines, hotels, restaurants and casinos (see, for example, Lee et al. 2013; Theodoulidis et al., 2017; Park and Lee 2009; Kim and Lee 2020).

However, the literature has not yet to produce an entirely consistent and conclusive study demonstrating that the result of implementing sustainability initiatives to improve the financial performance (FP) and value of the firm is any one of positive, negative, curvilinear or insignificant (Moore, 2001; Miralles-Quirós et al., 2019; Casado-Díaz et al., 2014). Therefore, more empirical works are required to investigate the economic implications of sustainability in term of various methodologies and samples (Lee et al. 2013; Park et al., 2017). In response to this gap in current literature, this doctoral thesis seeks to find an answer for airline firms as one of the most important and growing industries.

In this section a response to the reasons that justified the need for this thesis, namely, the requirement to understand the consequences and impact of contribution to sustainability initiatives on firm value and

financial performance (FP) of airline companies, has been provided. Furthermore, to support and reach the general objective of this doctoral thesis which is to determine how sustainability standards affects firm's financial performance and value, detailed and specific objectives are presented to systematically address the various aspects of the topic. The outline and structure of this doctoral thesis are also provided at the end of this section. The results as answer to the research questions have been published in academic reputable journals or are currently being subjected to an advanced revision process, with the main aim of providing an insight into important elements that should be considered in the management and success of the airline business.

1.1 Overview on airline industry

Air transport has been considered as one of the most popular and rapidly growing industries, offering a broad range of services worldwide (Belobaba et al., 2009). The industry is frequently considered for its contribution to sustainable development (Daley 2009). This is due to the industry's benefits to the society in bridging people and places and assists in achieving millennium development goals by improving human well-being. Consequently, air transport has become one of the primary modes of travel. The claim is confirmed by the international civil aviation organization (ICAO) who state that the number of passengers carried out on scheduled services by airlines rose to 4.5 billion in 2019 (ICAO 2019). Consequently, air transportation has attracted the intensity of attention not only from people directly involved in the business, but also from financial and industrial experts. However, the emergence of the Covid-19 pandemic in early 2020 has dealt a huge blow to the airline business worldwide. The pandemic wreaked financial devastation and uncertainty across the airlines' value chain and business activities. This was due to the dramatic drop in demand for passengers of air transport rooting in containment measures including lockdowns, quarantine, and isolation to halt the spread of the disease (OECD 2020). According to McKinsey (2021) airlines lost 60% of their revenue in 2020. Although, now the industry is signaling to recover it blooming days, the impact of the pandemic is far from over and the road to recovery certainly takes several years (McKinsey 2021).

In recent decades, air transport has been subjected to structural reforms in many aspects such as: technological (e.g., the emergence of commercial jet aircrafts in the 1950s and the design of wide-body jumbo jets in 1970s, administrative (e.g., the deregulation process starting from 1978 in the US) and financial (the continuously growing number of airlines listed in various stock markets around the world) (Belobaba et al., 2009, Malighetti et al., 2011). These changes markedly changed perspectives in the industry and led to an environment of market competition with organizations being genuinely concerned about their financial status. In particular, airline firms started to finance their operations from stock markets, instead of relying on state supports, issues such as the application of financial research on stock returns, the

cost of capital, and asset valuation become crucial (Malighetti et al. 2011). Airline business is highly seasonal, and profit can be affected by fluctuations in energy prices or economic downturns (Maverick 2021). Additionally, the recent Covid-19 pandemic has brought serious financial devastation for the airlines. It is reported that industry's revenue totalled $328 billion in 2020 which was 40 percent of their total revenue in 2019. Since in essence, those volatilities are not predictable, investors and business analysts do use financial and market factors to obtain insight on financial stability and future health of an airline firm. Among those, firm value has been considered as an important financial metric to assess how effectively airlines have been utilizing their resources and capacity.

1.2 Background of the study

Since the ultimate objective of for-profit organization is value creation and maximizing shareholders' benefits, firm value has become an important consideration in the financial attitude of stakeholders. Market value offers a meaningful insight to the company's valuation and can assist both executives and investors to determine the financial status of the company. Market value is an attempt to estimate the value of a property under open market condition (Pagourtzi et al., 2003). In other words, it refers to the price of an asset at which a supplier and a buyer would agree to change its ownership. As for publicly listed trading companies, the stock price is a measure of its market value. Stock price variation, therefore, represents a percentage change in a firm's market value at any given time and is driven by supply and demand. Market value is estimated by applying valuation methods in the form of procedures that reflect the nature of property and the environment under which an asset would be traded in the open market (Pagourtzi et al., 2003). Firm could also be evaluated in a broader sense to the degree to which its financial objectives has been accomplished. The term financial performance is a process to measure firm's overall financial health over the given period of time (Helmod, 2022). It can be represented by a set of variables such as operating profits, profits to sale ration, profit return on investment, return on assets (ROA), sale volume, cash flow and return on investment (Theodoulidis et al., 2017). Academic literature have mainly used Tobin's q as the most common measurement of general well-being of a firm (Kim et al., 2015). It is a ratio between a physical asset's market value and its replacement value. is widely used in the literature as representative of FP. There are different formulations of the measure but, as noted by Chung and Pruitt (1994), the yields tend to be similar. Understanding of financial value or shareholders' wealth indicated by both market value and financial performance indices is necessary for every type of resource allocation and it can be different in each industry.

Over the last few decades, sustainability challenges have emerged for businesses. The trend is to react to the rising demand for information by adjusting the semantics about the non-financial operation of companies. As a result, following the several internationally promoted frameworks—such as sustainable

development goals (SDGs), global reporting initiative (GRI) and sustainability reporting guidelines (SRG)— environmental, social and governance (ESG) has been introduced into the investment process as an analytical tool for assessing a firm's state of sustainability (Hill 2020).

Therefore, necessity to address modern sustainability challenges has given an important role to corporate governance in making decisions. Stakeholders and investors are also eagerly demand the development and adaptation of SDGs in addition to typical financial rewards when making business and investment decisions. For-profit organizations are implementing sustainable development initiatives as voluntary engagements to de-facto requirements such as moral concerns, managerial "perks", social pressure or strategic reasons (Baron 2000). These led businesses, as an indicator of their commitment to sustainability practices, to adopt such metrics in their strategies and decisions (Taherdangkoo et al. 2017). Firms are under pressure to provide an understandable metric of externalities regarding the eco-system and stakeholders (Jensen 2020). In current practice, ESG has become the most widely used measurement of sustainability standards for holding firms accountable (Howard-Grenville 2021).

Consequently, sustainable development strategies have been gradually adapted to every type of business seeking an efficient and responsible environment to show their commitment to stakeholders' benefits and maximize their wealth. However, despite that business is the key factor to meet SDGs, the feasibility of this scenario needs the detailed measurement and effective management of both financial and sustainability risks in investment portfolio (Folqué et al., 2021; Rivera et al., 2017). This has made companies to re-visit the concept of financial performance as business model drivers and also re-evaluate the balance between profitability and sustainability at their business strategy (Bryson & Lombardi, 2009). As for the airline industry, the awareness of sustainability issues and climate change is increased since the industry is under considerable public pressure to allocate more resources and contribute more to sustainable development initiatives due to their extremely large environmental footprint (Kim et al., 2020). In response, 38% of the top 100 airlines now publish a corporate sustainability report—this includes six airlines who disclose their contribution to corporate sustainability in their annual report (Heeres et al., 2018). Such a report can be quite critical in showing firm's effective communication of their commitment and performance on sustainability issues (Jadoon et al., 2020). However, there is disparity to report corporate commitment to SDGs.

The presence of sustainability standards can impact the financial status of the firm. These initiatives often entail committing financial resources to procuring eco-friendly equipment, launching high-quality standards for products, and developing safety programs (Park et al., 2017). However, despite these significant short-term costs for a firm, it can then benefit from these sustainability investments by establishing a long-term basis for survival and may enjoy success in promoting products and services

(Branco & Rodrigues, 2006). Consequently, for the benefit of managers and executives, scholars have actively attempted to deliver work that addresses the consequences of sustainability initiatives on firm performance and value (Park et al., 2017). In particular, in the tourism and hospitality industry, growing number of studies focusing on the topic in providing managerial insights to better handle the issue for a firms such as airlines, hotels, restaurants and casinos (see, for example, Lee et al. 2013; Theodoulidis et al., 2017; Park and Lee 2009; Kim and Lee 2020).

Bringing above discussion together, it is apparent that studying financial status and firm valuation of air carriers has significant implication in their real-world business and the economic environment in which they operate. For this research theme, based on the initial literature reviewed (**Chapter 2**), significant change is detected when it comes to the firm value topic for the last decades. It is seen that now-day value of airline companies is tied with modern corporate social responsibility issues instead of classic external and internal value drivers. Therefore, this led to direct the research toward corporate social responsibility (CSR) in theoretical and empirical examination of sustainability value drivers in this context.

1.3 Research objectives

The general objective of this thesis is to investigate how contribution to sustainability initiatives could influence airline firm's firm value and performance at the airline industry. In so doing, we tested the topic in different perspectives. The topic is timely and important due to steadily growing of sustainability standards in business and its implication for firm returns. Also, we worked on the characteristics which could influence the association as well as tested the formula in the other way around to find out how financial performance may have any impact on firm's sustainability initiatives adding state ownership as a moderator. Therefore, the specific objectives of the study are listed as follow:

RO 1: Explore the topic in current body of literature and identify the potential gaps.

RO2: Investigate the impact of ESG disclosure on firm value and financial performance of airlines.

RO3: Understand the moderating role of firm characteristic on the association between sustainability and financial performance of airlines.

RO4: Examine how firm performance influence its contribution to sustainability initiatives with moderator state-ownership on this relationship.

RO5: Identify how sustainability implementation could protect airlines' value and financial performance during the Covid-19 pandemic.

To achieve these objectives, we propose the following research questions:

RQ1: What is the financial relevancy of sustainability initiatives for air transport passenger carriers?

RQ2: How firm characteristics of size and age influence the association between financial performance and sustainability initiatives for airlines?

RQ3: If financial performance has any impact on airlines' contribution to sustainability initiatives adding state ownership as a moderator?

RQ4: Does sustainable development initiatives provides financial resilience during a crisis time of Covid-19 for airlines?

1.4 Structure of the thesis

As previously mentioned, the main objective of this doctoral thesis was to focus on the important key aspects sustainability initiatives and firm value in the air transportation industry. To reach this main aim, the thesis is built based on a compendium of five articles discussing different aspects of this general theme. **Chapter 2** systematically reviews the literature related to the firm value and value drivers in this industry. The section is the project's starting point and present the direction of the thesis and how it developed. The review contributes to the literature by providing unique comprehensive and generic review to classify and categorize relevant studies on the topic. The outcome has been submitted as a paper entitled "Harnessing the evolution of firm value of air transport industry toward a sustainable future: A review of research trends, directions, and outlook with special attention to the impact of the Covid-19" to Transportation Journal (currently Editor Assigned) indexed in social sciences citation index (SSCI) in JCR and Scopus. Based on the findings and gaps in the extant literature showing the transition of value drivers to sustainable based standards, the rest of thesis lie at the nexus of firm value and sustainability activities to conduct the 2nd to 5th chapters.

Chapter 3 examines the extent to which implementation of ESG disclosures influence the firm value and financial performance of airline firms. The study uses panel data analysis to the set of collected data for the sample of 36 airlines worldwide. In addition to the theoretical and managerial insights provided, the results are presented as a paper entitled "Impact of Sustainability on Firm Value and Financial Performance in the Air Transport Industry" which has been published in the Sustainability journal (volume 12(23), 28 November 2020, 9957) indexed in social sciences citation index (SSCI) in JCR and Scopus.

When exploring the direct association between the social and financial dimensions, a variety of firm characteristics can potentially moderate this relationship and are crucial for investigating the topic. For this reason, in chapters 4 and 5 of this thesis, the set of firm's characteristics such as size, age, ownership

structure, etc., as influential elements for the relationship between ESG-FP and the other way around (FP-ESG).

Chapter 4 discusses the role of size and age as firm-level attributes which could influence the firm's contribution to sustainability activities and are likely to assist in better understanding the ESG-FP relationship. The topic seems critical for airlines since business prospects for these firms is subjected to making progress in the sustainability dimension and in managing the alliance with government, industry and passengers. The study is provided as a paper entitled "Exploring the impact of sustainability (ESG) disclosure on firm value and financial performance (FP) in airline industry: The moderating role of size and age" which has been published in the Environment, Development and Sustainability Journal (volume 24, 02 August 2021, 5052-5079) indexed in social citation index expanded (SCIE) in JCR and Scopus.

It is argued that a firm's sustainability disclosure is subject to a range of characteristics influencing the cost and benefits of implementing these standards and its evolution in a broader context. Among these characteristics, a review by Garde-Sanchez et al. (2018) underlined the necessity for advances in sustainability issues in state-owned enterprises (SOEs), given their importance as economic drivers in the market. To check the issue for airlines, **Chapter 5** investigates if more profitable airlines do contribute more to the investment on sustainability or not. Therefore, the main purpose of this chapter is to investigate how airlines' FP may impact on their ESG disclosure. The chapter further explores the moderation effect of SOE on the relationship between financial performance and ESG performance. The outcome is presented as a paper entitled "How financial performance influences investment in sustainable development initiatives in the airline industry: the moderation role of state-ownership" which has been published in the Sustainable Development Journal (early view, 29 March 2022.) indexed in social sciences citation index (SSCI) in JCR and Scopus.

Furthermore, the emergence of Covid-19 which induced uncertainty in the airlines' business activities as most countries adopted complete or partial lockdown approaches to mitigate the spread of the disease. The issue is well covered by both industry practitioners and academia. One of the main discussions is how to protect airline firms as they are incurring huge losses across the globe. Therefore, proposing managerial orientations to save firm value would be a great contribution to both theory and practice. ESG has emerged as an agenda to secure the long-term benefit of the business. **Chapter 6**, therefore, takes advantage of the current worldwide issue to find answer for airline firms. Although, the part related with the empirical analysis and study discussion are presented in this thesis, the paper is yet to be submitted to a targeted journal.

Finally, the conclusion of the thesis is provided in **Chapter 7**. This section seeks to highlight the most important contributions made in the study. Similarly, limitations of the research and the future lines to which this work can lead are discussed.

This thesis is conducted within the project "Financial performance of airline industry: How big is the difference between accounting and market value?", from which the doctoral student obtained a grant co-financed by the European Union's Horizon 2020 research and innovation programme, within the framework of the Marie Skłodowska-Curie COFUND grant, and the Rovira i Virgili University (URV). This implied carrying out doctoral studies in Economics and Business, oriented towards finance, and the preparation of this doctoral thesis. **Error! Reference source not found.** presents a summary of the articles contained in t his thesis, the chapter to which they correspond, and the journals in which they have been published.

Table 1.1 Summary of the articles

Published Papers								
Journal	**Title**					**Status**	**Ranking**	
Sustainable Development (Wiley)	How financial performance influences investment in sustainable development initiatives in the airline industry: the moderation role of state-ownership					Published	**Impact Factor**	**6.159**
							JCR	**Q1**
	Year	Vol	Issue	Page	DOI		**Scopus**	**Q1**
	2022	-	-	-	https://doi.org/10.1002/sd.2314			
Environment Development and Sustainability (Springer)	Exploring the effect of sustainability (ESG) disclosure on firm value and financial performance (FP) in airline industry: the moderating role of size and age					Published	**Impact Factor**	**3.219**
							JCR	**Q2**
	Year	Vol	Issue	Page	DOI		**Scopus**	**Q2**
	2022	24	4	5052-5079	https://doi.org/10.1007/s10668-021-01649-w			
Sustainability (MDPI)	Impact of sustainability on firm value and financial performance in the air transport industry					Published	**Impact Factor**	**3.251**
							JCR	**Q2**
	Year	Vol	Issue	Page	DOI		**Scopus**	**Q2**
	2020	12	23	9957	https://doi.org/10.3390/su12239957			
Submitted Papers								
Humanities & Social Sciences Communications	Harnessing the evolution of firm value of air transport industry toward a sustainable future: A review of research trends, directions, and outlook with special attention to the impact of the Covid-19					Under review	**Impact Factor**	**5.192**
							JCR	**Q1**
							Scopus	**Q1**
Target Journal								
	Exploring the role of sustainability in supporting firm value during industrial crisis in the airline industry: Evidence from the Covid-19						**Impact Factor**	
							JCR	
							Scopus	

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Chapter 2.

Harnessing the evolution of firm value of air transport industry toward a sustainable future: A review of research trends, directions, and outlook with special attention to the impact of Covid-19

UNIVERSITAT ROVIRA I VIRGILI
FIRM VALUE AND PERFORMANCE ANALYSIS: IMPACT AND IMPLICATIONS OF IMPLEMENTING SUSTAINABILITY INITIATIVES FOR THE AIRLINE INDUSTRY
Yaghoub Abdi

2. Chapter 2. Harnessing the evolution of firm value of air transport industry toward a sustainable future: A review of research trends, directions, and outlook with special attention to the impact of Covid-19

Literature Review

Harnessing the evolution of firm value of air transport industry toward a sustainable future: A review of research trends, directions, and outlook with special attention to the impact of Covid-19

Under Review: Humanities & Social Sciences Communications, Submitted: 31/05/2022

2.1 Introduction

Air transport has been considered as one of the most popular and rapidly growing industries, offering a broad range of services worldwide (Belobaba et al., 2009). In recent years, the industry became one of the primary modes of travel. This is confirmed by the International Civil Aviation Organization (ICAO) who state that the number of passengers carried out on scheduled services by airlines rose to 4.5 billion in 2019 (ICAO 2019). Although, due to the Covid-19 pandemic the industry was hit hard and falls dramatically in term of provided services rate and passenger number, but it is seen that the industry is recovering. According to the International Air Transport Association, in 2021 overall travel number were 47% of 2019 level (IATA 2022). It is expected to improve to 83% in 2022, 94% in 2023, 103% in 2024 and 111% in 2025. Therefore, a continuation of this growth rate would double continue in term of passenger demand over following years as well. Since its establishment, air transport has been subjected to structural reforms in many aspects such as: technological (e.g., the emergence of commercial jet aircrafts in the 1950s and the design of wide-body jumbo jets in 1970s, administrative (e.g., the deregulation process starting from 1978 in the US) and financial (the continuously growing number of airlines listed in various stock markets around the world) (Belobaba et al., 2009, Malighetti et al., 2011). The rend follows the general accelerating of supply chain companies to gain competitive advantage (Azadian 2020). These changes re-shaped the industry and altered previously fundamental characteristics. They also markedly changed perspectives in the industry and led to an environment of market competition with organizations being genuinely concerned about their financial status. As they started to finance their operations from stock markets, instead of relying on state supports, issues such as the application of financial research on stock returns, the cost of capital, and asset valuation become crucial (Malighetti et al. 2011). In such respects, the industry has been transformed into a much riskier one (Vasigh, Azadian, and Moghaddam 2020). To remain efficient, it is apparent that the air carriers must seriously consider financial management and the economic environment in which they operate.

Since the ultimate objective of financial management is value creation and maximizing shareholders' benefits, firm value has become an important consideration in the financial attitude of stakeholders. Market value offers a meaningful insight to the company's valuation and can assist both airline executives and investors to determine the financial status of the company. Due to its importance, studies have focused on several factors affecting the value of airlines. However, a review of the literature shows that academics have paid insufficient attention to valuation studies (Malighetti et al. 2011). While there are many review studies in air transport context (Matias Ginieis et al., 2011; Matías Ginieis et al., 2012; Khudhair et al., 2019; Mardani et al., 2015; Kaps & Phillips, 2017; Kalemba & Campa-Planas, 2011; Campa-Planas & Kalemba, 2017; Spasojevic & Scott, 2018; Wang & Gao, 2021; Sun et al., 2021; Duval, 2013; Raza et al., 2020; Papatheodorou, 2021), there is still no comprehensive and generic review of which contextual factors affect a firm's valuation. The systematic review conducted by Pereira et al., (2021) appears to be the only study that considered value in the aviation industry. The authors identified fourteen value-creating innovations principally because of change initiatives in efficiency, convenience, portfolio differentiations, and sustainability. The current study extends the firm valuation framework by providing a comprehensive overview of publication activity in the form of graphs and tables to assess the strength of evidence of the topic and explore gaps in the literature. Given that the Covid-19 pandemic plunged the whole industry into crisis and destroyed much stakeholder value, it is crucial to fill any such gaps. We theoretically document the concept of firm value and then collect related studies commenting on factors related to the firm value grouped into corresponding themes. This approach enables us to unpack the nature of firm value drivers and recognize how these elements have been represented in academic contributions and indicating future research directions. For this perspective, this study sought to address the following questions:

a) How has firm value evolved and been investigated in the air transport industry?

b) What are the main research directions in relation to firm value in the industry?

c) What are the main influential factors to firm value at the industry?

d) To which context the research focus on value drivers has changed to sustainability activities?

e) What are the niches for future research in this area?

This study answers the foregoing research questions through a systematic literature review (SLR) and thematic analysis of the relevant information using the WoS & Scopus databases. There is limited documentation regarding the conduct of review studies in the field of air transportation. Existing reviews could be divided into two streams. On the one hand, there are studies focusing on the theoretical and empirical studies of the air transportation domain. These studies notably consider specific factors such as

air travel demand (Wang & Gao, 2021), revenue management (Raza et al. 2020), service quality (Kalemba & Campa-Planas, 2011); safety (Campa-Planas and Kalemba 2017), or organize the studies around the Covid-19 pandemic (Sun et al., 2021). Some studies, on the other hand, revolve around reviewing the interrelationship between the air transport and tourism (Papatheodorou 2021), and the role of air transport in economic development (Lenaerts, Allroggen, and Malina 2021). Our systematic review aims to identify and discuss the progress of academic studies of firm value in the air transport context including how this has changed over the years (e.g., number of papers focusing on the topic, highlighted host (journals) for publication, most productive researchers, and countries, etc.). The main contribution of the current study is therefore to provide a comprehensive understanding of the ongoing description and dissemination of the discussion on firm value in this sector by building a bridge among different perspectives and identifying the factors impacting firm value. In addition, this research refers to the construction of knowledge in the management perspective by classifying the practical discussions on the set of value drivers in the industry. A summary of identified literature gaps, research questions, and the current's study's contribution is presented in Table 2.1.

Table 2.1 Summarizing the study' contribution and aims.

Research gaps	Research questions	Contributions
Although market value is an important factor delivering insight of firm's financial position and health, there is no overview of how it has been reflected amongst academics.	What determinants have been analyzed in the previous literature for value of the airlines?	To show the evolution of published papers, determine the co-authorship among the main researchers in this field, identify authors, countries and journals working in this area.
There is a lack of structured thematic understanding of factors influencing firm value in air transport industry	What are the main research directions of the literature related to firm value in this industry?	To obtain the knowledge structure and hotspots of the research field (by designing keyword co-occurrence network) with the help of bibliometric analysis, identify main research themes in which firm value has been reflected.
Further, there is no study consider the evolution of value drivers during the time.	What value drivers have been on spotlight during the time?	To show the thematic evolution of published papers during the time. We investigate how academic interest has changed in focus on value drivers. Recently, sustainability issues have been on spotlight. We follow the direction at the industry.
There is a lack of structured thematic understanding of factors influencing firm value in air transport industry.	What are the niches for future researchers to explore in this area?	To present and justify the need to study a research problem and to present the practical ways in which the proposed study should be conducted, to develop new tests and processes that could eventually help for obtain more comprehensive framework of knowledge of the area for the theory and practitioners.

The structure of this study is as follows: Section 2 provides a conceptual background of the main research; Section 3 describes the methodology, design of the sample selection, and search strategy; Section 4 provides the empirical results. The article ends with conclusions, policy implications, and research limitations.

2.2 State of art

Understanding the mechanisms of firm valuation is essential for people involved in corporate finance. Our study of the air transport industry firstly addresses firm valuation at both internal (firm) and external (i.e., industry, country or international) levels. By so doing, we aim to understand the value mechanism and value drivers for airlines. Secondly, we categorize and conclude findings of the relevant literature. This section briefly reviews the business environment of airlines, the concept of a firm and its internal value factors, as well as external factors influencing market value.

2.2.1 Airline industry

The global airline industry is a worldwide service provider and plays a fundamental role in the establishment of the global economy (Belobaba et al., 2009). The industry assumes this role through its operations and impact on related businesses. Airlines receive a huge volume of funds, and recruit thousands of people, all of which contributes to innovation and economic growth. Air transport is also a driver of globalization. It improves quality of life by broadening people's leisure and cultural experiences, helps to enhance living standards, and contributes to sustainable development by facilitating tourism and trade. Its development and its technical and service achievements make it one of the greatest contributors to the advancement of modern society (ICAO 2017c).

In order to improve the performance of the industry, it is critically important for airline companies to operate efficiently, the most efficient ones can usually offer lower prices and consequently attract more passengers (Assaf and Josiassen 2012). In addition, more efficient companies can use benefits of scale by having a larger number of travellers which contributes to better global recognition and image for their brand. Traditionally, air transport has generated some of the lowest returns across business sectors. According to 2020 year-end economic report by international air transport association (IATA Economics 2020), even before the current pandemic crisis, equity holders had failed to gain an adequate return for their financial. As shown in Figure 1, IATA documents the divergence of returns on invested capital (ROIC) against the weighted average cost of capital (WACC), for the years 2007 to 2021. ROIC is a value calculated to evaluate a company's financial efficiency when allocating invested capital under its control to profitable investments. It also gives a sense of how well a company uses its money to generate returns (Lee, 2019). One can see that the companies operating in this sector have rarely generated revenues as high as the WACC for industry as a whole.

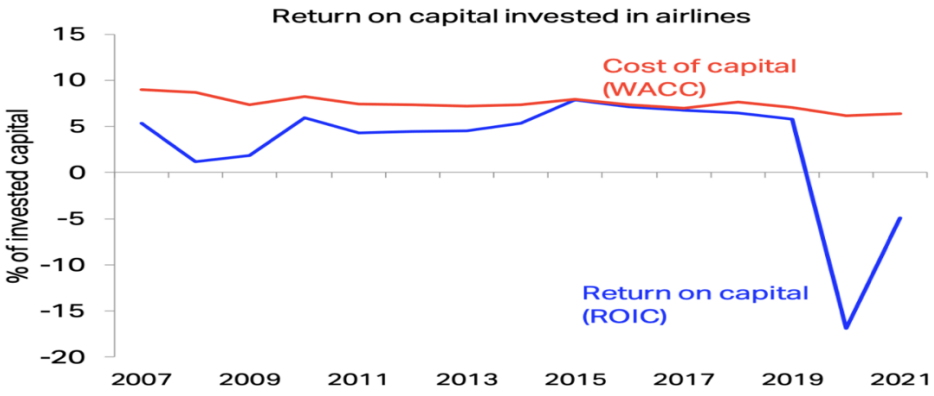

Figure 2-1 Industry median return on invested capital vs weighted average cost of capital (IATA Economics 2020).

2.2.2 Firm value

The concept of the firm is explained in the classic paper of (Jensen & Meckling, 1976). The explanation is based on Coase's theorem which is a milestone for subsequent finance theories. The authors of this paper define a firm and the concept of separation of ownership and control in a property right framework. In their view, the firm is a black box which, based on input-output formula, operates to convert relevant marginal conditions to attain the greatest possible profit. Property right describes a tool for managers and shareholders by which costs, and rewards are allocated among the participants in the firm. Thus, shareholder wealth is essential for the firm, and one must look for optimal solutions to any problems related to conflicts arising between the two sides. The market value of the firm is a measure of shareholder's wealth (Gill and Obradovich 2012). Market value is an attempt to estimate the value of a property under open market condition (Pagourtzi et al., 2003). In other words, it refers to the price of an asset at which a supplier and a buyer would agree to change its ownership. An agreed market value satisfies both the seller and the buyer. As for publicly listed trading companies, the stock price is a measure of its market value. Stock price variation, therefore, represents a percentage change in a firm's market value at any given time and is driven by supply and demand. Market value is estimated by applying valuation methods in the form of procedures that reflect the nature of property and the environment under which an asset would be traded in the open market (Pagourtzi et al., 2003).

Book value is an accounting concept which measures the value of a firm using assets as recorded on a balance sheet. It represents the wealth of a company in assets as well as the value of company's stockholder equity as registered on a balance sheet. It is an aggregation of a firm's financial assets and liabilities at their mostly historical amounts together with historical costs and revenues carried forward to future periods (Boulton et al., 2003). Book value, however, is the measure reflecting not just the accounting choices made

in the current period, but also accounting decisions made over the course of time on how to depreciate assets, value inventory, and deal with acquisitions. Investors are particularly interested in the association between market and book value. They consider the shares well above the book value as a target for overvalued portfolios, while those selling below the book value have been considered as undervalued portfolios. Both market and book values help in the determination of market prospects for the company. However, due to its ability to instantly reflect the growth or collapse of a firm, market value provides a better indication of investor's expectations regarding its business prospects. Some specific applications and issue are addressed by the book-to-market ratio. This ratio compares the original cost of the asset to the market value of the firm as determined by its market capitalization. The ratio is an important firm-level indicator for company's returns, regardless of size and geographical location which they are operating in (Cakici & Topyan, 2014). It dramatically highlights any growing discrepancies between book value and market capitalization (Boulton et al., 2003).

Asset valuation theories have long been of interest to both investors and academics in finance. The literature on firm valuation highlights the discrepancy between market value and book value of companies by means of the present value of future abnormal earnings. In this context, measures such as book-to-market value [B/M] reflects the investors' estimate of these abnormal earnings of the firm. The Fama-French three-factor model argues that many of the discussed CAPM average-return anomalies in literature such as size, book-to-market ratio, earnings/price, cash flow/price, and past sales growth are related and are captured by their model (Fama and French 1996). Their model has three main factors—size, book-to-market ratio, and excess return on the market. These factors are used as *small minus big* (SMB), *high minus low* (HML) and the portfolio's return less the risk-free rate of return. Same authors also introduced the size effect and the B/M effect as two behavioural anomalies. These two effects respectively argue that small firm stock tends to have higher return than the large firm stock and firms with high B/M [a low stock price relative to book value] tend to be persistently distressed. Conversely, low B/M [a high stock price relative to book value] is associated with sustained strong profitability (Fama and French 1995). In other words, a negative difference between market value and book value is an indicator of potential impairment, especially if the difference continues over time (Bini & Penman, 2013). Conversely, if the market value is higher than the book value it shows the potential ability to generate good profits or a value increase for the company and, consequently, for shareholders.

The issue has been discussed at the associated literature and reveals that there have been demands to reform accounting standards because the conventional historical cost approach has outlived its usefulness (Boulton et al., 2003). These claims resulted in a transition from industrial to a fundamentally knowledge-based nature approach. Based on this method, intangibles assets are considered as the new drivers of economic

activity (Skinner, 2008; Canibano et al., 2000). The valuation of intangible assets has become a significant contemporary discussion for researchers in different fields of human knowledge trying to identify relevant intangibles for management purposes and firm valuation (Fazzini, 2018; Lim et al., 2020; García-Ayuso, 2003). A positive relationship between better management and the disclosure of intangibles and financial performance is reported in contributions with this area (OECD 2012).

2.2.3 Internal factors influencing firm value of airlines

Understanding of financial value or shareholders' wealth indicated by the above-described indices is necessary for every type of allocation resource and it can be different in each industry. As for the industry in discussion, studies by Li et al., (2004) and Malighetti et al., (2011) have investigated the industry level value determinants for airlines. Both studies offered a range of possible determinants influencing firm value. For instance, Malighetti et al., (2011) collected data for 87 airlines and 24 airport companies to test the value relevancy of broad range of variables as summarized in Figure 2. As can be seen from the figure, many internal factors including above explained items affect firm value. The variables considered were classified into four potential value determinants including financial information, ownership structure and industry-specific variables and control variables to regress against firm value. In this framework, shareholders' wealth or value drivers have been introduced based on a wide pervious literature highlighting the market structure, the role of network (e.g., frequency, aircraft size, number of routes under com- petition and market share at local and global levels have) and type of business model (i.e., low-cost, or full-service) airline has chosen. They found that the ownership structure has a direct relationship with firm value: a higher ownership concentration is associated with a higher market valuation, probably because of the better tendency to maximize firm value under these conditions. This outcome is consistent with a general industry view asserting a positive link between State-ownership and both efficiency and return for firms operating in a high debt and equity ratio environment (Le and O'Brien 2010). This characteristic is in line with the investigation in this paper since the airline industry is a capital-intensive sector having high debt-to-equity ratio. Conversely, the study found firm size and age are negatively correlated with the firm value of airline firms.

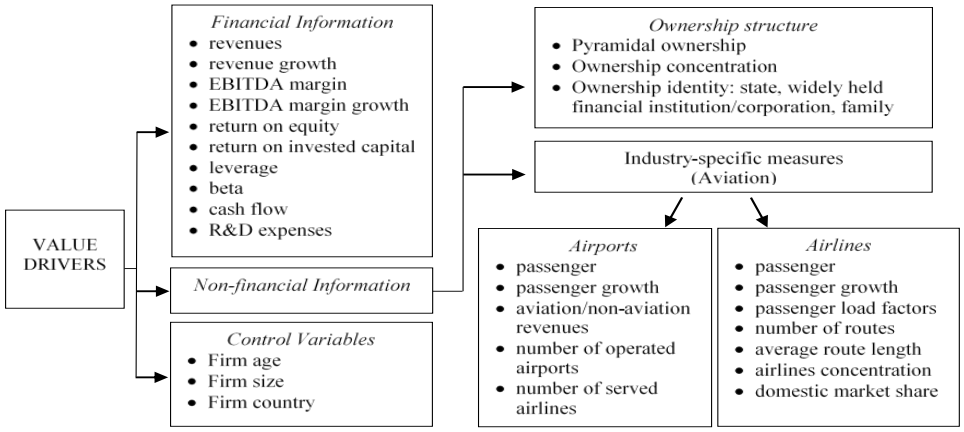

Figure 2-2 Value drivers at the air transport industry based on Malighetti et al., (2011).

2.2.4 External factors influencing firm value of airlines

The aviation industry has a strategic position worldwide. It is extremely sensitive to external economic, political, and social factors due to its heavy dependency on a wide a range of business and industrial support at country and international levels. Government policies, regulations, media industry and customers are parties having impact on industry performance and consequently market value. Due to their significance in terms of these factors and particularly due to bilateral trade agreements (Haanappel 1980), the majority of international airlines (excepting in the United States) were in control of governments until the mid-1980s where this type of airline was deemed to be the best model ensuring growth of industry (Belobaba et al., 2009). Therefore, the industry is highly connected with politics and government elites. The vast majority of state-owned airlines suffer from what has been known as *distressed state airline syndrome*, a political and organizational virus affecting this type of airline due to issues such as substantial losses [e.g. large accumulated debts, undercapitalized and indirect subsidies which hide real losses], over-politicized, bureaucratic management, poor service quality, etc. (Doganis 2001).

A sizeable portion of the industry involves cross-border operations so that not only the domestic market, but also economic conditions around the globe, affect the industry's performance. In this regard, academic research has widely reflected the issues and claims that establishing strategies to use their internal strengths and neutralize external threats may build sustained competitive advantage (Porter, 1985; Song et al., 2021). In this regard, the term *contagion* or *herd behaviour* are used to describe the transmission of instability or unexpected phenomena in one industry(country) to another because of trade, financial or other economic linkages between them (Gillen & Lall, 2003). A wide range of disasters, terror attacks, earthquakes, and

aircraft crashes are highlighted in the literature having implications on firms' financial decision making (Fernandez-Perez et al. 2021).

Studies also considered the impact of health crises such as SARS and the Covid-19 pandemic on firm performance. Such outbreaks challenge health care, economic, and financial systems worldwide. The problem is more severe for the airline industry because the shutdown significantly restricts people's movement decreasing passenger demand for flights. Financial market uncertainty will be triggered by negative sentiment in the operation and business environments. Therefore, airlines lose their value on global financial markets. To summarize, this study categorizes a variety of factors which changed considerably and have implications on value of the firm. These factors range from political, environmental, social factors to the public health situation.

2.3 Methodology

2.3.1 Systematic literature review (SLR)

Systematic review is a methodology that locates existing studies, selects contributions, analyses and synthesizes data, and reports the evidence in a way that allows reasonably clear conclusions to be reached about what is and is not known (Denyer & Tranfield, 2009). Alternatively, according to the Centre for Reviews and Dissemination (CRD), the method aims to identify, evaluate and summarize the findings of all relevant individual studies to make the available evidence more accessible to decision-makers (CRD, 2009). It also serves in two fundamental ways; identifying gaps in order to propose future lines of research, and providing background information as a framework (Kitchenham 2004). Therefore, a literature review is an essential component of almost any research topic. Moreover, conducting a literature review of high quality requires an in-depth understanding of the necessary processes and skills and some experience in the respective field (Fisch & Block, 2018).

According to (Tranfield, Denyer, and Smart 2003), the systematic review method helps to avoid the biases of conventional literature reviews, allows the researcher to summarize the accumulated body of knowledge concerning the topic of interest; explores the topic through different perspectives; and, finally, develops reliable knowledge from a pool of knowledge dispersed across a broad range of studies. SLR could be a very useful too in the analysis of available information and subsequent understanding in responding to the research question (Kitchenham 2004). In this study, based on the guidelines defined in CRD (2009) and Denyer & Tranfield (2009), the method was applied to provide a reference on international academic research related to firm valuation in the air transport industry.

2.3.2 Search strategy

We followed three steps to execute the SLR. The first was to set up keywords and perspective combinations of those key words in search. Inclusion and exclusion criteria for papers found constitute a second phase to adjust the relevance of each study to the current research paper concern. In this phase, we further evaluated selected papers based on certain characteristics. Finally, meta-analysis of selected papers, such as year-wise distribution of selected studies, identifying most productive author, geographical setting, and co-authorship maps as well as keyword co-occurrence analysis, were a third step. We further provide a thematic analysis of sampled articles to elucidate the main research strands in the field.

2.3.3 Keyword identification and sampling

As a search strategy highly contributes to a methodical extraction of papers, it is critical to determine which terms to use in the process of searching to find the relevant articles and to determine how these will be specified during the strategy. The approach undertaken is based on the main research question to encompass potentially relevant academic. As shown in Table 2.2, we used a total of eight keywords to develop the search strings: (book value, market value, firm value, stock market, valuation, air transport, airline, and aviation). These keywords were formulated to run in both databases as: “book value” OR “market value” OR “firm value” OR “stock market” OR “valuation*”) AND (“air transport*” OR “airline” OR “aviation”. In this formula, based on the guideline by Gu & Lago (2009) the Boolean operators of OR/AND have been used between keywords to allow synonyms and to link two clusters of term, respectively. Also, asterisk was used at the end of some keywords to extend the range of possible studies, as some papers use somewhat different keywords for the same concept (Wilding et al., 2012). The aim of the phase was to retrieve articles having the most relevant keywords in their title, abstract, or keyword sections for further assessment of eligibility and inclusion.

Table 2.2 Word combination for the searching.

Book value *OR* Market value *OR* *Firm Value* *OR* Stock Market OR Valuation*	*AND*	Air transport *OR* Airline OR Aviation

2.3.4 Inclusion and exclusion criteria

In this study, we used the following criteria to select relevant articles among those found in the review and filtered any non-compliant studies out of the sample. The first criterion was that the article be published following a peer-reviewed process. Therefore, we eliminated publication forms such as book series, conference proceedings, book reviews, working papers. The second criterion was that the sampled studies had to investigate the book value or market value of or one or more airlines. The subject area was also selected based on research conducted in the accounting, business, management, or economics fields. We also included studies in the fields of environmental studies and hospitality leisure tourism to cover work related to sustainability and its effect on firm performance and value of airlines in the WoS database. It is worth noting that we did not consider an exemption for affiliations, publishers, year of publication, or other filtration, which means that English language studies, having any firm valuation or performance measures appearing as a search result of the above-defined keywords and consistent with criteria, are included in the analysis.

2.4 Assessment of the selected publications

The assessment of the selected articles is divided into two sections: a descriptive analysis and a thematic analysis. The results from the descriptive analysis present the quantitatively description or summarize features from a collection of information regarding performance of authors and countries, years of publication and a keyword co-occurrence network. The thematic analysis emphasizes identifying and interpreting the organization of the studies in the sampled articles based on similarities and tendencies found.

2.4.1 Descriptive analysis

This section reports the main quantitative results obtained from the documents that are indexed in Scopus and WoS. Scopus, one of the largest abstracts and citation databases for peer-reviewed literature, was selected to apply keywords combinations. According to Elsevier (2021), Scopus generates precise citation search results and automatically updates researcher and institutions profiles. It also creates richer connections between people, published ideas, and organizations. Clarivate Analytics' Web of Science is also considered as one of the world's most important databases, offering comprehensive citation search and analytical information tools. It has a prominent position associated with scientific products and features across different knowledge domains (Li, Rollins, and Yan 2017). Consequently, both databases appear to be a useful tools to conduct systematic reviews (Campa-Planas & Kalemba, 2017; Calatayud et al., 2016; Li et al., 2017; Bergiante et al., 2015). The review identified a total of 572 empirical studies as follows: 411 peer-reviewed, 98 conference papers, 10 conference reviews, 16 reviews,16 book & book chapters as well as 21 more documents classified as early access (9), short survey (6), note (2), business article (1), preprints (1), and erratum (1). Papers not falling within the inclusion criteria, such as the conference papers and book chapters were filtered in this stage and the number of articles was reduced to 173 as the final sample. Using the R 3.6.0 programming package, Vosviewer, and Microsoft Excel, we analysed the sampled publications to determine the changes in the papers over the period. Figure 3 summarizes the search process.

2.4.1.1 Evolution of academic articles

Figure 4 illustrates the evolution of the selected academic articles between 1984 (the year the first related article appeared in a database) and 2021. It shows that publications are changing significantly, with ever-growing numbers of articles per year and an evolution of the publishing pattern. This implies that interest in the topic has been met with significant changes. In particular, the upward trend is more obvious from 2008 to 2018, as 91 of the 173 (52%) articles were published during these years. The trend is even more evident for the final three years with 39 articles published. It is worth mentioning that scientific interest on the topic follows the ongoing status of global business. During 2008–2018, for example, the world was suffering and recovering from a financial crisis and stock market volatility was considered as a popular topic. However, after 2017, the market had fully recovered, and the issue of firm value became less significant. So, we observe a decrease in number of published papers in 2018 and 2019. Then the topic drew increased attention in 2020 and 2021 due to the Covid-19 pandemic which threw the airline industry into the darkest period in its history. With the sharp decline in demand and activity for air transport industry, airline values have dramatically fallen. In the current context, it is quite relevant for scholars to give indications of the market value and performance of firms in the industry. For example, there is an urgent need for research to address the effect of support measures to get through the crisis such as suspending

some business operations to reduce costs, relief on taxes and charges, and to design proactive strategies for governments need to confront profound changes in oil prices.

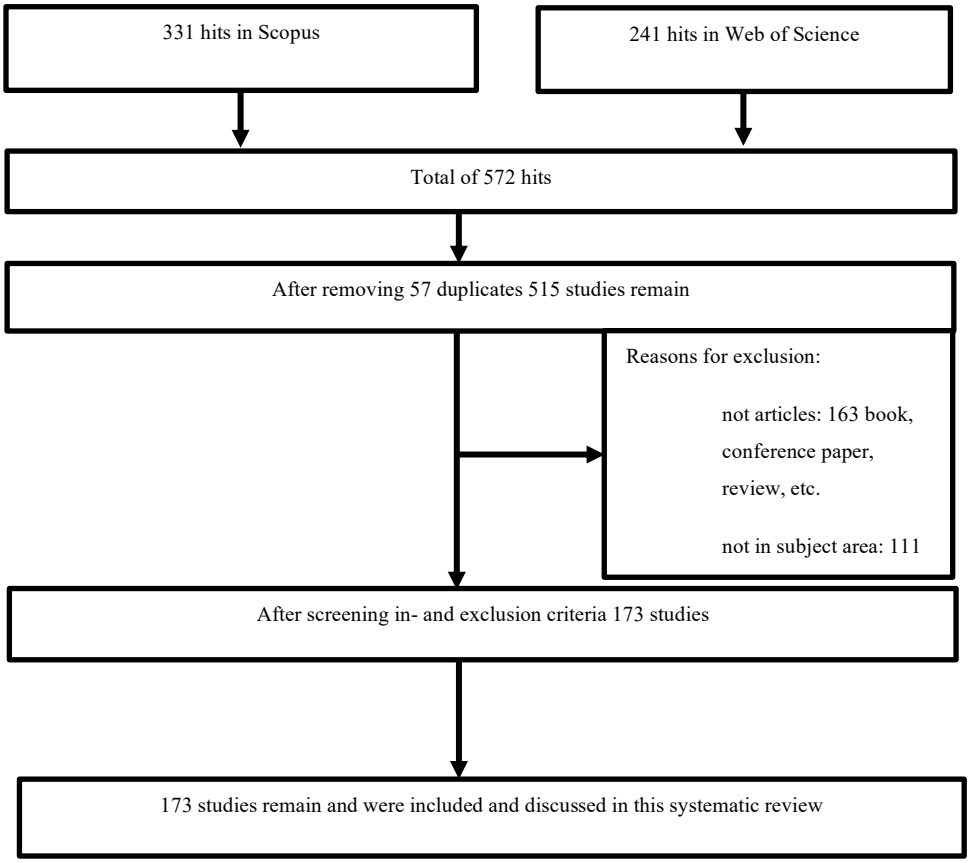

Figure 2-3 Research process summary

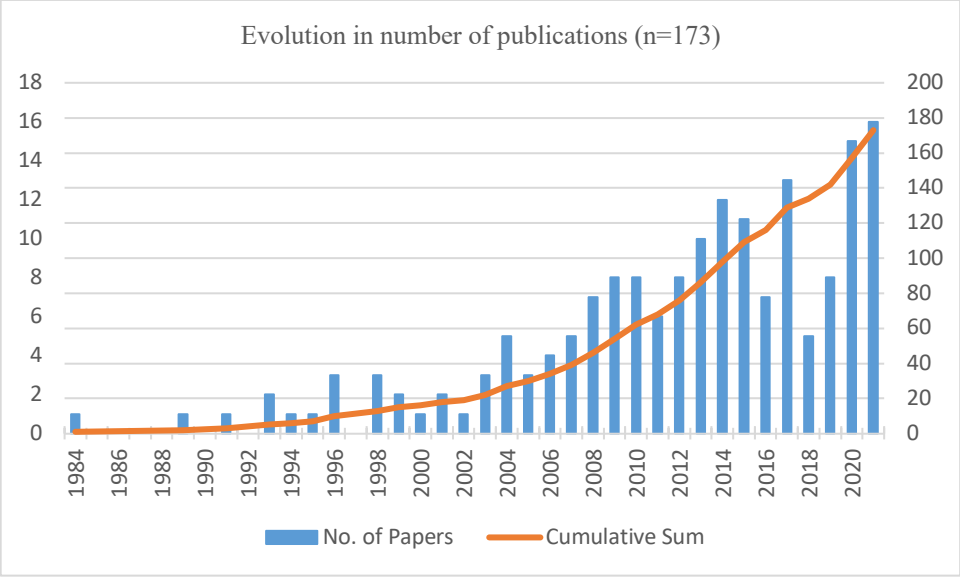

Figure 2-4 Year wise evolution of the academic article on air transport and firm valuation.

2.4.1.2 Most cited papers and sources

Some statistics for the selected papers are demonstrated in Tables 3 & 4. Notably, we report the most cited publications and most productive sources obtained from the systematic review process. The number of citations demonstrates the impact of all articles, authors, and journals. The idea behind statistics is to assess which paper has received most attention in academia by summing the number of citations for all articles published by each author. Additionally, we also report the most productive and the most cited journal.

Table 2.3 Top 10 cited articles.

Article		Year	No. of citations	Average citation per year
Author (s)	Title			
Kang et al.,	Impacts of positive and negative corporate social responsibility activities on company performance in the hospitality industry	2010	312	26
Xie & Shugan	Electronic tickets, smart cards, and online prepayments: When and how to advance sell	2001	261	12
Hadavandi et al.,	Integration of genetic fuzzy systems and artificial neural networks for stock price forecasting.	2010	248	20
Jerath et al.,	Revenue management with strategic customers: Last-minute selling and opaque selling	2010	164	13
Carter et al.,	Does hedging affect firm value? Evidence from the US airline industry.	2006	162	10
Drakos	Terrorism-induced structural shifts in financial risk: airline stocks in the aftermath of the September 11th terror attacks	2004	127	7
Behrens & Pels	Intermodal competition in the London–Paris passenger market: High-Speed Rail and air transport	2012	120	12
MacKerron et al.,	Willingness to pay for carbon offset certification and co-benefits among (high-) flying young adults in the UK	2009	114	8
Sun & Kim,	Does customer satisfaction increase firm performance? An application of American Customer Satisfaction Index (ACSI)	2013	83	9
Luo & Homburg	Satisfaction, complaint, and the stock value gap	2008	69	7

Table 2.4 The most productive and the most cited journals.

Journal name	No. of papers in the study	No. of citations	Impact factor	Quartile in Scopus
Journal of Air Transport Management	23	126	4.13	Q1
Transportation Research Part-E Logistics and Trans	7	31	6.87	Q1
The Service Industries Journal	5	3	6.53	Q1
Transportation Research Part-D Transport and ENVIR	4	13	5.49	Q1
Energy Economics	3	31	7.04	Q1
Journal of Financial Economics	1	115	6.98	Q1
The Journal of Finance	1	114	7.54	Q1
Journal of Marketing	1	41	9.43	Q1
Management Science	2	38	3.93	Q1
Review of Financial Studies	1	38	4.64	Q1

From Table 3 & 4, it can be seen that the most cited article is that by (Kang et al. 2010), entitled “Impacts of positive and negative corporate social responsibility activities on company performance in the hospitality industry”, which received a total of 312 citations. The Journal of Air Transport Management appears as the journal with the highest number of publications with 23 papers as well as the highest number of citations. This is expected since this journal is the specialized source for all air transport issues. In term of number of publications, the next resource is Transportation Research Part E: Logistics and Transportation Review with 7 publications, while the Journal of Financial Economics appears to be the one with second number of citations. These two journals issued 30% of the papers included in the sample and the remaining journals have just published one paper, demonstrating that the sampled papers are not uniformly distributed among different journal publications.

2.4.1.3 Geographical scope

We analysed the authors’ country of affiliation to identify the spatial distribution of the present research topic. Figure 5 depicts the countries contributing to the topic, where the United States of America (62 papers) is the top contributor, followed by China (30 papers). Spain (16 papers) is the third-most country

interested to the topic of valuation in air transport. Based on the review, the topic is North America/Europe-centric, as 74% (129 papers) of attention to the topic has been from these two continents.

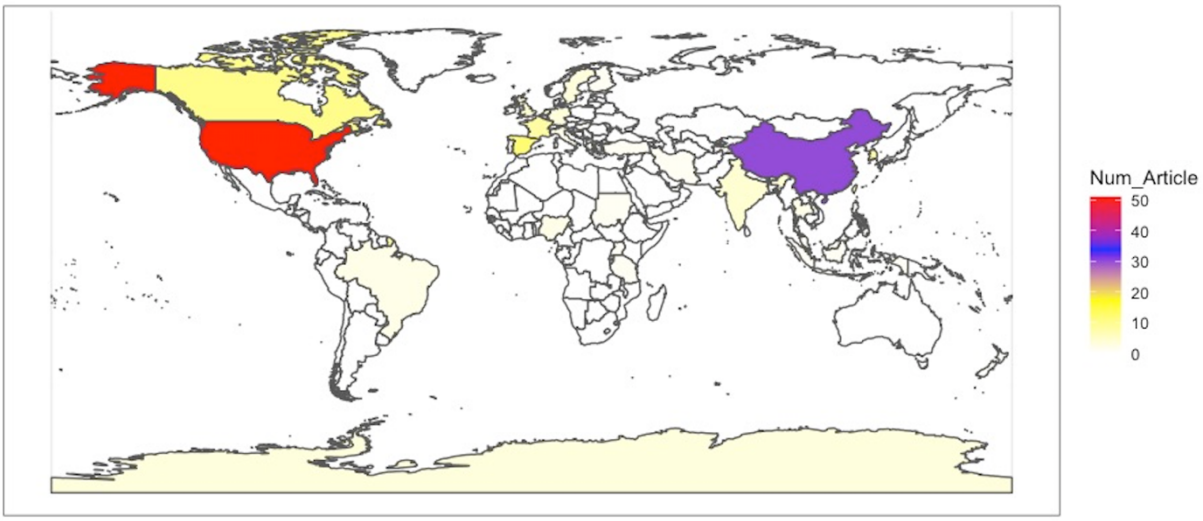

Figure 2-5 Geographical focus of authors by authors (RStudio)

2.4.1.4 Co-authorship analysis among authors

Scientific collaboration could be defined as the cooperation that takes place within a social context between two or more researchers, which facilitates the sharing of meaning and fulfilment of tasks in relation to a mutually shared goal (Sonnenwald 2007). In other words, co-authorship as an ongoing process can be described as divided segments that motivate people to share knowledge, skills and information (Samitas & Kampouris, 2017). Co-authorship in academic networks can to promote innovation in transition from knowledge transfer to an innovative partnership between institutions (Chen et al., 2013), and helps strong personalities come together and increase the quality and quantity of published papers (Samitas & Kampouris, 2017).

We used the full counting mode to identify data selection and thresholds. To apply the method, we consider the minimum number of documents of an author as 1 (minimum number of edges). Figure 6 shows the collaboration network of authors, illustrating interplay between scholars in this field. On this basis, the size of boxes depends on the number of publications in each team. The distance between two boxes is interpreted as an indication of intensity of the relationship between authors (Shi and Li 2019). The lesser the distance appears between two authors, the stronger they co-authored with each other. When specific authors closely collaborate, their respective nodes are thicker and closer. Connected authors are commonly grouped together. For example, the cluster of Zhang A, Hu Q, Zhang Y, Czerny A, Park J-H, Park N-K collaborated

closely and usually conducted research together. Zhang A obtained the highest total link strength among the authors, participating in five research projects.

In Figure 2-6 Co-authorship among the authors (adopted from the grapgh by biblioshiny package R), the size of the nodes is directly proportional to the number of publications and the different colours connect different authors. As shown in the graph, the authors display weak collaboration links, as clusters are distributed separately, and are barely connected. This may indicate that the researchers attach importance to establishing more collaborative relationships with each other. In this way, the information flow will have a higher propensity to diffuse throughout the field.

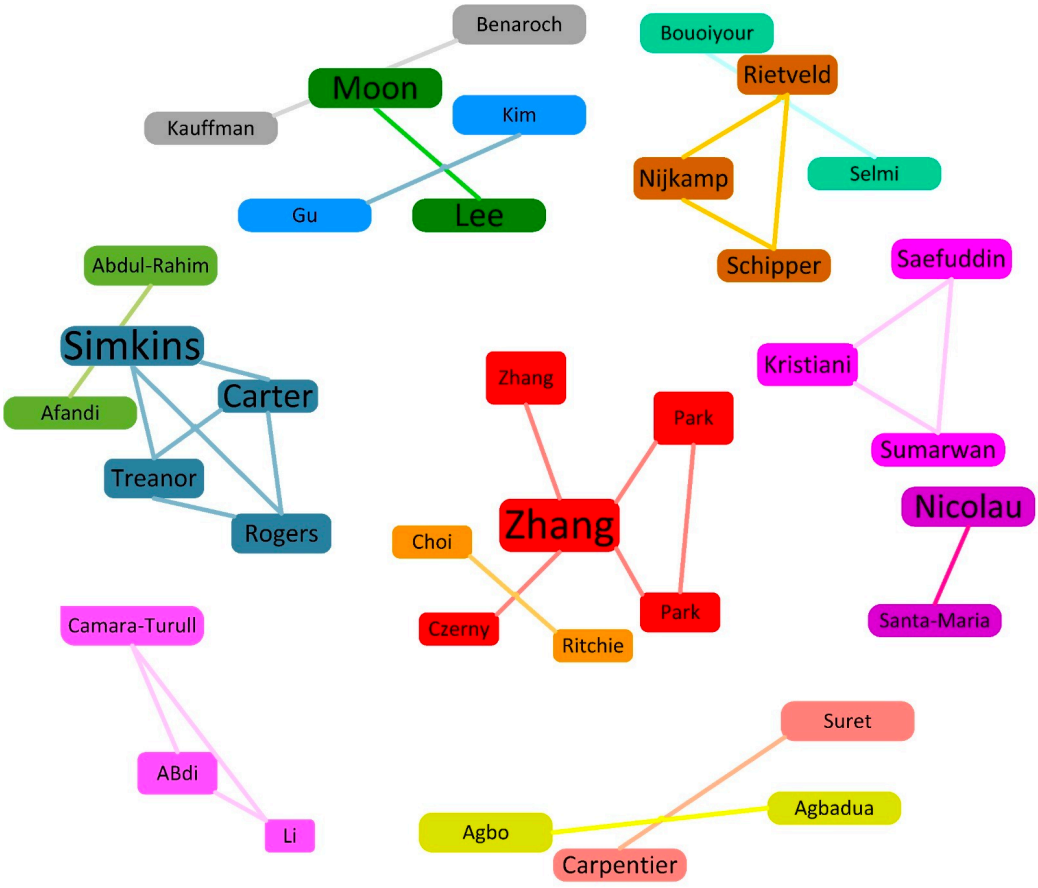

Figure 2-6 Co-authorship among the authors (adopted from the grapgh by biblioshiny package R)

2.4.1.5 Keyword co-occurrence analysis

The word co-occurrence analysis provides the network of conceptual relations from the perspective of researchers in the field. By placing the words in context, and in relation to other terms and concepts, the co-word map can be seen as a sematic representation of knowledge structures (Tijssen & Van Raan, 1994). It involves co-occurrence of words in articles defined by the researchers and those by professional indexers.

Co-occurrence of keywords arises when two or more words appear together in a research study. Figure 2-7 Keyword co-occurrence analysis (Using VosViewer) (constructed by the VosViewer software), demonstrates the keyword co-occurrence analysis of the terms *firm valuation* and *air transport*.

To interpret the figure, some points related to the distance proximity between nodes, their size, and the thickness of lines between them must be considered. In terms of size, the bigger the node [word], the larger the weight. The degree of relationship among these words is also shown by the distance between nodes. A shorter distance generally reveals a strong connection. Additionally, a thicker line reflects a greater co-occurrence between terms.

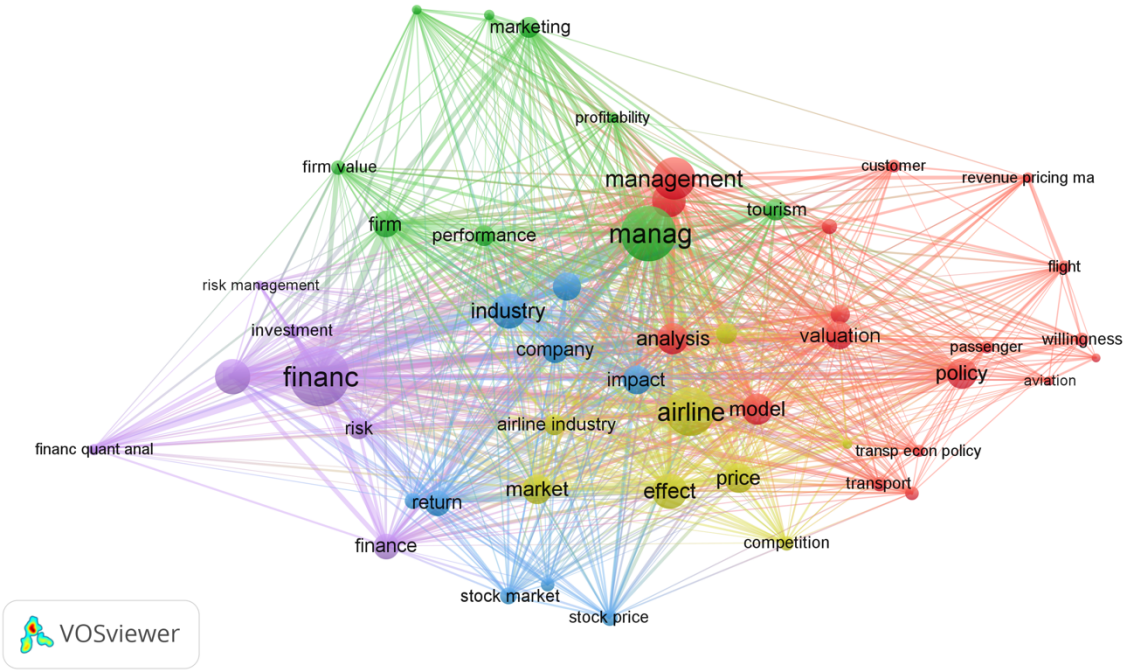

Figure 2-7 Keyword co-occurrence analysis (Using VosViewer)

Sixteen main keywords appeared as result of applying co-occurrence network with minimum of four occurrences. The figure highlighted the dominance of air transport and stock market terms. Expectedly, the word *airline* had the highest frequency among the analyzed documents. The second most frequent concept among the shown terms is *value* which has been reflected in many forms such as firm value, stock price, stock market, price, valuation, market, and performance. Thus, it stands out as a more cohesive body of literature when the subject is valuation. Accordingly, taking the joint analysis from the figure, viewers can get the sense that *management*, *finance*, *airline*, *valuation*, *policy*, *analysis*, *industry*, *stock*, *analysis*, and *return* were popular in addressing valuation in air transport context. These keywords are shown in five clusters represented by different colors. To be specific, *management*, *finance*, *airline industry*, and *stock*

returns, are the most prominent keywords to represent the topic over the whole period. The implication of keywords with higher centralities is that, first, the issue treated by the literature is primarily a managerial issue. Second, the subject is highly oriented toward the finance area. Third, the academic interest focused specifically on the airline industry is substantial. Nonetheless, it is less important than the two research keywords listed above (Management and Finance).

2.4.2 Thematic analysis

Based on our initial reading of the 173 papers, the influence of seven major groups of factors on airline value can be defined based on major themes. It is worth noting out that this categorization is a purely manual classification of the sample without using any coding method. It seems that the whole transportation industry is highly influenced by the impact of system risks due to a broad range of external factors including financial events (recession, fuel price change, etc.), natural calamities (hurricane, tsunami, polar vortex etc.), or man-made disasters (war, terrorist attack, etc.) (Deb 2021). Almost all these studies use quantitative methods to approach the topic. This is not surprising since, for our sample, we tested two-factor associations (firm value and another quantifiable variable such as oil price, implementing sustainability standards, etc.) and is a variance question in nature (Hermundsdottir & Aspelund, 2021; Van-de-Ven, 2007). Table 2.5 provides the detailed list of categorization and references for the main research themes.

2.4.2.1 Industry-level characteristics

We categorized the subject of inconsistencies in industry-level performance such as mergers and acquisitions (M&A), aircraft crashes, alliance, inter-industry competition, etc., as the most popular topic to study the consequence of these actions on firm value (37 papers). Some of these topics have been widely covered in the sample. For instance, Wassmer & Meschi (2011) studied the effect of code-sharing alliance formations and terminations on firm value. They found that the stock market will react to these incidents. The next notable determinant is a change in oil prices which significantly impacts the operation of firms in this industry. Wang, (2013) extracted three main reasons from the literature as to why oil price is an important factor for airline firms: their first and second reasons are based on the discounted cash-flow model highlighting a firm's future cash-flow as a value influencer: a) oil is an important natural resource in economic activities influencing costs and expected cash-flows, and b) the rise in oil price led to inflation. If the price increase is met by an anti-inflationary policy (i.e., a rise in interest rate) from the central bank, higher interest rates cause discount rate incensement which finally has an adverse effect on the stock price for the firm. As the third reason, a rise in oil price will increase commodity prices which will finally lead to diseconomies of scale. In all cases, oil price increases magnify the operating costs for airlines and reduce their profits (Mollick and Amin 2021). Therefore, there is a connection between oil prices and stock market

returns for airlines. More, specifically, within this category, factors such as competition, co-specification, merging, aircraft crash, bankruptcy, accidents, and the market structure have been mentioned as value influencers which are matched with the theory discussed by (Malighetti et al. 2011). These contributions enhance our understanding of the relationship between asset prices and changes in these value driver factors. This should be of great interest to scholars, corporate executives, money managers, regulators, and policy makers. Large-scale transport for long-distance passenger transport have usually been to cost-benefit calculations for policy recommendations (Kristoffersson et al. 2021).

2.4.2.2 Firm-level value influencers

Studies in this category are mainly to analyse changes in firm-level performance such an airline's business model (low-cost & full-service), firm demand for hedging, new route announcement, bankruptcy protection, etc., as the second popular topic to study the consequence of these actions on value (36 papers). For example, Kökény et al., (2021), explore the significance of the business model of European listed airlines for their stock market performance. They find that an airline's business model provides an insight for investors into what kind of market reactions to expect in various stages of an operation and allow them to apply relevant criteria and financial indicators when making their investment decisions. That means full-service airlines performed significantly better than low-cost ones at the time of crisis when stock markets suffered the most damage. This hypothesis gains support from (Deb 2021) who documented that two small-scale services Compass Airlines and Trans States Airlines as well as Virgin Australia filed to bankruptcy due to the Covid-19 pandemic. Also in this category, factors such as flight and network efficiency, launching a mobile app, leasing choices, oil refinery, strategic risk-taking behaviour of CEOs, and technical efficiency have been mentioned as value influencers which are matched with the theory discussed by (Malighetti et al. 2011). For example, in an interesting study, Manuela et al., (2016) investigate Delta airline's oil refinery acquisition as a strategy to hedge against higher fuel prices and the effect of this on its financial and operational performance. They find that the strategy had a positive impact on income and was rewarded by the stock market via higher share prices following the acquisition announcement.

2.4.2.3 Sustainability

Many studies (31 out of 173) show evidence of the relationship between sustainability and firm value. Articles with a *Sustainability* theme bring together topics related to concerns arising from issues in regard with film's environmental, social and governance responsibility. Due to the heterogeneity between terms referring to environmental, social and governance issues we use the term *sustainability* to represent these issues. The topic has gained currency in recent decades among investors, academicians, and even government regulators. It has been described as a voluntary corporate commitment to obligations imposed on a company based on society's expectations of conventional corporate behaviour (Casado-Díaz et al.,

2014). It means that companies are under pressure to contribute to sustainable development by developing corporate strategies that integrate sustainable practices into their activities with the aim of achieving corporate sustainability (Escrig-Olmedo et al. 2019). This corporate sustainability is itself defined as corporate activities which proactively seek to assist sustainability equilibria, including the economic, environmental, and social dimensions over time. It also addresses the company's operations and productions, management and strategy, organizational units, marketing and communications with its stakeholders (Escrig-Olmedo et al., 2019; Lozano, 2015). These studies link the firm's market value and returns to the level of commitment to sustainability standards toward professionally managing issues such as resource use emissions, innovation, employee and shareholder relationship, management, and board. These investigations suggest that sustainability issues influence firm value and the financial performance of airlines (Abdi et al., 2021) and, consequently, will be reflected in the stock market.

2.4.2.4 Customer relationship and marketing

The next sub-group focuses on relationship between airlines and their customers. Consumer's behaviour has long been analysed in economic literature. However, it has been in to transportation literature by the beginning of this century (Pan and Zuo 2020). For airlines, the consumer behaviour especially the one related to airline choice behaviour is considered as an important element in planning and is a basis for their strategies (Munoz and Laniado 2021). This research strand highlights the importance of managing the relationship with customers and the influence of this on firm value. Given the highly competitive atmosphere in the global airline business, airlines are taking a range of actions to satisfy and stay connected with their main customers, their passengers. These activities include marketing strategies (e.g., social media activities to internal operations to improve safety and service quality). Based on the findings of these studies, market value modifications are expected due to changes in the level of passenger satisfaction, investment behaviour tendencies, and wage concessions (Sun & Kim, 2013b). The operators and practitioners must consider these dimensions and attributes because these items are influential to the overall perceived quality of firm's services (Ojo 2017).

2.4.2.5 International political and economic instability

Changes in the political and economic situation significantly affect the market value of airlines. We use political and economic instability as an umbrella for studies in this domain since changes in firm value are rooted in the political and macroeconomic situation. On this basis, we introduce this stream of literature mainly discusses contributions to firm's market value and the reaction to volatility in worldwide political and economic factors such as terrorist attacks and transmission of these shocks to the market. For instance, although oil price volatility is an economic phenomenon, significant changes in supply and demand are usually triggered by political disturbances, such as terrorist attacks, in oil producer or import countries

(Mollick and Amin 2021). Although such shocks have affected various industries at both country and international level, they are disproportionately felt by insurance and tourism (including airlines). The issue was well reflected by IATA director and CEO Pierre Jean Jeanniot a year after the 9/11 terrorist attack: "We have lost more in one year than we have made in our entire history. This is an industry that is now in a deep hole. We must start looking for footholds and ways to climb quickly out of the financial abyss" (Drakos 2004). These papers mainly reflect the increased uncertainty of the industry following such incidents. For instance, (Gillen & Lall, 2003) studied the importance of trade linkage and airline alliances in the transmission of global shocks to market value. They found the negative impact of shocks such as September 11 attacks on the mean abnormal returns of airlines.

2.4.2.6 New method to predict share price

Apart from the studies having internal or external value drivers in focus, there are contributions that introduce fresh methodologies to increase the prediction accuracy for stock prices. It is worth to note that studies in this sub-category could mostly fit to the internal factor category, but since the innovative aspect of introduced stock price forecasting is on their spotlight rather than correlation between specific variable with firm value, we decided to present them in new category. It is discussed that, due to the complexity fact of the stock market and the influence of cyclical factors on the market, multiple components could influence the performance of prediction models, such as finance data, extracted features, optimization algorithms, and parameters of the prediction model (Zheng and He 2021). Therefore, the selection of model features could consider both technical and fundamental characteristics. In this way, technical features could be the first option when the share price is stable, whereas fundamentals might be better when the share price has high fluctuations. It would be more accurate through using long-term historical data for operating airlines (Zheng and He 2021). The models developed in this category could enhance the accuracy of a firm's valuation and assist investors in making timely decisions for their economic strategies and business activities.

2.4.2.7 Health crisis

The global health crisis was found to be the next factor influencing the market value of airlines. From this perspective, severe acute respiratory syndrome (SARS) and Covid-19 are as infectious diseases threating human life. Such a risks disrupt business operations regardless of the industry in infected countries. Given the contagiousness of these diseases, infected countries adopted different measures to limit contacts (such as stopping unnecessary movement out of the home, stopping public transport, school and university closure, and strict social distancing measures). Such restrictions immediately effect the economy. The airline industry is one of the first to suffer because of the dramatic drop in passenger demand. Due to the Covid-19 outbreak the market value of airlines shrank significantly (Maneenop and Kotcharin 2020).

Studies in this cluster mainly use event study methodology to analyse the impact of such a disaster on online stock returns. The method is popular in economics and finance for investigating the implication of new information arrival from particular events on stock market prices (Maneenop and Kotcharin 2020).

These studies investigate, by comparing the situation before and after the outbreak, to what extent the firms in this industry may suffer (Liew 2020), how severe is the impact and what the impact on stock price volatility may be (Deb 2021), and by comparing stock returns for the airline industry with the whole market return (Maneenop and Kotcharin 2020). Different events and daily data sets were selected in these studies. They include crucial announcements such as days-from-first-case reports by China (January 13, 2020) and the USA travel ban announcement by President Trump (March 11, 2020). The findings of these studies are also interesting: Liew (2020) observed the rapid decline in profit of the airline and tourism related business by monitoring statistics derived from three leading consolidators, namely, hotel accommodations, airline tickets, and travel service services. Deb, (2021) finds that Covid-19 had an unprecedentedly severe effect on the stock price movements of airlines. He further proposed a method to predict the market reaction to similar events especially in the short-term. Finally, (Maneenop and Kotcharin 2020) find that airline share prices reduce more significantly than the whole return of market. All three of these studies resulted in major changes in airline valuation theory. Thus, immediate policy designs to alleviate the impact of the pandemic in the airline industry are necessary.

Table 2.5 Contents and references for the main research themes.

Topic area **Industry-level characteristics**
Impact variable Mergers and acquisitions (M&A), industry financial crisis, oil price, international connections, slot policy, crashes, the impact of low-cost carriers' entry on legacy airline stock prices, alliance, aviatic innovation system (AIS), inter industry competition based on announcements of new routes, effect of oligopolistic rivalry on spillovers in financial reporting, countervailing power mergers, market structure, strike crises, monopoly
Method case-by-case analysis, panel data, vertical-structured model, Fama–French–Carhart's (1997) four-factor asset pricing model augmented with oil price risk factor, DHS model, event study methodology,
Main finding **M&A:** it is shown that by adopting investment valuation and presenting innovative patents the more vulnerable company could attain a triumphant price during the negotiation of M&A. Also, hypothesis that the merged airline gains countervailing power towards airports, is rejected.

Oil price shocks: a significantly positive impact of demand-driven oil shocks on airline earnings. Also, it has been documenting that oil price risk exposures vary considerably over time. It is also found that there is a performance difference between full-service and low-cost companies. This is because low-cost companies stockpile in a more efficient way, which depends less on current jet fuel price. Therefore, the adjustment of firm's product structure can improve its ability of resisting the crude oil price risk.

Announcing the slot policy: an airline chooses to hoard slots if and only if the demand/capacity ratio is significantly low. When the airline must hoard slots by operating excessive flights, it would use smaller aircraft, charge a higher airfare, and serve more passengers.

Aircraft crashes: the crash airlines experience deeper negative abnormal returns as the degree of fatality increases. The stock prices of the rival airlines also suffer in large-scale disasters but benefit from the disasters when the fatality is minor.

Competition and market entry decision: oligopoly structures, entry barriers, and high fixed costs make the airline industry highly susceptible to competitive and network expansion impact of low-cost airlines' entry. This could be explained by two possible factors: competition, and network expansion, for the effects of low-cost entry and that these have contrasting impacts.

Alliance: from a stock market perspective, alliance formation and termination can be seen as two interrelated events and that it is difficult to reverse initial valuations past the alliance formation. Analysis also indicates that the effects on rival firms do not appear to be moderated by the degree of rivalry between the alliance partners and their rival firms. This may suggest a potential channel through which international alliances improve partner firms' competitiveness and their profitability, which in turn decrease rival firms' value.

Aviatic innovation system (AIS): the value of the AIS is to provide airlines with innovation-oriented techniques for future strategy creation. It is therefore believed that the AIS can contribute to the survival of airlines in near future.

Industry announcement of new routes: both firms' profits may rise or fall, depending on launching costs for the announcer, and on whether market expansion or market substitution is dominant for the rival.

Unexpected earning announcement by rivals: firms experience discernable abnormal stock price reactions at the announcement of unexpected earnings by rival airlines. The extent of the price reactions is related to the extent of rivalry between the announcing and non-announcing firms.

Market structure: The network effect intensifies price competition depending on the size of the market and on consumers' valuation of waiting time, various subgame perfect equilibrium configurations are exhibited.

Future Studies

Future research should investigate how oil price shocks affect sector output, profits, or investment throughout the region. Also, since the factors presented could correlate, future studies may need to take such interactions into account. Additionally, extending the analysis to either dedicated cargo carriers or combination carriers could provide generalize image of the industry since both of which groups may display similar or dissimilar characteristics. Furthermore, extending the analysis to either dedicated cargo carriers or combination carriers could provide generalize image of the industry since both of which groups may display similar or dissimilar characteristics. Finally, extending the sample and data on world-wide carriers is suggested. This is because studies presented are suffered from small sample sizes and therefore hesitate to generalize to the industry. Therefore, more empirical evidence is needed on evaluating the influence of industry level value determinants for airlines.

Study

Mohanty et al., (2014), Bernile et al., (2012), Detzen et al., (2012), Davidson & Worrell (1993), Bosch et al., (1998), Domke-Damonte (2000), Cheng & McDonald (1996), Cheng et al., (2021), Akyildirim et al., (2021), Mollick & Amin, (2021), Trifonov, (2021), Wang & Gao (2020), Thorbecke (2019), Sheng et al., (2019), Ho et al., (2013), Wassmer & Meschi (2011), Chen & Chen (2010), Alves & Barbot (2010), Cheng et al., (2009), Benaroch et al., (2007), Gong et al., (2008), Flouris & Swidler (2004), Kiesel et al., (2017), Gaudenzi & Bucciol (2016), Czerny & Zhang (2015), Kwoka & Gu (2015), Park et al., (2003), Ho et al., (2021), Yun & Yoon (2019), Venkataraman & Ramachandran (2016), Murphy et al., (2013), Hunsader & Dickens (2011), Murphy (2006), Park et al., (2003), de-Fusco & Fuess, (1991), Beneish & Moore (1994), Shepherd (1991), Allroggen et al., (2015).
Topic area **Firm-level value influencers**
Impact variable Business model (low-cost & full-service); airline's distribution capability and retailing platforms to set offers to customers, firm demand for hedging, aeronautical charges, vertical differentiation strategy (paying for an upgrade to a premium product after purchasing the base product), cash compensation for chief executive officers (CEOs), new route announcement, service-quality attributes in an airline choice, bankruptcy protection, flight and network efficiency, mobile app, financial and non-financial disclosure, leasing choices, oil refinery policy, strategic risk-taking behavior of CEOs, bankruptcy, technical efficiency, discrete choice analysis, agency costs, sell the insurance, pricing policy, wage concessions
Method survey, panel data, real options valuation (ROV) approach
Main finding **Airline's business model:** full-services performed significantly better than low-costs at the time of crisis, when stock markets suffered the most damage. **Hedging:** a positive relationship between hedging and firm value is reported. Also, it is discussed that hedging could improve income predictability, operating performance increased for the affected firms, and increase (decrease) analysts' forecast accuracy. It is also suggested that airlines should hedge their positions in jet fuel using a horizon-sensitive model that directly accounts for movements in the jet fuel, crude oil spread. **Economy seating upgrades:** introducing of the premium economy seating upgrades is associated with an increase in the price dispersion and revenues in the coach class. **Route strategy:** both opening a new domestic route and announcing multiple new routes achieve the greater financial gain. There are first mover advantages, whereby early entrants gain more than later entrants. Additionally, a price-discounting strategy contributes to market value. It is claimed that specific expansion activities such as aircraft purchases or crew recruiting could significantly impact the potential for high profits. **Mobile app**: it is estimated that the introduction of mobile apps in lodging and airline companies can increase shareholder return by 1.32%. **Leasing:** impact of leasing on an airline's operating profit is stronger for low-cost carriers than for full-services: deviating from the optimal level of leasing might be more harmful for a low-costs than for a legacy carrier.

CEO: CEO's tenure and education play a significant role in accounting for airlines' strategic risk-taking. **Bankruptcy:** during its bankruptcy the firm's value will drop significantly. For example, Eastern airline's value dropped over 50%. **Wage:** capital markets respond positively to wage cuts but not significantly to wage freezes or two-tier settlements.
Future Studies Regarding the business model, it would be likely to explore how business model influence the rebounding of firm value after crisis and estimate the time to reach the value before crisis. The role of state intervention should also be subject of investigation. Also, the factor being reflected in such a studies is that they are relatively suffer from small number airlines in analysis. This is an important factor since extreme stock price movements of a single airline were able to move the average, leading to potential bias. New route announcement is a subject with high capacity to grow since very few studies have investigated it. Future studies are suggested to explore factors such as competition mechanisms, shareholder base and governance which may also affect financial performance. To capture these effects and make some more accurate predictions on individual optimal strategies improving profitability, it is suggested to design a structural model of airlines' performance, requiring data collection on competition at the route level, operators' characteristics, airlines' ownership, and governance indicators (number of independent directors, size of the board of director). Finally, the diverging findings regarding the effectiveness of financial hedging implies the necessity of further implore in that direction to give consistent managerial implications for the aviation industry.
Study Kökény et al., (2021); Wang et al., (2021); Ranasinghe et al., (2021); Giambona & Wang (2020), Álvarez-Sanjaime et al., (2020), Cui et al., (2019), Hu et al., (2019), Bertus et al., (2009), Gu & Kim (2009), Tsai et al., (2008), Carlos Martín et al., (2008), Gong, (2007), Carter et al., (2006), Hung & Liu (2005), Chen et al., (2017), Qin et al., (2017), Bayer et al., (2017), Bourjade et al., (2017), Manuela et al., (2016), Lee & Moon (2016), Korkeamäki et al., (2016), Turner & Lim (2015), Berghöfer & Lucey (2014), Treanor et al., (2014), Swaminathan et al., (2014), Carter et al., (2006), Weiss & Wruck (1998), Alam & Sickles (1998), Singal (1996),Hersch & Mcdougall (1993), Ramanchi et al., (2017), Nwude et al., (2016), Kizildag & Goh (2011), Hofer & Eroglu (2010), Thomas et al., (1995),Özcan (2019).
Topic area **Sustainability**
Impact variable Environmental, social and governance (ESG) standards, Sustainable Development Goals (SDGs), donation proposals (willingness to pay for sustainability initiatives), negative externalities caused by air travel, willingness to pay (WTP) a price premium for flights using bio-fuel blends, innovation (potential variations in the risk to an airline's market value resulting from incurring high investments in innovations), corporate social responsibility (CSR), voluntary carbon offsets, top management team (TMT), CEO apology (apologizing depends on the firm's level of responsibility for the crisis), innovations involving information technology (IT), environmental externalities

Method
Panel data, Enhanced and Efficient Earned Value Management (denoted E^2-EVM), real options methodology, contingent valuation (CV) method, double-bounded dichotomous choice of contingent valuation method (CVM), contingent valuation approach, stochastic dynamic programs (DPs)
Main finding
ESG standards: It has been observed that airlines' contributions to governance and environmental initiatives improve a firm's market value. Additionally, the results for firm's participation in social is disperse. Firm characteristics (size, age, etc.) are also tested to moderate the relationship between ESG and market value. **Willingness to pay for carbon offset:** passengers' willingness to pay depends on key factors are the quantity of CO_2 reduced or offset via the project and the respondents' gender, education degree, occupational status, environmental consciousness, and travel habits. It is suggested that uptake of voluntary offsets may be encouraged by investing in projects with co-benefits and by emphasizing those co-benefits to consumers. **Apologizing:** the stock price response from apologizing depends on the firm's level of responsibility for the crisis. **Innovations:** innovations lead to an increase in an airline's risk, via volatility, but this variation is not the same for all types of innovation: advanced consumer segmentation innovations are found to have a greater impact on sales than on fixed costs. **CSR:** likewise ESG, the findings suggest mixed results across different studies as different impacts of positive and negative CSR activities on financial performance are reported.
Future Studies
It is suggested that future studies on the current topic may test for the potential moderating effect of leverage, return on assets or dividends on the relationship between sustainability indicators and market value. For willingness to pay, it is recommended to complement the data by the analysis of the current voluntary contribution of air travelers based on revealed preferences. This is since the public awareness of global climate change has increased and probably the willingness to pay has gone to the same direction. This would allow us to detect the causes that are limiting the voluntary purchase of carbon offset units, which might be due to the inconvenience of paying the donation or to the lack of properly designed proposals offered by airlines. Also, considering mixed results of CSR, future studies may develop a method that provides its own weight for each CSR activity and employ data that more clearly and comprehensively encompass CSR domains. This could be achieved by using structural equation modeling (SEM) that may provide a greater level of precision and depth in the analysis of the determinants and consequences of each CSR measure. In conclusion, more studies are demanded for: 1. Provide more evidence to reach the conclusive impact of each of these sustainability related items on firm's performance and market value. 2. Quantify the exact impact of each sustainability undertakings on firm's financial records. 3. Explore how firm characteristics could impact investment in sustainability and vice versa.
Study
Abdi et al., (2021); Rambaud et al., (2021); Rotaris et al., (2020); Abdi et al., (2020), Racine et al., (2018), Shaari et al., (2020), Sonnenschein & Smedby (2018), Goding et al., (2018), Choi & Ritchie (2014), Nicolau & Santa-María (2012a), Nicolau & Santa-María (2012b), Azar & Johansson (2012), Lu & Shon (2012), Kang et al., (2010), MacKerron et al., (2009), Baarsma & Lambooy (2005), Lee & Moon (2018), Choi et al., (2018), Karaman et al., (2018), Kim et al.,

(2017), Lee et al., (2017), (Moon et al., 2016), Choi (2014), Suksmith & Nitivattananon (2015), Kauffman et al., (2015), Carpentier & Suret (2015), Jou & Chen (2015), Schipper et al., (2001), Clarke et al., (1999), Corte & Gaudio (2014), Schipper et al., (1998).
Topic area **Customer relationship and marketing**
Impact variable Marketing productivity, demand type price sensitivity, security policy, willingness to pay (WTP) for business class seats of the HSR, social media word-of-mouth (WOM), financial value of the frequent flyer members, third party customer complaints, passengers' valuations on airline service attributes using stated preference analysis,
Method Survey, finite mixture structure individuals (to identify unobserved consumer types and assess whether firms price discriminate), panel data
Main finding **Dynamic marketing productivity (DMP):** it is argued that DMP can be a source of competitive advantage, thereby positively affecting a firm's financial performance and intangible value. **Demand type price sensitivity**: The results support the existence of two high-type "business" traveler is less price sensitive, has a higher valuation, and pays a higher price than the low type "tourist." The proportion of high types also increases as the departure date nears. **Security policy:** It is reported that respondents preferred full disclosure of some information related to terrorist threats regardless of the consequences for specific industries or future threats, in particular threats involving attacks on commercial airlines. **Customer satisfaction:** Findings reveal that the impact of customer satisfaction is reflected in the profit margin, return on assets, return on equity, proxies of a firm's profitability, and in the market value. The results indicate that customer satisfaction positively affect a firm's profitability and value in the hospitality and tourism industry. More specifically, if a firm's index of customer satisfaction increases, or a firm announces a new strategy to enhance satisfaction, the firm may be more likely to enjoy improved financial performance. **Service quality**: It is shown that airlines are not able to maximize profits regarding service frequency, and that these airlines are leaving the market. **Social media NWOM**: Results report the reciprocal influence effect between social media NWOM events promoted by consumers, and the effect that informational social influence has on the development of negative social media firestorms for a service. Findings also emphasize consumer focus on comparing negative experiences and events between brands, including those competing in the marketplace. **Financial value of the frequent flyer members**: cooperation between customers and airlines, maintain goodwill of customers, and maximize the expected total returns to airlines. The findings suggest considerable mutual benefits associated with a 'voluntary overbooking' policy that emphasizes cooperation between passengers and commercial airlines.
Future Studies

Company's strategy to deal with its customers play a vital role in its longevity. In theory, satisfied customers can increase sales, reduce costs, consequently revenue for the firm and finally, improves firm value. Therefore, future research could reflect the reaction of customers in regard with the airline´s strategy or innovative activities. Potential studies also could take advantage of different customer behavior track methods such as customer satisfaction score, net promotor score and social media modeling. Additionally, more contribution is demanded in regard with the social media since airline companies could connect with existing and potential customers, offer customer service, and demonstrate their brand. This is important due to the gap is evident in this area as currently there exist very few papers dealing with new social media potentials for airlines. Finally, consumers' reaction to special events or crisis and their feedback on how management has been successful in controlling the situation considering the impact of the informational social influence, appears as an interesting topic for future work.
Study
Escobari & Hernandez (2019), Rahman (2020), Smith et al., (2013), Sun & Kim (2013), Jou et al., (2013), Behrens & Pels (2012), Hess (2007), Huse & Evangelho (2007), Lijesen (2006), Nicolau & Santa-María (2017), Merkert & Beck (2017), Xun & Guo (2017), Janawade et al., (2015), Petrescu et al., (2020), Dalalah et al., (2020), Lu (2017), Kristiani et al., (2014), Jerath et al., (2010), Casado-Díaz et al., (2009), Jackson (2009), Chen & Wu (2009), Yang & Klassen (2008), Delquié (2008), Xie & Shugan (2001), Schwartz & Zea (1999), Lu (2017), Luo & Homburg (2008), Jiménez-Barreto et al., (2021).
Topic area
International political and economic instability
Impact variable
Political uncertainty, travel crises arising from issues such as terrorism, Brexit, International regularity of open sky, deregulation,
Method
Panel data, survey,
Main finding
Safety: importance of safety is directly related to an airline's earnings and stock prices. **Terrorist attacks:** attacks in Paris and Brussels had a strong short-term effect on the valuation of airline companies. Furthermore, we find that smaller, less geographically diversified, airlines are significantly less affected by the attacks than their global peers. **Brexit:** Given the centrality of the European Union in regulating various sectors, the decision to leave impose high uncertainties for UK industries in upheaval. It is found that the adjustment of stock prices is inconsistent with the uncertain information hypothesis assuming that policy changes are typically associated to a decrease of stock prices, but once the uncertainty-induced event is reduced, stock prices would increase again. The lack of opportunity to benefit from the European passporting rules to establish businesses, to access to EU's Research and Development funds and to hire the skilled workers have been offered to explain the adverse effects of Brexit on UK industries. **The global financial crisis:** It is claimed that the event significantly intervenes with the return's volatility of airline companies around the world. The results suggest that major international events may all have risk effects on the returns on the share prices of airlines. analytical tool for industry practitioners. They should quickly and efficiently come up with responses to effectively reduce the period of crisis shocks and economic losses.
Future Studies

Although, these critical situations cannot be controlled by airlines, future studies could focus on practical solutions to mitigate volatility of their return. For example, studies could measure the volatility in market value for airlines which has long-term contracts with fuel suppliers to achieve to compare the extent of fluctuations. Moreover, research could develop a review on airlines' performance during political and economic crisis times to provide lessons from history and evaluate different strategies to better face these situations. Also, future studies are suggested to develop an alternative economic shocks and air- line stock price measures. Such a co-movements based on the dynamic conditional correlation model could be used in future research, which could also offer more policy impacts. Another important issue is scholars should use different types of models to construct risk factors to identify the optimal estimation laws. They are also advised to ponder the obstacles and challenges of an industry from different perspectives in order to assist the industry to recover and further develop.
Study
Jeon (2021), Markoulis & Neofytou (2019), Flouris & Walker (2005), Kolaric & Schiereck (2016), Gillen & Lall (2003), Bouoiyour & Selmi (2018), Krieger & Chen (2015), Wang (2013), Rauh & Schneider (2013), Chen et al., (2010), El-Gazzar et al., (2009), Cam (2008), Da-Silva Rocha & Figueiredo Pinto (2006), Drakos (2004), Kim & Gu (2004), Goodrich (2002), Karels (1989).
Topic area
New method to predict share price
Methods
Component Analysis (PCA), two-stage (operational and stock market indicators) network data envelopment analysis process, the binomial option pricing model, Black-Scholes model, discounted cash flow (DCF) methodology, developing a framework introduces the concept of acquisition and valuation risks, Multiple Objective Linear Programming (MOLP) optimization model, integrated approach based on genetic fuzzy systems (GFS) and artificial neural networks (ANN) for constructing a stock price forecasting expert system, contingent claims valuation model, the real options framework to a multi-stage investment in the aerospace maintenance, repair, and overhaul (MRO) industry
Main finding
It is claimed that it can assist practitioners in determining the profitability potential of an aircraft type. Moreover, it is beneficial in complementing the purchase or lease decisions of airlines as well as providing them with the appropriate retirement age. New models are of great interest for financial managers at airline companies. First, the understanding of how the capital markets value a company, acknowledging the existence and strategic significance of intangible assets, is of great relevance for all managers looking at the financial markets as an opportunity for future financing. Second, assessments on the financial value created are necessary for all major resource-allocation decisions. In these regards, the paper provides evidence of what factors are perceived as being more important by financial investors, therefore more appealing, on average, to external providers of capital. This is even more important in a historical context when many changes have significantly re-shaped the aviation industry, and following the global trend of privatization, many airlines and airports are now operated by private companies, which usually rely on stock markets for financing. In conclusion we found that several value drivers supply interesting and some counter-intuitive effects on the valuation mechanism of firms belonging to the aviation industry. Furthermore, studies in this category explain theoretical reasons why and when firms can practice revenue management. Finally, new methods could assist project and investment appraisal decision making in the airline industry to support better capital investment decision making in the future.
Future Studies
Future studies are encouraged to apply feature selection with optimization algorithms. Also, the combination of deep learning and SoftMax or support vector regression for the stock price prediction problem would be in interest.

Study
Zheng & He (2021); Zhang et al., (2021); Nikulina & Tarasova, (2021); Vasigh et al., (2020), Golbeck & Linetsky (2013), Malighetti et al., (2011), Ng (2007), Escobari (2014), Kalyebara & Ahmed (2012), Minja (2011), Hadavandi et al., (2010), Guzhva et al., (2010), Oum & Zhang (2004), Miller & Park (2004).
Topic area
Health crisis
Impact variable
Covid 19, SARS
Method
Event study, GARCH model, panel data,
Main finding
Studies in this category are mainly to analyze and understand any pandemic's effect on stock prices. It is claimed that sensitivity of firms' cash flows to lockdowns during pandemics depends on their cost structure. Although fear grips stock markets when a pandemic like Covid-19 strikes, severely affecting stock prices. However, fundamental value drivers of companies do not change drastically during pandemics. It is also found that firms with past characteristics of larger size, more leverage, more cash flows, less ROA, and more internationalization are more resilient to stock declines reacting to Covid-19, larger firms with greater cash reserves and higher market-to-book ratios experienced less negative returns, while firms with greater leverage were penalized more. In such a situation, the government is at an intersection whether to provide financial support or guarantee existing debt, or to believe in market mechanisms and let the airline firms file for bankruptcy. Therefore, findings call for immediate policy designs to alleviate the impact of the pandemic in the airline industry around the globe. To back up the airline industry, several alleviation policies may deal with mergers and acquisitions, tax policy, and government subsidies. These policies, of course, will increase the national debt.
Future Studies
Likewise political and economic crisis, critical heath situations are not controlled by airline companies. Future research could focus on developing a guidance for the investors on how to response to disasters. Further, more empirical evidence is demanded to design an intervention policy guideline for regulators, policy makers and industry practitioners in better react to events such as noble Covid-19 pandemic. The important aspect which has been reported as limitation of studies in this theme, is to strive to minimize limitations by developing new models and enlarge the sample to generalize the results. Future research is also encouraged to investigate how stocks in other countries have been affected and try to explain cross-country differences in responses based on the industrial structures, the level of development, and macroeconomic policy responses.
Study
Mohanty & Mishra (2021); Deb (2021), Singh & Shaik (2021), Thorbecke (2020), Carter et al., (2021), Maneenop & Kotcharin (2020), Liew (2020), Zheng & He (2021), Das & Mahapatra (2020).

2.5 Summary, implications, and future research avenues

This study sought to investigate the current state of research on the value of firms in the air transport context. We adopted a specific perspective to achieve the study objectives, namely, identifying and classifying the related academic products. We selected 173 peer-reviewed articles published in the WoS & Scopus databases as our sample dataset for further investigation. Specifically, we first identify trends in the number of publications by year, the most productive journals, the country of author's affiliation along with co-authorship and keyword co-occurrence analysis.

Secondly, by contrasting and scrutinizing our sampled papers, we identify the main discussed themes as the determinants of firm value. The study contributes to the literature by providing, to the best of our knowledge, the first systematic review of firm value in the air transport context based on sampled publications to describe and disseminate the discussion on the topic. It also brings together various literature streams. This topic is especially in demand due to the recent Covid-19 pandemic which has highlighted the importance of valuation for corporations. The pandemic has also driven a radical shift in scholarly productions centring on the value issue for airlines. The Journal of Air Transport Management (with 23 papers and 126 citations) is the most frequent, and the most cited, journal. The geographical scope analysis for the authors' affiliation shows the USA (62 papers) as the highest-contributing country, followed by China (30 papers). As far as co-authorship among authors is concerned, Zhang A et al. were the biggest cluster of authors working closely together. However, most authors in this field tend to work separately.

The keyword co-occurrence analysis reveals that *airline* is the top-most frequently cited keyword among terms in this context. Also, it is worth mentioning that in recent years, scholars have used new keywords, such as *firm value*, *financial markets*, *environmental economics***,** and *Covid-19* to introduce the topic. In regard with the thematic analysis, we find that the largest number of studies examine the firm level factors influencing value. The second largest group of papers investigate the effect of changes in the political and economic situation on its market value. These contributions suggest that variations in factors such as political instability, terror attacks, oil price shocks and jet fuel prices may lead to market volatility. Also, issues related to sustainability are the third most popular theme for researchers. Based on the findings of these studies, drastic stock market reaction is to be expected due to any changes in the level of corporate environmental, social and governance responsibility of airlines. Issues related to customer and marketing strategy, health threats, and firm-industry level value determinants are the found to be the other main themes in our dataset.

2.5.1 Study implications

This paper contributes to both the wide-ranging academic debate and practice perspectives. From an academic point of view, and despite the importance of valuation issues for the firms, contributions in the tourism literature (including airline context), remain scant. Considering the inadequacy of review investigations as a response to an evident need, our study approaches the issue objectively in collecting the data from reputable journals in the WoS & Scopus databases which ensures the quality of the papers reviewed. By doing so, we contribute to identifying and classifying the important value driver and influencer factors. This helps to fill this gap and bring new insights by overviewing the relevant literature trends through synthesis of the available documents. Additionally, focusing on the airline industry which is one of the most important and rapidly growing industries, could provide with significant first-hand insight to the current body of knowledge. To conclude, adding an in-depth systemic tendency to the wide divergent literature available in the field could benefit future researchers that are interested in air transportation business valuation and analysis.

This led us to the second theoretical contribution of this study which is the categorization of available research on the topic of firm value in this context. Future researchers can find support on each of the concepts categorized among the analysed documents. Our classification of the literature uniquely offers readers a comprehensive perspective on the literature. We theoretically document the concept of firm value and then collect related studies offering insights on factors related to the firm value in each corresponding theme. We conclude by discussing the potential future research avenues for each theme. This approach enables a novel focus on the topic by identifying major value determinants and relationships between them to extend the understanding of the existing state of research. The empirical findings confirm the theoretically anticipated firm-level financial and non-financial value drivers as well as external factors influencing the market value. For this research theme, we detect the significant change in academic contribution for the last decades. We observe that now-day contributions have turned their attention from classic external and internal value drivers to modern corporate social responsibility issues. To this end, the research themes identified can help academics to understand and identify the main actors discussing firm value and to take advantage of the aggregation of existing knowledge on the topic.

Similarly, the review results are also of practical relevance for airline managers since systematic literature reviews can provide a reliable basis to formulate decisions and take actions (Tranfield et al. 2003). On this basis, executives may also use the results to see how the issue is treated in the literature and benefit from the empirical results for setting business strategy and decision-making. Large-scale operations of airlines are accompanied by a high-level of use of resources, and every major decision has an implication for a firm's financial performance, which will be reflected in its share value. This is understandable given

that firms' resources are scarce and need to be applied efficiently. Further, these companies also should bear in mind the profile and offering of their competitors to customers (Chih et al. 2021). In practice, however, there is evidence that the current business strategy of airlines is ineffective. It is reported that most airline companies experience low revenues which prevents the industry from expanding, business model modification is vital to meet the sustainable growth (Nzuva 2020). Therefore, our study could provide the industry practitioners with ongoing academic discussion to update the knowledge. Based on our understanding of the studies reviewed, we suggest that major changes in an airlines' value are due to quite recent phenomenon such as unexpected events and how to protect it at that crisis time. Notably, the theme has gained attention after proposing Seventeen United Nations Sustainable Development Goals (SDGs) in 2015 which entail committing financial resources to procuring eco-friendly equipment, launching higher standards for products, and developing safety settings collectively as corporation framework for "shift the world on to a sustainable and resilient path". The trend seems to be more popular with the outbreak of the Covid-19 pandemic, where stakeholders and institutional investors are looking for sustainable profit-making shares and protect their wealth. Consequently, airline managers and industry decision makers are acknowledged on the recent preference alteration toward importance of sustainable development strategies to show their commitment to stakeholders' benefits and maximize their wealth. This transformation also provides an opportunity to initiate sustainable development strategy, which may protect the industry against unforeseen events such as health crisis (e.g. current pandemic and SARS), international political and economic instability (e.g. the global financial crisis in 2008, terror attacks such as the September 11 attack, etc). In this sense, our findings provide insights for managers considering allocating available resources to sustainability activities through adopting more efficient and robust approaches which consider the firm's characteristics in terms of its business model and ownership structure. For instance, on the investment on renewable resources, there are opportunities to reduce energy consumption with more fuel-efficient aircraft technology, more direct flight patterns, and aircraft movements throughout the flight cycle. This may also lead to enhancement in market competitiveness by bringing advanced climate change policies and promote transparency to shareholders to increase their trust. We suggest that managers consider these factors to act proactively under economic turbulence rather than taking a reactive approach. This could also apply to policy makers since they, together with airline stakeholders are facing the issues related to sustainability. In this sense, requiring firms to invest more in such initiatives could provide a common benefit, not only for the firm, but also for society in the long-term.

2.5.2 Limitations and future research

Since systematic review is essentially selective, observational, and retrospective, our study has several limitations. First, the search terms used cannot be assumed to be fully comprehensive and capture all

relevant academic articles. This is because a broad range of keywords have been used by researchers in the literature. We restricted the search to the definite and the most probable keywords to capture the most relevant studies. Therefore, it is almost impossible to cover the state of the field over time in a single study. To address the issue, future research may use a literature-exploration algorithm to find an almost overwhelming number of matching documents on a research topic. The second limitation is that we considered only articles published in the WoS and Scopus databases in this study. Future reviews should include articles published in other databases such as journal citation reports (JCR).

Third, within the papers found in the review, several studies were recognized as directly unrelated and removed from the study. Future studies may need to broaden the scope of the investigation in this context. Such a studies can be improved by investigation and assessing of advanced-metamodels from other contexts and compliance with new techniques to be utilized (Binsuwadan et al. 2021). Additionally, due to the current outbreak of Covid-19 and the questions it raised about valuation, contributions to measure the effectiveness of preserving actions to get through the crisis such as cutting the capacity to reduce costs, relief on taxes and charges by governments, and to propose proactive strategies for policymakers to deal with fluctuating oil prices, seems necessary. In particular, more dedication is required in investigating the effectiveness of fiscal policies to prevent exposures to oil-related sectors such as air transport industry. Furthermore, given that most studies in the literature concentrate on one or a few airlines, more studies could be carried out focusing bigger samples to comply with the variety of firms. Finally, findings of theme analyses may encourage more investigations toward sustainable value drivers as a promising area of research. Clearly additional contributions to providing significant information for understanding sustainable development agenda in recognition of firm value are needed for a sustainable future of air transport industry.

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FIRM VALUE AND PERFORMANCE ANALYSIS: IMPACT AND IMPLICATIONS OF IMPLEMENTING SUSTAINABILITY INITIATIVES FOR THE AIRLINE INDUSTRY
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Chapter 3

The impact of sustainability activities on firm value and financial performance in the air transport industry

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3. Chapter 3. The impact of sustainability activities on firm value and financial performance in the air transport industry

Empirical Paper

Impact of Sustainability on Firm Value and Financial Performance in the Air Transport Industry

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3.1 Introduction

The Air transport is considered as one of the most popular, rapidly growing industries, offering a broad range of services and community benefits. It provides a service to every country in the world and has played an integral role in the creation of a global economy. The industry is a major economic force, in terms of both operations and impacts on related industries, such as aircraft manufacturing and tourism (Belobaba et al., 2009). Consequently, air transportation has attracted the intensity of attention not only from people directly involved in the business, but also from financial and industrial experts. However, the airline sector is also regarded as a challenging industry in terms of its environmental impacts and contribution to global climate change, basically through burning fossil fuels and releasing pollutant gases into the atmosphere. Aircrafts generate carbon dioxide (CO2), which is the main greenhouse gas that directly discharges into the air. According to an air transport action group report, worldwide flights emitted around 895 million tons of CO2, which is roughly 2% of man-made carbon emissions (ATAG, 2018). Recently, as awareness of corporate responsibility and business ethics has increased, the development of long-term strategies and investments to achieve a sustainable industry has been a key to guaranteeing the future of air cargo (IATA, 2020). Both investors and consumers are also attracted by the role of environmental and social issues, as they increasingly support and empower businesses with regards to keeping shares and products more sustainable. Therefore, airlines are aligning themselves by integrating socially responsible aspects into their business practices for the purpose of sustainable development and competition (Campbell, 2007).

Environmental, social and governance (ESG) scores have appeared as an important pillar of corporate social responsibility (CSR) for development of sustainable strategies that affect the financial performance of multinational firms (Eccles & Serafeim, 2013; Duque-Grisales & Aguilera-Caracuel, 2019). Firms are interested in finding out the answer for whether promoting environmental, societal and managerial product

can also lead to beneficial economic outcomes for the related business. The possibility of financial impetus along with long term healthy financial and organizational structure as well as favorable public image, are sufficient to motivate companies to move forward on achieving sustainability. Especially, the beginning of the financial crisis in 2008, led to a positive shift in capital market attitudes toward corporate sustainability (Escrig-Olmedo et al., 2019). It seems that investors in general term are sensitized to how a firm deal with its responsibility towards this key stakeholder, putting higher value on companies which are seen to be more concerned about their relations with this corporate sustainability stakeholder (Qiu et al., 2016). The issue is even more complicated for companies operating in tourism and hospitality industry. Most recently, Su & Chen (2020) find that due to the characteristic intrinsic to the hospitality industry, financial performance of hospitality firms is more sensitive to addition or deletion events, when compared with the performance of non-hospitality firms. Having the exact estimation of fluctuation in value and financial performance, offers a deeper insight for the tourism related companies to assess their vulnerability in unexpected scenarios such as current turbulent time of Covid-19, in which companies have faced rapid decline in the performance and share prices (Liew, 2020).

There has been an active debate questioning financial relevancy of sustainability initiatives proposing theory and empirical approaches to deal with the topic. Despite of the development of research in the tourism literature, the consequences of implementing sustainability measures is still controversial and scant (Eccles & Serafeim, 2013; Eliwa et al., 2019). Associated studies use corporate social responsibility (CSR), and ESG (in some studies both have been used interchangeably (e.g. Eliwa et al., 2019) as representative of sustainability performance as well as Tobin's Q as financial performance measure. Some suggest that ESG practices have a positive impact on firm's performance (Fatemi et al., 2018; Ferrell et al., 2016). However, some studies conclude that a firm's financial performance is negatively charged by ESGs (Lee et al., 2009).

In attempt to enrich the tourism and sustainability literature, the current study investigates the firm's value and sustainability performance for a sample of airlines. We address the impact of environmental, social and governance disclosures (ESGs) in three aspects: first, in what is likely to be the first study, we separately study the ESG components to find out if a firm's ESGs play a significant role in promoting the gap between market-to-book value as a sign of financial distress. Second, we check whether the airlines' financial performance is charged by disclosure of these sustainability practices. In prior studies (e.g. Lee et al., 2009;Yang & Baasandorj 2017; among others), return on assets (ROA) was considered as current financial performance of the firms, while in this research we specifically concentrate on airlines' value along with Tobin's Q as the measure for financial performance. Market-to-Book ratio and Tobin's Q provide a good tool of comparison as they take into account market value of firms (Goodman, 1995). Third, we also define

a dummy of airline types, i.e., full-service, and low-cost carriers, to test whether these two sub-sets are needed to be investigated separately. The review of the contemporary research in the air transport domain highlights an importance of conducting this type of study, especially the importance of empirical studies, when trying to understand the evolving literature and its links to financial performance.

The paper proceeds as follows. Section 2 reviews the relevant literature and presents the main hypotheses that we test. Section 3 details the data and sample selection, study variables and model specification. Section 4 presents the empirical findings. Section 5 discusses and the results and finally, section 6 provides the study implications, limitations, and some suggestions for future research.

3.2 Literature review

3.2.1 A review of sustainability research

We begin our review with a brief discussion on the evolution of sustainability. Sustainability per se is an ambiguous concept, with no single definition to refer to its goals, dimensions and implications (Goodman, 1995; Eden, 2000). There is also no single representative index and reporting framework for the concept, as a set of qualitative and quantitative indices have been developed to measure the state of sustainability of the business unit (Korhonen, 2003), and it is hard to assess the impact of these standards on policy making and moving forward sustainability (Hák et al., 2018). The concept was first applied in forestry as a policy, indicating that harvesting has to be less than forest yield in new growth (Hák et al., 2018; Wiersum, 1995). It was introduced as a technique of how to deal with natural resources to avoid extinction and preserve them for future generations. The issue was formulated in today's form by the World Commission on Environment and Development (WCED) report known as "Our Common Future" or "Brundtland Report" in 1987. The report demonstrates the way in which human survival and well-being could depend on successes in raising sustainable development to a global ethic by calling for international awareness and action in respect of population, food, plant and animal species, energy, industry and urban settlements (WCED, 1987). It also provides the first comprehensive definition of the sustainable development agenda as "meet the needs of the present without compromising the ability of future generations to meet their own needs". In this context, firms and industries represent a big catalyst for change by paying serious attention to sustainability issues. It is said that emphasis on sustainability assists companies to better manage their social and environmental impacts as well as improving their operational efficiency and natural resource stewardship, which are a vital element in their relations with shareholder, employee, and stakeholders (Starbuck et al., 2014). From this perspective, the Global Sustainability Standards Board (GSSB) sought ways to place global development on a sustainable path and set up a sustainability reporting framework (promoted by GRI standards) as a practice to assess the economic, environmental, and social contributions of a firm. Presented

as Triple Bottom Line Reporting, the GRI program provides tools to evaluate the ethnical basis of an organization's corporate social responsibility (CSR) sustainability programs, where in this framework companies are required to report results of stakeholder engagement in five economic, environmental, social, society and product responsibility performance indicators (Wilburn & Wilburn, 2013).

On this basis, CSR became widely used to address the actions that firms are asked to take on a sustainability perspective. The term was first formalized by (Bowen, 1953) as a set of the obligations to pursue politics or to follow lines of action in decision-making which are desirable in terms of objectives and values of society. In other words, CSR is as a voluntary corporate commitment to exceed the explicit and implicit obligations imposed on a company, based on society's expectations of conventional corporate behavior (Falck & Heblich, 2007). This means that companies are required to contribute to sustainable development by developing corporate strategies that integrate sustainable practices into their activities with the aim of achieving corporate sustainability (Escrig-Olmedo et al., 2019). This corporate sustainability by itself is defined as corporate activities which proactively seek to assist sustainability equilibria, including the economic, environmental, and social dimensions over time. It also addresses the company's operations and productions, management and strategy, organizational units, marketing and communications with its stakeholders (Falck & Heblich, 2007; Qiu et al., 2016).

Another aspect of particular interest that it is worth noting is that there seems to be a high tendency for investors to have a firm's sustainability performance in place. Thereby, they become interested in sustainability issues and firms' environmental footprints in their investment decisions. Investors are keen to follow the degree to which firms exhibit a sense of social responsibility, and their corporate governance. Specifically, this trend became popular after the United Nations introduced the principles for responsible investment (PRI) program for organizations and researchers interested in sustainability issues in 2005. The goal of the program is for investors to consider and implement responsible environmental, social and governance factors in their investments in stocks, fixed income, private equity, hedge funds, and real assets (Hill, 2020). The PRI has developed an initiative, a signatory-based system where participants can access guides, data, reporting and assessment tools to communicate their progress in sustainability dimensions. So far, it has been signed by 2000 investment managers with $80 trillion in assets under management (Hill, 2020). These standards have been formulated in three areas, being jointly captured by the most recent sustainability acronym, ESG (Gillan et al., 2010). The ESG includes a variety of issues associated with the environment (e.g. climate change), social responsibility (e.g. human rights) and corporate governance (e.g. shareholder protection) (Lagasio & Cucari, 2019). It is refers to the three central factors in measuring sustainability impact of an investment in a company, which makes it possible for a firm to participate in individual Env, Soc and Gov activities at different levels (Eccles & Serafeim, 2013; Lagasio & Cucari, 2019). The term has been

studied well at the literature to investigate financial decisions associated with its involvement. This domain has covered a wide variety of topics such as effects on information asymmetry, cost of capital and capital structure of firms (Benlemlih, 2017).

3.2.2 Sustainability in the air transport industry

The airline industry is a major economic force in terms of its operations and impacts on related businesses, such as aircraft manufacturing and tourism (Belobaba et al., 2009). Moreover, it also has considerable environmental impacts on the global context (Mak & Chan, 2006). The good news is that achieving sustainability in the context of air transport can be done, although it will have costs (Forsyth, 2011). Although very slowly, airlines (along with all industries) started to launch environmental, social and governance initiatives, collectively known as ESG factors, and to report their performance (Cowper-Smith & Grosbois, 2011). The ESG factor forms a new accountability measure reflecting a voluntary commitment to non-financial goals (Arayssi & Jizi, 2019). However, the air transport industry's participation in ESG activities is still low (Lee et al., 2013; Seo et al., 2015; Arayssi & Jizi, 2019). Recently, it has been seen that 38% of the top 100 airlines publish a corporate sustainability report, including six airlines which integrate their presentation of corporate sustainability reporting in their overall annual report, and three airlines which publish an environmental report (Heeres et al., 2018). This participation rate has motivated academicians in the tourism field to investigate the consequence of implementing these initiatives for firms' operations. The trend is more evident as more tourism researchers have shown a growing interest in sustainability performance (Lee et al., 2009; Heeres et al., 2018). This scholarly attention has been paid to measuring the association between ESG practices and the financial performance of firms providing products and services in the tourism industry. Lee et al., (2013), Inoue & Lee (2011) and Park & Lee (2009), are just a sample of these studies investigating the impact of ESGs on the financial performance of airlines, hotels, restaurants and casinos.

It is shown that while ESG activities may decrease short-term financial performances of airlines, they can cause significant positive effects on the overall financial performance of air carriers (Lee et al., 2009; Lee et al. 2013; Park & Lee, 2009). We summarized the scholarly research conducted and models used regarding sustainability issues in the aviation context. As can be seen from Table 3.1, these studies have been found through the search in Scopus, Web of Science and Google Scholar and reviewed by theme, and methodology used. Based on the results, we see that the existing research could be divided into two main classes: conceptual research and empirical research. With respect to air transport and tourism industry in general, as also pointed by Lee & Park, (2010) and Knutson (2006), studies associated with the sustainability issues are largely conceptual and explanatory. In these contributions, essential aspects of CSR have been recognized in order to

be incorporated into the firm's strategy and practices. In one of the most recent works Amankwah-amoah (2020) argue the new contemporary issue related to Covid-19 pandemic and adopting challenges to develop these sustainability initiatives at the firm-level. The review also indicates that the empirical studies that have been carried out in the context have been spare. As for the empirical class, studies have been trying to discuss the linkage between sustainability issues with financial performance. Considering the inadequacy of empirical investigations of as an apparent need, our study contributes to filling the gap and bring new insights by offering the broader framework to link the disclosure of ESG pillars separately with subsequent market valuation and financial performance which especially for the prior, we did not find the similar study.

Table 3.1 Summary of the scholarly conducted research and models used regarding sustainability performance in the aviation

Author	Title	Journal	Methodology	Key Findings
Coles et al., (2014)	Corporate Social Responsibility (CSR) among EU low-fares airlines	Journal of Sustainable Tourism	Content analysis	There are more CSR activities than is made public & very few low-fare airlines had conducted a systemic audit of CSR-related activities.
Tsai and Hsu (2008)	CSR and cost assessment in the airline industry	Journal of Air Transport Management	A hybrid models to select optimal aviation CSR programs and the costs of those programs	This study offers a hybrid model to help the airline industry solve the problem of selection decisions and costs evaluation of CSR programs.

Wang et al., (2015)	Evaluating CSR of airlines	Journal of Air Transport Management	Entropy weight and grey relation analysis	The finding is twofold. First, On-time performance, accident rate, flight frequency, growth of employees' revenue, and employees' revenue are relatively most important measures of CSR in eight major Chinese airlines. And second, most of the larger stat-controlled airlines perform better in CSR measures.
Seo et al. (2015)	Synergy of CSR and service quality among airlines	Journal of Air Transport Management	Panel Data	A positive synergistic effect of service quality and CSR for full-services, as well as, a negative synergistic effect of service quality and CSR for low-cost airlines.
Arjomandi and Seufert (2014)	Evaluating technical and environmental performance of airlines	Economic Modelling	data envelopment analysis (DEA)	Technically efficient airlines are from China and North Asia, whilst, many of the best environmental performers are from Europe.

Lee et al. (2013)	CSR and firm performance in the airline industry with control for moderating role of oil prices	Tourism Management	Panel Data	Findings support a positive main effect from operation-related (OR) CSR activities on firm performance. Also, a positive moderating effect of oil prices on the relationship between OR CSR dimension.
Amaeshi and Crane (2006)	Stakeholder Engagement: A mechanism for Sustainable Aviation	Corporate social responsibility and environmental management	Conceptual	The study provides a stakeholder engagement framework to support airport companies in formulating and implementing strategies for sustainable airport development and suggests a practice guide to operationalize the framework.
Hagmann et al., 2015)	Exploring the green image of airlines: Passenger perceptions and airline choice	Journal of Air Transport Management	Questionnaire quantitative method	The green image of airlines does influence airline choice during booking. It has been also observed that a passenger willingness to pay extra for a green image, however, not as much as their willingness to pay extra for amenities, such as additional legroom.
Lee and Park (2010)	Financial impact of CSR on Airlines	Journal of Hospitality and Tourism Research	Multiple regression analysis	Results support for a positive and linear impact of CSR on value performance but not on accounting performance for airline companies.
Yang & Baasandorj (2017)	CSR and financial performance	Finance Research Letters	Panel Data	CSR increases current and expected financial performance of both full-service and low-cost airlines.

Amankwah-amoah (2020)	New challenges of environmental sustainability of global airline industry due to Covid-19	Cleaner Production	Conceptual	Some airlines are sought to sidestep environmentally friendly commitments to overcome new challenges such as cost pressure and survival threat.

Source: Compiled by authors based on scholarly search in Scopus, WOS and Google Scholar.

3.2.3 Hypothesis development

There are three major strands of research regarding corporate sustainability and firm value: the resource-based view, the legitimacy theory and the stakeholder theory (Lopatta & Kaspereit, 2014). First, the resource-based view of the company is seen as the firm's competitive advantage tools. These resources are any assets that a firm employs which help it to achieve goals or record the best performance in its key success factors (Lopatta & Kaspereit, 2014; Bryson et al., 2007). From this perspective, a firm's sources of competitive advantages are a set of tangible and intangible basic resources that come together coherently to enable the organization to attain its goals (Barrutia & Echebarria, 2015). In a rational market, ESG pillar score disclosure may bring firms a competitive advantage (Barrutia & Echebarria, 2015; Porter & Kramer, 2006; Xie et al., 2019). Second, according to the legitimacy theory it is not possible to separate society, politics, and economics. This means that the political, social and institutional frameworks have to be considered in economic activities (Deegan, 2002). The idea is comprehensively defined by (Suchman, 1995) as "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions". On this basis, if shareholders perceive that a firm's performance is not sustainable, the company's legitimacy is under threat and risky for long-term survival of the firm (Davis, 1973). This implies that the company's ability to do business depends on the public image in society. As most investors are unable to individually assess the sustainability of a firm, they rely on ESG pillar scores as an indicator of its legitimacy and ethical business practices provided by sustainability rating agencies (Drempetic et al., 2019). Thus, participation in ESG activities could be a tool by means of which a firm can gain social legitimacy for environmental, social and governance impacts of its operations. Third, the stakeholder theory focuses on the relationship between a firm and all bodies involved in its business domain, including customers, investors, community, etc. (Freeman & David, 1983) defined the concept as all those who can affect, or are affected by the achievement of organizational objectives. Based on this theory, an organization has to work to satisfy its stakeholders. If it manages to successfully meet the demands of its stakeholders, organizational sustainability will be achieved. Therefore, as (Garvare & Johansson, 2010) noted, "Global sustainability

will be promoted if organizational sustainability is achieved without compromising the ability of interested parties to meet their needs, both present and future".

Building on this research background, in this study the aim is to test whether a firm's ESG pillar scores influence its value and financial performance in the air transport context. To do so, we employ the market-to-book ratio as proxy of the company´s value defined as price of equity divided by its book value. Over the course of time, firms are expected to grow and achieve higher profit records, therefore the book value no longer defines the real value as there would be an important gap between book and market value of equity. Fama-French´s three-factor model is one of the most well-known tools in asset pricing theory addressing the issue. They argue that market-to-book effect is among the facts that cannot be explained in the capital asset pricing model (CAPM), but it can be captured by their proposed model (Fama & French, 1996). Fama-French introduced the market-to-book effect as a behavioral anomaly. Based on this effect, they discovered that firms with low ratio (a low stock price relative to book value) tend to be persistently distressed. Conversely, high value (a high stock price relative to book value) is associated with sustained strong profitability (Fama & French, 1995). In other words, a negative difference between market value and book value is an indicator of potential impairment, especially if the difference continues over time (Bini & Penman 2013). However, if the market value is higher than the book value, this shows the potential ability to generate good profits or value increase for the company and its shareholders. Adding sustainability issues to this debate, we expect that ESGs have a positive relationship with market-to-book ratio, since firms with better sustainability records tend to have higher market value above their book value. Rational investors usually tend to pay more for a company with high sustainability records, and do not hold a share of companies with a worse social reputation. On this basis, we propose the first study hypothesis as follow:

H1: Corporate environmental, social and governance pillar scores are positively related to the market-to-book ratio.

We also employ Tobin's Q as representative of a firm's financial performance to evaluate how this measure reacts with the firm's sustainability performance. In regard of the scientific literature background, the academic debate has been going on for more than 50 years to evaluate the implications of launching these standards on a firm's performance (Eliwa et al., 2019). By reviewing the argument, research yield seems to be split into two main streams. First, the encouraging view says that environmental and social responsibility can be consistent with shareholder wealth maximization as well as reaching broader societal goals. (Hill, 2020) pointed out that implementation of ESGs, through their influence on corporate financial performance and imposed risks on broader economic growth and financial market stability, will influence investment return. On the opposite side, there is a view arguing that these practices are often a manifestation of managerial agency problems inside the firm and, hence, problematic (Bini & Penman, 2013; Benabou &

Tirole, 2010; Cucari, 2019). From the empirical perspective, this has been proved in some studies with controversial results Xie et al., 2019; Eccles & Serafeim, 2013). Some research suggests that ESG activities have a positive impact on a firm's performance (Fatemi et al., 2018; Masulis & Reza, 2015). However, other studies conclude that a firm's performance is negatively charged by ESGs (Lee et al., 2009). Taking the issue in consideration more precisely, according to a survey of 132 empirical papers by (Alshehhi et al., 2018), more than 78% of these studies report a positive relationship between corporate sustainability and corporate financial performance. Based on this discussion and in accordance with related studies in the air transport industry, we also consider a positive relationship between these two categories. Also, it is worth noting that long-term sustainability can improve a firm's benefit through improved relations with stakeholders and reduced cost of conflicts with them, reputation creation and employee productivity (Lourenço et al., 2012). Therefore, we defined the second hypothesis as:

H2: Corporate environmental, social and governance pillar scores are positively associated with firm's financial performance.

3.3 Methodology

3.3.1 Data and sample selection

This study collected panel data in order to test the impact of sustainability activities on firm value and performance of airlines over the period from 2013-2019 using multiple regression analysis. This method has been widely used in prior studies (Lee et al., 2013*;* Lee and Park 2010; Lee et al., 2009).The data used in this research are drawn from Thomson Reuters Eikon database. It is largely explored for academic research and covers the most comprehensive historical financial data since the 1950s. This database also provides ESG (Economic, Social, and Governance) information on over 5,000 globally listed companies, including airlines. The Thomson Reuters ESG pillar Scores were designed to transparently and objectively measure a company's relative sustainability performance across ten themes (emissions, environmental product innovation, human rights, shareholders, etc.) based on reported company data. It should be noted that the ESG pillar scores provided by this database are an annual score for each airline ranging from 0 to 100 points. These scores are available in the database as the weighted average of the scores achieved in more than 70 key performance indicators calculated from 400 data points that make it up.

During data exploration and preparation stage, we faced some challenges as follow: first, as in almost all time series analyses, we encountered missing data values for the variables in the observation of interest. Using the mean imputation technique, we replace each of the missing values with the mean of the observed data for each airline. The advantage of using this method is that it is simple to implement, and no

observations are excluded from the model (Strike et al., 2001). Second, we also faced some data values which are significantly different from others. We identified those data points as outliers and removed them from the sample. The data are unbalanced panel data with 27 sampled worldwide airlines. For the purpose of this research, we used a range of variables regarding firm's value, financial and sustainability performance of airlines as well as six control variables. The explanation of these variables is given in the following sections.

3.3.2 Variables

3.3.2.1 Dependent variables

In this study, we employ a slightly different approach to study airlines' value as a sign of financial distress. The market-to-book ratio is used as proxy of firm´s value defined as the market value of equity divided by its book value. The ratio is an important firm-level predictor for return in all countries and in almost all categories (Cakici & Topyan 2014). Also, consistent with Lee et al., (2013; Lee et al., (2009) and Theodoulidis et al., (2017), we adopt Tobin's Q for the analysis of the relationship between sustainability measures and financial performance in the airline industry. Several definitions of Tobin's Q have been proposed in the literature; however, these different methods tend to yield similar values for Tobin's Q (Chung & Pruitt, 1994). In this study, in line with Xie et al., (2019), we used Tobin's Q as total market value divided by total assets and took the natural logarithm value to eliminate the effect of outliers.

3.3.2.2 Main variables

We employ the pillar scores for Environmental, Social and Governance dimensions as measures of the sustainability performance of airlines. The measurement is based on the rated ESG factors for each firm-year in Thomson Reuters Eikon database. The database rates three pillars based on publicly available reported information related to each dimension. The environmental pillar is concerned with a company's impact on living and non-living natural systems, including air, land, and water, as well as complete ecosystems. It reflects how well a company uses the best management practices to avoid environmental risks and capitalize on environment opportunities in order to generate long-term shareholder value. The social pillar evaluates a company's capacity to generate trust and loyalty with its workforce, customers, and society, through its commitment to develop the best working conditions. It reflects the company's reputation and the safety of its license to operate, which are key factors on determining its ability to generate long-term shareholder value. Finally, the corporate governance criteria refer to a company's systems and processes, ensuring that its board members and executives act in the interests of its long-term shareholders. It reflects a company's capacity through its use of methods and innovative practices to direct and control its rights and responsibilities through the creation of incentives, as well as checks and balances in order to

generate long-term shareholder value. These measures entail a careful process to standardize the information and guarantee that it is comparable across the entire range of companies (Thompson Reuters, 2019).

3.3.2.3 Control variables

Consistent with empirical research, the current study uses six control variables that can affect a firm's value and financial performance: profitability, leverage, dividend payout ratio, size, age, and the number of years an airline has been reporting ESG score. These control variables are used in the literature examining the effect of sustainability measures on firm performance in different industries such as banking (Miralles-Quirós et al., 2019), the restaurant context (Kim & Lee, 2020), as well as on studying companies contributing to the United Nations Global Impact (Ortas et al., 2015). Return-on-assets (ROA) is suggested as a proxy for a firm's operating profitability. It is defined as a firm's operating efficiency regardless of its financial structure. ROA is calculated by dividing a company's operating profit prior to financing costs by total assets. Firms with higher profitability are likely to achieve better market performance and consequently have more chances to make eco-friendly and sustainability investments (Miralles-Quirós et al., 2019; Waddock & Graves, 1997). Leverage (Lev) is broadly suggested in different industries to control a firm's capital structure. According to (Kraus & Litzenberger,1973), a firm's capital structure has implications for the firm's performance. The theoretical basis arising from trade-off theory implies that low-growth firms having stable cash-flows and tangible assets should consider using more debt, because they can use tax shields and would incur lower costs if distress occurs. Airlines appeared to have high average indebtedness and low turnover, therefore consistent with this characteristic, especially as some airlines have negative equity (Pires & Fernandes, 2012). They introduce the tax advantage of debt where a firm with less cost disadvantage of financial distress can actually increase debt to a certain level.

Likewise, the dividend pay-out ratio (Div) has been proposed to have an implication on a firm's financial decisions. It is considered as an illustrative channel to convey the wealth to shareholders as well as signals to investors regarding a firm's financial status (Moon et al., 2015). This is because shareholders and investors have inferior information to the firm's insiders. This asymmetry establishes a potential inaccuracy in pricing the firm's claims by market and therefore provides a positive contribution for corporate financing decisions (Klein et al., 2002). This makes investors hesitate to invest in an unbalanced information situation due to the potential increase in financial doubt. Therefore, the payout system has been proposed in corporate finance as an alarm signal of a firm's performance and financial situation in order to control the investment risk (Moon et al., 2015). Based on the study by (Gordon, 1959), the higher the dividends, the higher the firm value. Given this, we expect a positive relationship between performance and dividends. From an empirical perspective, we use the debt ratio for a firm's leverage, which is defined as total liabilities over

total assets. This is consistent with both Lee et al., (2013) and Yang & Baasandorj (2017) as they also proposed it as a control variable to consequently have an implication on an airline's value and performance. Consistent with Lee et al., (2013*);* Lee et al., (2009); Gordon (1959); Qureshi et al., (2020); Chen & Gavious, (2015), for the purpose of this study we also include firm size in our control variables. In theory, based on economies of scale, large firms perform better than small firms because large firms tend to achieve better efficiencies in their operations, including greater purchasing power and reduced costs (Lee et al., 2013; Ding et al., 2016). This control variable should be particularly relevant because of the possible appearance of scale economies related to environmentally and socially oriented investments and initiatives (Ortas et al., 2015). There are different proxies introduced for the size of the firm, in this study, following Lee et al., (2013), we used natural log of total assets. Furthermore, based on Saeidi et al., (2015) and Yang & Baasandorj (2017), firm's age has also been used to discover the effect of sustainability activities on airlines' financial performance. We consider the year in which the airline started doing business as the base to calculate the firm's age. This study also uses two initiative variables to (1) control for the number of years for which the airlines have been contributing to sustainability practices (Rep ESGs) and (2) check for airline type (TpDummy). By RepESG, we mean the difference between airlines in terms of the number of years for which they have been disclosing sustainability measures which we consider as an influential factor for the purpose of the current research. Meanwhile, TpDummy is a dummy variable to check the effect of airline type. This is important as the airlines' performance is proved to be different depending on the type of service (Heshmati et al., 2018). For this purpose, in accordance with Yang & Baasandorj (2017), we refer to Seo et al., (2015) to divide air carriers into full-service and low-cost carrier to value the dummy. In addition, we also refer to the international civil aviation organization (ICAO, 2017a) to confirm the type of some of the airlines within the sample. Table 3.2 summarizes the full list of variables used in this study.

Table 3.2 Description of variables.

Variable	Definition	Description
Dependent Variables		
MB	Market-to-Book ratio	As defined by Thomson Reuters Eikon Database, it is a security's price divided by its book value per share actual.
TQ	Tobin's Q	Tobin's Q= market value / total assets
Explanatory Variables		
Env	environmental pillar score	Thomson Reuters score for environmental disclosure.
Soc	social pillar score	Thomson Reuters score for social disclosure.
Gov	governance pillar score	Thomson Reuters score for governance disclosure.
ROA	Return-on-Assets	As defined by Thomson Reuters Eikon Database, ROA measures a company's operating efficiency regardless of its financial structure (in particular, without regard to the degree of leverage a company uses) and is calculated by dividing a company's operating profit to financing costs by total assets.

Div	Dividend pay-out ratio	Defined as the average gross dividends-common stock over 5 fiscal years divided by average of income available to common excluding extraordinary items for the sample period and is expressed as percentage.
Lev	Leverage Ratio	Defined as total liabilities over total assets.
Size	Firm Size	Natural logarithm of total assets.
Age	Firm's Age	The number of years since company's foundation (start doing business).
ESGRep	ESGs Reporting	Number of years the airline has been reporting ESG scores.
TpDummy	Type Dummy	The dummy for type of airline, i.e., whether it is full-service or low-cost one.

3.3.3 Model specification

To pursue the research hypothesis and accomplish this study's purpose, the analysis is conducted to test the effects of three environmental, social and governance sustainability performance indicators on financial distress, measured by market-to-book ratio and firm's financial performance, using Tobin's Q. Following Lee et al., (2013)*;* Lee et al., (2009) and Seo et al., (2015), panel data analysis has been applied to detect the statistical relationship between them. Panel data is a dataset in which entities are observed over time. It allows us to control for variables which cannot be observed or measured, and to account for individual heterogeneity (Baltagi, 2008). According to the hypotheses mentioned above, we formulate two independent regression equations in the following empirical models, including dependent and explanatory variables as follows:

Model 1

$$\mathrm{MB_{it}} = \alpha + \beta_1 \mathrm{Env_{it}} + \beta_2 \mathrm{Soc_{it}} + \beta_3 \mathrm{Gov_{it}} + \beta_4 \mathrm{ROA_{it}} + \beta_5 \mathrm{Div_{it}} + \beta_6 \mathrm{Lev_{it}} + \beta_7 \mathrm{Size_{it}} + \beta_8 \mathrm{Age_{it}} + \beta_9 \mathrm{RepESG_{it}} + \beta_{10} \mathrm{TpDummy_{it}} + \varepsilon_{it} \quad (1)$$

Model 2

$$\mathrm{Tobin's Q_{it}} = \alpha + \beta_1 \mathrm{Env_{it}} + \beta_2 \mathrm{Soc_{it}} + \beta_3 \mathrm{Gov_{it}} + \beta_4 \mathrm{ROA_{it}} + \beta_5 \mathrm{Div_{it}} + \beta_6 \mathrm{Lev_{it}} + \beta_7 \mathrm{Size_{it}} + \beta_8 \mathrm{Age_{it}} + \beta_9 \mathrm{RepESG_{it}} + \beta_{10} \mathrm{TpDummy_{it}} + \varepsilon_{it} \quad (2)$$

A clear strategy has been followed to select the best fit predictor for each model based on (Torres-reyna, 2010). Models were fitted in the environment of R (R Development Core Team, 2019), and RStudio (RStudio Team) using utilities in the R-package 'plm' (Croissant & Millo, 2008).Our dataset is based on a panel consisting of 27 airlines from 2013 to 2019. However, missing data mean that the effective number of observations is lower; the panel would thus be unbalanced. While running the models as an unbalanced panel, we observe the loss of a significant volume of data by R-studio (the software reduced our 27 airlines to 23). Therefore, we decided to fill in the missing values by the mean of each airline in order to keep the data. We estimated both fixed and random effect models by running the Hausman test to compare two estimators. Both fixed effect (e.g. in Yang & Baasandorj 2017, Seo et al., 2015; Theodoulidis et al., 2017)

model and random effect model (e.g. in Cucari et al., 2017; Lee et al., 2013) have been broadely used in empirical literature. The results of the test for the two models used in this study denote p-values higher than 0.05. Thus, we cannot reject the null hypothesis, and the random individual model was found to be the preferred method to pursue the study aims.

3.4 Empirical results

3.4.1 Descriptive statistics

Summary statistics for the research variables are presented in Table 3.3. The market-to-book ratio shows a mean value of 1.57, ranging from 0.38 to 3.74. This means that airlines' stock is expensive and current market value of airline assets is different from records on balance sheets. Another reason for this high ratio is because of airlines' intangible assets, where this is normally ignored in book value. Tobin's Q is distributed between 0.06 and 1.78, with a mean of 0.46 and a standard deviation of 0.73. This means that the studied airlines' replacement costs are greater than the value of their assets. Return on assets (ROA) is low, as shown, with a mean value of 0.03, indicating the sampled firms' inefficient performance in converting the invested capital into operating profit. We can also see that the sustainability related ESG pillar scores of environmental, social and governance indicators have an overall mean of 50.30. The governance pillar has the highest average score of 53.41, followed by the social pillar. This denotes that acting in the best interests of long-term shareholders is more important for board members and executives of airlines. The mean score on the environmental pillar is 44.83, showing a weakness of efforts to integrate policies and systems for environmental management in airlines. Take into account that, although the minimum score for each domain is 0 and the maximum is 100, the sample airlines never reach 100 in the entire period, with a minimum (maximum) of 0.21, 1.04 and 7.37 (95.36, 93.09 and 96.07), respectively. This highlights the large variation in sustainability performance of airlines. Dividend pay-out ratio (DIV) has a mean of 0.19 and firm leverage ratio (LEV) shows a minimum (maximum) value of 0.00 (1.20), with a mean value of 0.70. Also, it is worth noting that the RepESG shows a mean of 8.5, indicating that the participation of airlines in reporting sustainability records is less than 50% (since the Thomson Reuters started to launch ESGs in 2002, based on the time period of the study, the potential maximum number of years for each airline is 17).

Table 3.3 Summary of descriptive statistics

Var/Index	MB	TQ	ENV	SOC	GOV	LEV	ROA	DIV	SIZ	Age	RepESG
Mean	1.57	0.46	44.83	52.66	53.41	0.70	0.03	0.19	18237	39	8.5
Median	1.45	0.37	48.06	52.70	54.54	0.73	0.03	0.20	15500	44	8
Max	3.74	1.78	95.36	93.09	96.07	1.20	0.12	0.71	64529	85	18

Min	0.38	0.06	0.21	1.04	7.37	0.00	-0.06	0.00	5,092	3	1
Std. De	0.73	0.33	22.99	20.34	25.06	0.23	0.03	0.18	14115	23	4.03
Skewness	0.87	1.55	-0.39	-0.34	-0.13	-0.71	0.12	0.83	0.91	0.07	0.39
Kurtosis	0.15	2,69	-0.70	-0.09	-0.15	1.37	-0.03	0.09	0.29	-1.4	-0.72

3.4.2 Discussion of results

Prior to selecting which panel regression model to use, in order to identify potential endogenous variables, some robustness tests have to be carried out. First, we draw the correlation matrix for the study variables. In statistics, the correlation coefficient measures the strength and direction of a linear relationship between two variables. The value ranges between +1 and –1. Tables 4 and 5 summarize the correlation matrix of variables for the market-to-book ratio (Table 3.4 Correlation matrix for model with market-to-book ratio as dependent variable) and Tobin's Q panels (Table 3.5 Correlation matrix for model with Tobin's Q as dependent variable). Regarding the information provided, it is evident that there is a high correlation between the ESG dimensions. To clarify, the most relevant is that of the social pillar with the environmental score. Except for that, the absolute values for both model variables are under 0.5, indicating an absence of significant relationship between some variables. Second, as presented in Table 3.6 Variance inflation factor, this study calculated the variance inflation factor (VIF) to identify the presence of multicollinearity, e.g. whether two or more variables are highly correlated, which might affect the estimation of the regression parameters (Hair et al., 2009). It can be easily seen from the table that the test indicated no multicollinearity problems, since the variance inflation factor (VIF) results for all regression models was less than 5 (Hair et al., 2012).

Table 3.4 Correlation matrix for model with market-to-book ratio as dependent variable

	MB	**Env**	**Soc**	**Gov**	**ROA**	**Div**	**Lev**	**Size**	**Age**	**RepEsg**
MB	1									
Env	-.081 (0.27)	1								
Soc	-0.053 (0.467)	0.81 (7.67E-46) ***	1							
Gov	0.21 (0.00438)	0.35 (0.00000) ***	0.31 (0.00001) ***	1						
ROA	0.39 (2.84E-08)	-0.34 (0.00000) ***	-0.31 (0.00001) ***	-0.084 (0.25)	1					
Div	-0.11 (0.138)	-0.10 (0.166)	-0.14 (0.0548)	-0.052 (0.474)	0.06 (0.409)	1				
Lev	0.08	0.34	0.39	0.13	-0.42	-0.37	1			

	(0.275)	(0.00000) ***	(2.62E-08) ***	(0.0674)	(1.33E-09) ***	(0.00000) ***				
Size	0.075 (0.308)	0.45 (6.27E-11) ***	0.35 (0.00000) ***	0.17 (0.0219) *	0.019 (0.793)	-0.10 (0.152)	0.38 (9.42E-08) ***	1		
Age	-0.30 (0.0000361)	0.46 (3.72E-11) ***	0.36 (0.000000) ***	-0.075 (0.303)	-0.069 (0.344)	-0.11 (0.142)	0.043 (0.557)	0.32 (0.000000) ***	1	
RepESG	0.033 (0.648)	0.49 (9.81E-13) ***	0.43 (9.18E-10) ***	0.29 (0.00006) ***	0.066 (0.365)	0.081 (0.268)	-0.000 (0.998)	0.22 (0.00187) ***	0.45 (7.55E-11) ***	1

Signif. Codes: '***' if p-value < 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '.' if p-value < 0.1

Table 3.5 Correlation matrix for model with Tobin's Q as dependent variable

	TQ	**Env**	**Soc**	**Gov**	**ROA**	**Div**	**Lev**	**Size**	**Age**	**RepEsg**
TQ	1									
Env	-0.47 (9.88E-12) ***	1								
Soc	-0.44 (2.43E-10) ***	0.81 (7.67E-46) ***	1							
Gov	-0.02 (0.782)	0.35 (0.00000) ***	0.31 (0.00001) ***	1						
ROA	0.56 (4.89E-17)	-0.34 (0.00000) ***	-0.31 (0.00001) ***	-0.084 (0.25)	1					
Div	0.20 (0.00596) **	-0.10 (0.166)	-0.14 (0.0548)	-0.052 (0.474)	0.06 (0.409)	1				
Lev	-0.34 (0.000000) ***	0.34 (0.00000) ***	0.39 (2.62E-08) ***	0.13 (0.0674)	-0.42 (1.33E-09) ***	-0.37 (0.00000) ***	1			
Size	-0.19 (0.00983) **	0.45 (6.27E-11) ***	0.35 (0.00000) ***	0.17 (0.0219) *	0.019 (0.793)	-0.10 (0.152)	0.38 (9.42E-08) ***	1		

Age	-0.37 (0.00000) ***	0.46 (3.72E-11) ***	0.36 (0.000000) ***	-0.075 (0.303)	-0.069 (0.344)	-0.11 (0.142)	0.043 (0.557)	0.32 (0.000000) ***	1	
RepESG	-0.0096 (0.896)	0.49 (9.81E-13) ***	0.43 (9.18E-10) ***	0.29 (0.00006) ***	0.066 (0.365)	0.081 (0.268)	-0.000 (0.998)	0.22 (0.00187) ***	0.45 (7.55E-11) ***	1

Signif. Codes: '***' if p-value < 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '.' if p-value < 0.1

Table 3.6 Variance inflation factor

Panel with Market-to-Book Ratio								
Env	**Soc**	**Gov**	**ROA**	**Div**	**Lev**	**Size**	**Age**	**RepESG**
2.20	1.95	1.19	1.13	1.05	1.14	1.09	1.68	1.94
Panel with Tobin's Q								
Env	**Soc**	**Gov**	**ROA**	**Div**	**Lev**	**Size**	**Age**	**RepESG**
2.00	1.82	1.17	1.11	1.04	1.10	1.05	1.77	2.07

3.4.2.1 Panel data analysis-market-to-book ratio

Table 3.7 Empirical results for the market-to-book ratio panel presents the results of the main effects of the model with market-to-book ratio as dependent variable, which is panel I of the study. Panel I show the results of testing the model, asserting that launching sustainable standards could impact the discrepancy between the book and market values. This model considers environmental (Env) and social (Soc) and governance (Gov) pillar scores as the main explanatory variables.

The results reveal that both Env and Gov are positive but insignificantly associated with firm's market-to-book ratio, implying that an increase in both pillars leads to a higher ratio. On the basis of these findings, we find support for H1 regarding a positive relationship between each of the ESG factors with market-to-book ratio. The higher ratio suggests that airlines' effort to improve their Env and Gov pillar could be seen as a potential profit-making opportunity by investors. This is because a high market-to-book ratio means that the firm has earning growth and positive return on its assets, signifying a good enough reason to own its stock. Therefore, airlines' investment in environmental and governance practices, such as using re-usable resources, innovation, reducing emissions, management structure, shareholders maximizing benefits and implementation of a sustainability reporting strategy, may also result in a higher market-to-book ratio. Consequently, the firm is also likely to have sustained profitability. Social disclosure is negative and significant, denoting that investing in social image leads to a drawback in ratio and potentially financial distress. In contrast to environmental and governance factors, the social pillar outcome does not support H1 of the study. This result seems to be surprising given the preponderance of capital market implication of social performance and social disclosure implying that investors in general place a relatively high value on firms who are seen to be better address their social responsibilities. One reason for this could be that

investors do not weight social-based practices, such as human rights and product responsibility, as more tangible environmental and governance activities.

In term of the control variables, we did not find any significant statistical effect on market-to-book ratio. ROA and dividends negatively influence on this variable. On the contrary, size, leverage and age are found to have a positive relationship with the dependent variable. Finally, the TpDummy is not significant, showing that further dividing airlines into sub-categories of full-services and low-costs is not necessary. The result of two Env and Gov pillars and size is consistent with a paper recently conducted by Serafeim (2020), in which he also finds that companies with a higher ESG (the ESG combined score) score resulted in a higher market-to-book ratio along with a broad range of financial ratios, such as return on investment, and firm size.

Table 3.7 Empirical results for the market-to-book ratio panel I

Variables	Coefficients	z-value	p-value
Env	0.00050365	0.1639	0.86979
Soc	-0.00536202	-1.7074	0.08775.
Gov	0.00380730	1.6070	0.10805
ROA	-0.08941674	-0.0847	0.93248
Div	-0.11771785	-0.4951	0.62050
Lev	0.39616425	1.4709	0.14131
Size	0.03715850	1.0048	0.31498
Age	0.00149240	0.3195	0.74932
Rep ESG	0.00437381	0.2872	0.77393
TpDummy	-0.01922893	-0.0696	0.94451

Signif. Codes: '***' if p-value < 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '.' if p-value < 0.1

3.4.2.2 Panel data analysis-Tobin's Q

Likewise, the results of effects from the panel with Tobin's Q as dependent variable (panel II) are provided in Table 8. Panel II tests how corporate efficiency is related to sustainability activities. Like the model with the market-to-book ratio, here also the models considered the environmental (Env), social (Soc) and governance (Gov) categories as the main explanatory variables.

In line with the results of Panel I, a positive relationship is evident between the Env, Gov pillars and airline's financial performance, implying that the firm's growth in these sustainability directions improves the airline's financial performance. This is especially true for the environmental dimension, as it is double significant. Therefore, H2 of the study appears to gain support from environmental and governance dimensions, stating that both directly charge airlines' financial efficiency. Consistent with Xie et al., (2019), this result implies that airlines with environmental activities tend to be more efficient. This is especially important as, in today's highly competitive situation, employing more prudent environmental policies may provide an advantage for the airline. Put in perspective, the environmental pillar involves using renewable

resources, innovation and reducing emissions, where making progress in each will lead to more efficient operations for the airline. Regarding the renewable resources, for example, some opportunities to reduce energy consumption are suggested by (ICAO, 2017b). These suggestions include establishment of more fuel-efficient aircraft technology, more direct flight patterns and aircraft movements throughout the flight cycle. Also, for innovation and reducing emissions, Yan et al., (2016) defined technology-based (i.e. adopting novel or advanced technologies) and process-based (enhancing process efficiency in order to obtain higher utilization of capacity, simple procedures and omit resource-wasting processes) innovations for airlines, where they also prove that both innovation categories positively charge the firm's revenue. Overall, improving these three environmental initiatives leads to less fuel consumption for the airline which accounts for 25-35% of total operating costs, and brings higher financial performance consequently (Heshmati & Kim, 2016, IATA, 2014).

The same is true for the governance dimension of airlines. This perspective considers both stakeholder and shareholder-oriented pillar strategy since it covers the management, shareholders, and CSR policies of the firm. Our results show that a company's overall development in these three dimensions will also have a positive implication for its financial efficiency. This makes sense especially for the management structure of a company, which corresponds to the shareholder theory standpoint. The finding is consistent with (Hillman & Keim, 2009), where these researchers also find that a firm's investment in stakeholder management could complement shareholder value creation and consequently provide a basis for competitive advantage.

In contrast, the social pillar is negative and double significant, which is against the above-stated H2. The reason behind this outcome could be because of the costs involved in launching social policies, especially if costs failed to be covered by the benefits gained from the airline's efficiency. In other words, the airline's investment in the workforce, human rights, the community, and product responsibility seem to be an extra financial burden and not-returned, at least in the short term. Therefore, it negatively influences the financial performance of the firm. In this view, we find the result weakens the argument that social disclosure reflects the firm's strong commitment to employee and other stakeholders building competitive advantage at the market. Based on this view, investors expect that participating in societal initiatives have positive impact on growth rate of firm's future advances in bringing more cash flow. This finding is inconsistent with (Lee et al., 2013*;* Qiu et al., 2016; Xie et al., 2019). For example, Qiu et al., (2016) found that social disclosure is associated with higher efficiency and values (growth rate of future cash flow) for the firms which is contradicted with the general perception of globally investors who now care about a firm's social performance and mirroring the value attached to social screens.

Similar to Panel I, control variables appear to have no statistical significance in this panel. Leverage shows the negative impact on the dependent variable where, in comparison with Panel I, the sign is different. This seems to suggest that every increase in airlines' leverage will cause a decrease in their financial performance. On the contrary, like Panel I, size is found to have a positive relationship with Tobin's Q. Adding this result to sustainability performance, there is support from a theoretical background arguing that larger firms have a higher operational effect and are more visible in society. Therefore, the larger the size, the more capability (and eagerness) to invest in ESG issues (Qureshi et al., 2020), and a potential higher financial efficiency for the firm. Our finding is inconsistent with outcome of previous studies that also consider the size variable in examining the influence of sustainability initiatives on financial performance at the airline industry (Lee et al., 2013*;* Tsai & Hsu 2008). The possible justification for this inconsistency is dissimilarity in employed data set and model specifications. This finding, however, is in line with Yang & Baasandorj (2017), who also found the positive effect of size on financial performance. Finally, the TpDummy in this panel is not significant, showing that further dividing airlines into sub-categories of full-services and low-costs is not necessary.

Table 3.8 Results for the full panel Tobin' Q panel II

Variables	Coefficients	z-value	p-value
Env	0.0087968	2.6325	0.008477 **
Soc	-0.0102770	-3.0021	0.002681 **
Gov	0.0035723	1.3020	0.192908
ROA	-1.6335460	-1.4272	0.153514
Div	-0.1635009	-0.6208	0.534699
Lev	-0.0680228	-0.2127	0.831583
Size	0.0499891	1.1749	0.240036
Age	-0.0037735	-0.5409	0.588605
Rep ESG	0.0153358	0.8783	0.379808
TpDummy	0.1208856	0.2908	0.771181

Signif. Codes: '***' if p-value < 0 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '.' if p-value < 0.1

3.5 Discussion

The sustainability issues have recently risen in importance, in the firm's value and financial performance perspectives, among investors, academicians and even government regulators. However, to date, research on the relationship between ESG factors' performance and firm's value and financial performance has achieved limited advances in the air transport industry. More precisely, (1) from a sustainability perspective, no attention has been paid to separately analyzing the impact of ESG factors. Furthermore (2), association between sustainability performance and financial distress has not previously been studied. In order to fill these gaps, this study contributes to the tourism and sustainability literature, empirically testing the firm

value, financial performance, and sustainability performance in each ESG dimension of airlines. There are some principal differences between this article and the related research in this area. In specific, we study the impact of sustainability performance on some new aspects: we consider the ESG components to study how airlines' voluntary implementation of these standards influences their valuation by employing market-to-book ratio as a proxy of firm value as well as a sign of potential financial distress. Additionally, we added the dummy variable in account for type of airline. This is to check whether there is any significant difference in research outcome among full-service and low-cost carriers.

The empirical results show that for the exemplary companies considered in this study, in one hand, environmental and governance pillars are positively associated with a firm's market-to-book ratio and Tobin's Q in both models. We find that an increase in both pillar disclosures leads to a higher market-to-book ratio and financial performance of airlines. Based on this result, airline's attention to environmental and governance practices, such as using re-usable resources, innovation, reducing emissions and better management structure, shareholders maximizing benefits and implementation of a sustainability, makes it more attractive for the investors. The outcome particularly is in interest due to the fact that in today's highly competitive situation, employing more prudent environmental and governance policies may provide a considerable advantage for the airline.

In the other hand, paradoxically with the public perception that social activities reflect the business' strong commitment to employee and other stakeholders' benefits and consequently somehow provide competitive advantage at the market, social pillar as measured in this study, found to be negatively associated with both firm's value and its financial performance. This shows that an airline's social activities result in lower market value and level of financial performance. Regarding the control variables, ROA and dividends are negative and insignificant across the panels. Conversely, size positively charges the dependent variable in both models. Leverage and age are found to be positive in Panel I of market-to-book ratio, but both are negative in Tobin's Q panel. The dummy for type of airlines is insignificant in both panels, showing that dividing airlines into full-service and low-cost carrier categories is not necessary. Overall, constructed based on the sampled airlines and applied methodology, our findings offer the insight into the sustainability and financial performance linkage at the air transport. The outcome of this study highlights the importance of considering sustainability practices at the industry. We find the direct relationships between environmental and governance sides of ESG, but indirect for social disclosure part.

3.6 Conclusion

3.6.1 Study implications

Study findings have implications for researchers at the theoretical perspective, and airline practitioners together with policymakers from managerial perspective. In academic point of view, despite the recent developments in the tourism literature, the consequences of implementing sustainability standards on firm efficiency and performance remains controversial and scant. An issue invariably recurs in discussion about financial performance: does implementing environmental, social and governance disclosures improve firm´s financial performance? Notwithstanding, our sample and the period of time analyzed may help answer this question and enrich the body of literature. We opened up a new research line by separately relating three sustainability performance dimensions of airlines (ESGs) to their value and efficiency. The results can be considered in the development of the resource-based theory (Xie et al., 2019; Porter & Kramer, 2006; Lourenço et al., 2012), legitimacy theory (Drempetic et al., 2019) and the stakeholder theory (Freeman & David, 1983) in the evolving field of sustainability. We investigate the possible relationships linking sustainability initiatives to the value and financial performance outcomes of airlines. However, the underlying mechanism of the relationship is still poorly understood. Therefore, academics can take consideration of our findings and study different samples of airlines in different time-periods to (1) check whether the results are consistent and (2) discover the answer to why social pillars have a negative relationship with ESGs.

Second, airline industry practitioners, i.e., executives and managers, may also find these results interesting and informative in regard to their sustainability issues. Specifically, managers may consider the results of such studies in order to make the most sustainable investment and target the priorities of the firm. This makes more sense on recalling the fact that firms' resources are scarce, and they need to operate efficiently. Based on the current study´s results, holding other things constant, we suggest that an airline's investment in environmental and governance practices will be rewarded with value and efficiency opportunities in the market space. In this way, airlines' investment to provide better environmental (consistent with Xie et al., (2019)) and governance status could result in higher market-to-book ratio and revenue from invested funds. The environmental pillar involves using renewable resources, innovation and reducing emissions. With renewable resources, for example, as suggested by (ICAO, 2017b), there are some opportunities to reduce the energy consumption, such as more fuel-efficient aircraft technology, more direct flight patterns and aircraft movements throughout the flight cycle. Also, for innovation and reducing emissions, (Yan et al., 2016) defined technology-based and process-based innovations for airlines, where they also prove that improvement in both innovation categories positively charge the firm's revenue. Overall, based on our

results, improving these three environmental factors leads to less fuel consumption which accounts for 25-35% of total operating costs of airlines, and achieves higher financial performance for the firm (Heshmati & Kim, 2016, IATA 2014). In the governance perspective, initiatives in management structure of firms could be considered. Such activities may include launching independent board of directors to reduce agency costs, providing most accurate reporting system for financial and operating sections and facilitating the participation of shareholders in a firm's decisions. This may lead to enhancement of market competitiveness by bringing advanced climate change policies and guarantee the promotion of transparency toward shareholders so as to gain their trust. Finding of social disclosure also could be informative for the practitioners. Interestingly, the results indicate that investigated airlines will not have higher value and financial performance enhancement from social sustainability practices. This outcome denotes that investing in social image leads to a drawback in ratios and could be a potential sign of financial distress. Possible justification may argue that investors do not weight social-based practices as more tangible environmental and governance activities.

In summary, lack of sustainability initiatives on firm's financial records implies the need for more communication and understanding of the topic. Results of this study may encourage airline practitioners to include environmental and governance performance metrics, since it may also improve financial efficiency of the firm. Other insight is that policymakers need to see the value in improving sustainability disclosure for airline industry. By understanding these practices, they will have more comprehensive view on factors influencing shareholders' wealth maximization principles in the air transport industry.

3.6.2 Limitations and future research

This study encountered some limitations. First, the finding is applicable to just a small proportion of airlines, depending on the best ESG data available in the Eikon database. This relatively small sample size could be extended with a larger set of airlines in future research. We also recommend an in-depth analysis of both full-service and low-cost airlines. In this view, qualitative comparative analysis (QCA) could be considered. The method has been suggested by recent review study of (Cucari, 2019) to examine these sub-fields in corporate governance domain. Finally, in the future it would be interesting to expand the firm's value analysis to a larger sample, in order to investigate the reflection of airlines' value as a result of the promotion of sustainability records. Therefore, it could be interesting to make the financial distress factor available in this context, especially with regard to the recent unexpected Covid-19 pandemic.

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Chapter 4.

The role of firm characteristics in moderating association between sustainability initiatives and financial performance

UNIVERSITAT ROVIRA I VIRGILI
FIRM VALUE AND PERFORMANCE ANALYSIS: IMPACT AND IMPLICATIONS OF IMPLEMENTING SUSTAINABILITY INITIATIVES FOR THE AIRLINE INDUSTRY
Yaghoub Abdi

4. Chapter 4. The role of firm characteristics in moderating association between sustainability initiatives and financial performance

Empirical Paper

Exploring the impact of sustainability (ESG) disclosure on firm value and financial performance (FP) in airline industry: The moderating role of size and age

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4.1 Introduction

The presence of stainability standards can impact the financial status of the firm. These initiatives often entail committing financial resources to procuring eco-friendly equipment, launching high-quality standards for products, and developing safety programs (Park et al., 2017). However, despite these significant short-term costs for a firm, it can then benefit from these sustainability investments by establishing a long-term basis for survival and may enjoy success in promoting products and services (Branco & Rodrigues, 2006). Consequently, for the benefit of managers and executives, scholars have actively attempted to deliver work that addresses the consequences of sustainability initiatives on firm performance and value (Park et al., 2017). In particular, in the tourism and hospitality industry, growing number of studies focusing on the topic in providing managerial insights to better handle the issue for a firms such as airlines, hotels, restaurants and casinos (see, for example, Lee et al. 2013; Theodoulidis et al., 2017; Park and Lee 2009; Kim and Lee 2020).

Nevertheless, the literature has yet to produce an entirely consistent and conclusive study demonstrating that the result of implementing sustainability initiatives to improve the financial performance and value of the firm is any one of positive, negative, curvilinear or insignificant (Moore, 2001; Miralles-Quirós et al., 2019; Casado-Díaz et al., 2014). Therefore, more empirical work is required to investigate the economic implications of sustainability in term of various methodologies and samples (Lee et al. 2013; Park et al., 2017). Sustainability is often discussed in the context of three areas, environmental (Env), social (Soc) and governance (Gov) which are jointly captured by the acronym ESG (Gillan et al. 2010). Our first contribution is to the emerging stand of literature which suggests that ESG disclosure has a significant effect on an airline's market value and FP. Although its industry and products have been highlighted as significant factors differentiating a firm's attribute to sustainability initiatives , ones which potentially affect the empirical outcome (McWilliams & Siegel, 2001; Lee et al., 2013), very few studies specifically investigate the airline industry (e.g. Lee & Park 2010; Yang & Baasandorj, 2017). Given this gap, our second

contribution is to produce additional empirical evidence for disentangling the ESG-FP relationship which is valuable in the air transport context.

When exploring the direct association between the social and financial dimensions, a variety of firm-characteristics can potentially moderate this relationship and are crucial for investigating the topic (Rowley and Berman 2000). Among these, Roberts (1992) discussed the role of size and age as firm-level attributes which could influence the firm's contribution to sustainability activities and are likely to assist in better understanding the ESG-FP relationship. Although the significant effect of these two variables was recently tested and confirmed by D'Amato & Falivena, (2020) for a sample of Western European companies, no study has been conducted specifically for the airline industry. In addition, the sustainability literature generally neglects the type of airline. Our third contribution to the literature is, to the best of our knowledge, the first study that investigates the moderating effect of both size and age in an airline context. In particular, the topic critical for airlines since business prospects for these firms is subject to making progress in the sustainability dimension and in managing the alliance with government, industry and passengers (McManners 2016b; Daley 2010).

The objective of this study is twofold. First, it aims to explore the influence of ESG activities on FP and the value of airline firms. Second, we clarify the moderating role of size and age in the relationship between their sustainability and financial performance. For both objectives, we add to the empirical evidence on the impact of sustainability on financial performance in airline industry, adding size and age as moderators lacking in prior studies. This is critical for airlines since, as already mentioned, their business prospects are subject to progress in both sustainability and alliance management (McManners 2016b; Daley 2010). Accordingly, our study could help the executives to better allocate the firm's available resources to sustainability activities through adopting more efficient and robust approaches. Finally, we provide data by carrier type for managers of low-cost and full-service airlines when choosing among different sustainability initiatives.

The structure of this study is as follow: Section 2 provides a conceptual background of the main research; Section 3 describes the methodology, design of the sample and variables; Section 4 provides the estimation results. A Discussion is given in Section 5. The article ends with Conclusions, Implications, and Future Research Directions as Section 6.

4.2 Literature review and research hypotheses

4.2.1 ESG and firm's FP and value

Over the last few decades, firms have been adopting sustainability initiatives for a variety of reasons ranging from voluntary engagements to de-facto requirements such as moral concerns, managerial "perks", social pressure or strategic reasons (Baron 2000). These led businesses, as an indicator of their commitment to sustainability practices, to adopt such metrics in their strategies and decisions (Taherdangkoo et al. 2017). Firms are under pressure to provide an understandable metric of externalities regarding the eco-system and stakeholders (Jensen 2020). In current practice, ESG has become the most widely used measurement of sustainability standards for holding firms accountable (Howard-Grenville 2021).

Since the ultimate objective of a firm is to yield higher returns, the emerging question is how ESG reflects in its FP and value. The query has been tested in large number of empirical studies since 1972 (Margolis and Walsh 2001), these usually being justified by reference to one of several theoretical frameworks (Grosbois 2012) which explain different aspects of ESG and help empirical investigations in understanding the impact on a firm's operations. Stakeholder theory is one of such approach which focuses on the relationship between a firm and all the bodies involved in its business domain. The theory directly connects the issue of sustainability to the degree in which a corporation regards or disregards shareholder benefits (Driver and Thompson 2002; Campbell 2007). It emerged in response to the increasing need to link sustainability initiatives with a firm's interaction with its stakeholders (Diez-Cañamero et al. 2020). On this basis, the ESG score developed as being representative of the degree of a firm's integration of sustainability issues (Ferrero-Ferreroet al. 2016; Birindelli et al. 2018). By introducing ESG standards into a firm's financing strategy, stakeholders become a key driver, and ESG a key metric, of corporate social responsibility (Diez-Cañamero et al. 2020). Stakeholder theory could also provide meaningful interpretations for a firms' financial benefits (Driver and Thompson 2002). In this sense, according to Gillan et al., (2021) ESG initiatives could drive value in two ways: first, an increase in shareholder value as a result of higher cash flow levels for the firm (e.g. higher reputation helps to better sell products to customers, highly trained employees improve productivity for a firm, etc.). And second, maximizing the shareholder utility arising from owning shares of in a sustainable firm.

Another approach discussed in linking ESG-FP and value is slack resources theory. From this perspective, business directors always strive to legitimately adjust a firm's current efficiency and to have surplus assets available to address unforeseen threats or prospects for improvements. The theory proposes investigating how "slack" recourses eventually impact a firm's performance. It considers business resources in four dimensions: a firm's objective is to obtain sustainable rents (above the average of competitors); resources are unequally distributed between firms and better resource management ensures better returns; better performance could be sustained as long as it valued by the customers; finally, innovation is the source of

better performance (Taylor and Oinas 2006). From this standpoint, a firm's sources of competitive advantages are a set of tangible and intangible basic resources that come together coherently to enable the organization to reach its goals (Barrutia and Echebarria 2015). These resources are any assets that a firm employs to assist it to achieve goals or record the best performance in its key success factors (Bryson et al. 2007; Barrutia and Echebarria 2015). Therefore, according to resource-based theory, firms emphasize building competitive heterogeneity (Taylor and Oinas 2006), where their sustainability performance (ESG scores) could provide this benefit (Xie et al. 2019).

Empirically, the studies in the literature have produced mixed findings in regard to the relationship between ESG-FP or value (Gillan et al. 2021). First, most studies suggest a positive relationship between ESG, and FP and value (Pavlopoulos et al., 2019; Aouadi & Marsat, 2018; Li et al., 2018; Jo & Harjoto, 2011; Brogi & Lagasio, 2019; Okafor et al., 2021; Qureshi et al., 2020; Long et al., 2020). Based on the outcome of these studies, sustainability initiatives can assist businesses to better meet stakeholder interests (Lee et al., 2013). The second category of empirical results suggest a negative relationship between ESG-FP and value (Duque-Grisales & Aguilera-Caracuel, 2019; Moore, 2001; Buallay, 2019; Lee et al., 2009).. This negative direction is probably due to the costs related to the implementation of these initiatives which are not reflected in a FP because these practices are not performed in the correct manner or because there is not enough institutional support to render them more visible, thus not ensuring approval from stakeholders. Finally, some researchers find that there is no specific relationship between ESG-FP and value since the cost involved in these activities will be paid-off by their benefits (McWilliams et al., 1999; Lahouel et al., 2019). Studies in this category hesitate to propose any direction in the relationship and discuss misspecifications in the research design such as nature of the industry under investigation (Lee et al., 2013).

The indefinite outcome of the research on the relationship between ESG-FP highlights the need for further investigation. Additional research is required on means of minimizing the bias in measurement and empirical approaches. Notably, the impact of industry, products and firm characteristics could affect the level and type of participation in sustainability initiatives and therefore result in differing empirical outcomes (McWilliams & Siegel, 2001; Lee et al., 2013). Specifically, industry type, size and age are mentioned as firm-level attributes which could influence a firm's contribution to sustainability activities (Roberts 1992). Consideration of these could assist in better understanding the ESG-FP relationship.

4.2.2 Sustainability in the airline industry

The air transport industry plays an important role in modern history. It is associated with a variety of ideas and implications connecting leisure, recreation, social contact and cultural exchange (Daley 2010). For this reason, the industry is a major economic force in terms of its operations and impacts on related businesses,

such as aircraft manufacturing and tourism (Belobaba et al. 2009). However, it is also regarded as one of the most challenged industries in regard to environmental impact and sustainability issues. It is one of the transportations subsectors which is individually assessed for environmental impact (Dessens et al. 2014). It has been claimed that aviation is the most challenging industry in which to implement sustainability initiatives (McManners 2016a and 2016b). This is due to doubts in regard to whether environmental sustainability is compatible with financial sustainability. Particularly, air transport is considered an excellent example of the direct contradiction between sustainability and economics policies and provides a good base for investigating how airlines can balance societal initiatives in their business strategy (McManners 2016b). For airlines, financially sustainability is achievable, but environmentally sustainability poses the question of cost both on the firm and on the industry level. It means that "good policies achieve environmental sustainability at minimum cost in terms of other objectives, or equivalently, achieve the maximum environmental benefits consistent with an acceptable level of economic and financial performance" (Forsyth 2011).

The type of airline has also been the focus of studies related to linking ESG-FP such as those of Seo et al. (2015) and of Yang and Baasandorj (2017). The topic is relevant, since in the transportation industry, the nature of the operation affects the sustainability performance (Borghesi et al. 2014). Low-cost airlines are found to pursue a cost leadership strategy by efficiently allocating available resources to achieve competitive advantage, while full-service airlines follow a hybrid strategy providing high quality services as well as cost efficiency (Seo et al. 2015). However, although sustainability standards are defined based on common-sense standards in frameworks, the consequence could be different for full-service and low-cost airlines. Full-service carriers are found to be more environmentally friendly than their low-cost counterparts (Hagmann et al. 2015). This is because, for low-cost airlines, operational efficiency saving could not offset non-operational investment on sustainability initiatives (Nidumolu et al. 2009). Conversely, full-service airlines are characterized by a high to stakeholder expectation in terms of sustainability activities (Seo et al. 2015). The mixed findings on the ESG-FP association together with wide disparities in ESG participation between airlines encourages additional investigation in the industry. We, therefore, attempt to contribute to the literature by examining the influence of ESG disclosure on FP while to best of our knowledge, for the first time considering two important firm characteristics, age, and size in this context.

4.2.3 Research hypotheses

Both firm FP and value have recently attracted academic attention in assessing how the ESG initiatives impact on a firm's prospects (which is also meaningful for its value). For example, Fatemi et al. (2018) find that ESG score strengthens firm value. In the existing literature, one the one hand, firm value is influenced

by the cost of ESG undertakings. When the cost is low, a firm could achieve positive results by improving employees' productivity as well as avoiding pollution fines (Barnea and Rubin 2010). However, higher utility motivates firm insiders to invest more than value-maximizer levels (as empirically confirmed by (Videras and Owen 2006)) and therefore lowers shareholder benefits. Then, since implementing such initiatives across all dimensions is costly, a negative association is expected. The opposing view, on the other hand, highlights the value-enhancing factors of a firm's engagement in ESG. Improvement in operating efficiency (Brammer and Millington 2005), capital market benefits (Dhaliwal et al. 2011; Godfrey 2013) and risk management (Dhaliwal et al. 2012) are among proved benefits of implementing sustainability initiatives. Although both aspects provide a better understanding of the advantages and drawbacks of sustainability in relation to firm value, there is, as yet, no definite outcome for the standing association (Jo and Harjoto 2011). Malik (2014) summarizes contributions from both streams and, in agreement with the positive side, acknowledged the value-enhancing possibilities of sustainability engagement. Consequently, the expectation is that ESG has a positive impact on an airline's value.

H1. For airlines, implementing ESG initiatives have a positive relationship with firm value.

Although the literature has not yet formulate a conclusive, entirely consistent result, regarding the ESG-FP association, a large majority of the conducted research reports a positive link between them (Friede, Busch, and Bassen 2015). It is, therefore, generally believed that reasonable implementations of ESG criteria do not necessarily lead to lower returns and financial performance (Hill 2020). The core aspect of this argument is that contribution to sustainability activities promotes a firm's ethnical identity which leads to a higher stakeholder level of satisfaction and better financial performance (Okafor et al., 2021).

As for airlines, Lee and Park (2010) show that, although ESG activities may decrease short-term FP, they can result in significant positive effects on the long-term FP of air carriers. Consistent with that common belief, this study also proposes as our hypothesis H2 that there is a positive linkage between ESG-FP. Related studies for the sector have shown that while ESG activities may decrease short-term financial performance, they will cause significant positive effects on the overall long-term FP of air carriers (Lee and Park 2010; Lee et al. 2013; Yang and Baasandorj 2017). Theodoulidis et al. (2017) pointed out that the differences in the results of similar studies for airlines could be due to disparities in data and analysis methodologies.

H2. For airlines, implementing ESG have a positive relationship with FP.

Also, empirical contributions to the link between ESG-FP, have investigated their role in relationships such as business type (Seo et al. 2015); franchising strategy (Kim and Lee 2020) and oil prices (Lee et al. 2013). This study also searches for moderating roles of firm size and age. There are number of reasons as to why firm size relates to the relationship between ESG-FP. First, larger firms tend to have more available financial resources than do their smaller counterparts (Gupta 1969; D'Amato and Falivena 2020). Therefore, they are able to invest more in sustainability projects. Large firms are also considered to have a well-defined strategy and goals to monitor their business and, consequently, are in a better position to handle sustainability projects. Furthermore, a firm's visibility could be considered in this context since more visible firms seem likely to be willing to undertake better sustainability practices due to their public image among shareholders (D'Amato and Falivena 2020).

A firm's age is also considered as potential moderator of the relationship (Saeidi et al. 2015). Based on Peloza (2006), the idea is driven from the fact that managers need a kind of insurance to invest in sustainability practices. The introduction of the valuation of sustainability practices offers an insight into the cause-and-effect relationship between ESG-FP and value. On this basis, younger firms are less concerned about their public and social image and are more concentrated on financial performance. Therefore, it is expected that young firms will undertake fewer sustainability-related initiatives (Peloza 2006; Yang ad Baasandorj 2017). This view has been supported by the recent empirical work of D'Amato and Falivena (2020), who studied both variables as moderators for ESG implementation and firm value for a sample of Western European companies. They found size and age significantly moderate of the association. The current study considers size and age to be the relevant moderators in ESG-FP and value' relationship. Therefore, H3 of the study is formulated as below:

H3. In the moderation relationship of firm financial and firm value with ESG, size and age act as positive moderators.

4.3 Methodology

4.3.1 Data

The data was collected from two sources: the Thomson-Reuters Eikon database and the official websites of sampled airlines. Eikon contains sustainability measures in the form of ESG combined scores as well as separate measures for each component. It gathers relevant publicly reported information and formulates metrics based on combination of ten relevant data points reflecting the firm's sustainability activities since 2002. These data points are grouped into the three ESG dimensions (see Appendix1).

These categories are weighted based on an automated and factual logic to calculated the overall score of each dimension and the combined ESG score of the companies (Eikon 2019). While retrieving ESG data, we found that information is available for only a limited number of airlines (94 firms world-wide) and, even for these, the ESG score does not exist for all years because they started to implement sustainability standards from different years. Therefore, we selected 2009–2019 as longest period possible, leaving us with 38 ESG-rated airlines (see Appendix 2 for the basic information of sampled airline including country of headquarters, company name, stock code and date of incorporation).

Thompson-Reuters also includes the financial data for variables used in this study. However, since we again faced the missing values for financial variables, we referred to airlines' official annual reports as the second source of our data to fill absent values where possible. Before estimating the models, we checked the distributions of explanatory and control variables for normality. We detect outliers and remove them from the dataset (see supplementary file for the step-by-step detailed information about the sources and empirical procedure for filtering and collecting of used data).

4.3.2 Variables

Because the aim of this study is to investigate the consequences of ESG disclosure for airline's FP and value, the group of dependent and independent variables were identified. These variables have been commonly utilized in the levant literature (see for example Pavlopoulos et al., 2019; Aouadi & Marsat, 2018; Jo & Harjoto, 2011; Qureshi et al., 2020). In particular, with reference to the designed framework of factors affection value and financial performance of airlines by Malighetti et al., (2011), study variables are also applied for related research in this context (e.g. Lee et al. 2013; Theodoulidis, et al., 2017). In specific, market-to-book ratio is used to find out if a firm's value is affected by ESG. Both market and book values help in the determination of market sentiments for the company. Over the course of time, for firms that are expected to grow and record higher profits, the book value no longer defines the real value as there would be an important gap between book and market value. The well-known Fama-French theory introduced the market-to-book effect as a behavioural anomaly by which firms with high market-to-book (a high stock price relative to book value) tend to be persistently distressed. Conversely, low market-to-book (a low stock price relative to book value) is associated with sustained strong profitability (Fama and French 1995).

Tobin's q is widely used in the literature as representative of FP. There are different formulations of the measure but, as noted by Chung and Pruitt (1994), the yields tend to be similar. We empirically followed the approach by Xie et al, (2019) which defines the Tobin's q as total market value divided by total assets. Thompson-Reuter's ESG dimension scores are considered as sustainability performance. Env refers to the

degree by which the firm can undertake managerial initiatives to avoid environment risk and take advantage of the opportunities provided in maximizing value for its shareholders. Soc proposed that the firm use available means to build trust and loyalty to ensure long-term stakeholder benefits. Finally, Gov, is seen as an evaluative tool for the quality of its administration systems and processes.

The current study uses size and age as moderators as well as a set of control variables including return on assets (ROA), leverage and dividend ratio. In line with Yang and Baasandorj (2017) we consider the log of total assets as the firm's size. Likewise, the year in which the airline started doing business is used as the base year for calculating the firm's age. ROA is a proxy of the firm's operating profitability. It is measured as company's operating profit prior to financing costs divided by total assets. Firms with higher profitability are expected to have more chances to invest in sustainability initiatives (Waddock and Graves 1997; Kim and Lee 2020). Leverage (Lev) is another control variable widely proposed in the literature to control for the capital structure of firms. The theoretical basis for utilizing this ratio arises from trade-off theory which implies that low-growth firms with stable cash-flows and tangible assets are likely to use more debt in their capital structure. This characteristic is especially appropriate for the air transport industry which is seen to undertake high average indebtedness, low turnover and negative equity (Pires and Fernandes 2012). In accord with Lee et al. (2013), we use the debt ratio (defined as total liabilities over total assets) for a firm's leverage. The dividend ratio is considered as a channel for conveying a firm's wealth to shareholders as well as giving signals to investors regarding a firm's financial status (Moon et al. 2015). Based on Gordon (1959), higher dividends implies a higher firm value. In this sense, we expect a positive relationship between financial performance and dividends.

The current study also uses two initiative dummy variables (1) RepESGs account for the number of years for which the airline has been reporting ESGs and (2) Ctype determines the airline's business model in the full panel. A summary of variables employed is presented in Appendix 3.

4.3.3 Models

The current study uses panel data for the main analysis. Panel data analysis is a very popular form of longitudinal data in finance in order to investigate the behavior and reaction of firms (e.g. Okafor et al., 2021; Park et al., 2017; Ferrero-Ferrero et al., 2016; among others). Depending on diagnostic test outcome, it employs a fixed, random, or mixed effect model. These models have also been applied in the literature to investigate the ESG linkage with FP and value. For instance, studies such as Yang ad Baasandorj 2017; Qureshi et al. 2020; used fixed effect models, while random effects were employed in Seo et al. 2015; Kim and Lee 2020 and Lee et al. 2013). We followed the econometric strategy by Torres-reyna (2010) to verify the relevant fit predictor according to the Princeton panel data analysis. On this basis, two tests are

conducted: First, Breusch-Pagan's multiplier test (LM-test) was performed to select between Pooled-OLS or Panel-Data estimation. Second, if panel effects existed, the Hausman-Test selected between Fixed-effects and Random-effects models. The test specifies whether significant correlation exists between unobserved specific random effects and the regressors (Yaffee 2003). The methodology source and data analysis information are presented in Appendix 4. Based on our above-mentioned hypotheses, we formulated two independent regression equations in the empirical models, including dependent and explanatory variables as follows.

Model I

$$\begin{aligned} MB_{it} = \alpha + \beta_1 Env_{it} + \beta_2 Soc_{it} + \beta_3 Gov_{it} + \beta_4 ROA_{it} + \beta_5 Div_{it} + \\ \beta_6 Lev_{it} + \beta_7 Size_{it} + \beta_8 Age_{it} + \beta_9 RepESG_{it} + \beta_{10} Env * Size_{it} + \beta_{11} Soc * Size_{it} + \beta_{12} Gov * Size_i \\ + \beta_{13} Env * Age_{it} + \beta_{14} Soc * Age_{it} + \beta_{15} Gov * Age_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

Model II

$$\begin{aligned} TQ_{it} = \alpha + \beta_1 Env_{it} + \beta_2 Soc_{it} + \beta_3 Gov_{it} + \beta_4 ROA_{it} + \beta_5 Div_{it} + \\ \beta_6 Lev_{it} + \beta_7 Size_{it} + \beta_8 Age_{it} + \beta_9 RepESG_{it} + \beta_{10} Env * Size_{it} + \beta_{11} Soc * Size_{it} + \beta_{12} Gov * Size_i \\ + \beta_{13} Env * Age_{it} + \beta_{14} Soc * Age_{it} + \beta_{15} Gov * Age_{it} + \varepsilon_{it} \end{aligned} \quad (2)$$

A number of robustness tests have been proposed before executing panel regression analysis. This due to the problems that these models encounter such as outliers (biasing the regression slope) and autocorrelation (Yaffee 2003). We removed outliers and, to identify potential endogeneity among variables, we derived the correlation matrix and variance inflation factor (VIF). A correlation coefficient measures the strength and direction of a linear relationship between two variables. Table 4.1 Correlation matrix for model with market-to-book ratio as dependent variable summarizes the correlation matrix of the variables employed in this study. There is a relatively moderate correlation between the ESGs. In particular, the social and environment variables have the highest correlation. Excepting these two, the absolute values for the other variables are under 0.5, indicating an absence of significant. As for the VIF, it can be seen from Table 4.2 Variance inflation factor that, since all values are smaller than 10, we may conclude that our data do not suffer from multicollinearity.

Table 4.1 Correlation matrix for model with market-to-book ratio as dependent variable

	MB	TQ	Env	Soc	Gov	ROA	Div	Lev	Size	Age
MB	1	-								
TQ	-	1								
Env	-0.190 (0.233e03)	-0.46 (1.40e16)	1							
Soc	-0.190 (1.98e03)	-0.38 (7.35e-12)	0.78 (7.20e-63)	1						

Gov	0.0960 (1.25e01)	0.00 (8.71e-01)	0.29 (4.65e-07)	0.27 (8.46e-07)	1					
ROA	0.42 (9.60e-14)	0.57 (7.12e-31)	−0.36 (1.74e-09)	−0.31 (1.28e-07)	-0.00 (9.81e-01)	1				
Div	−0.12 (3.63e02)	0.08 (1.04e-01)	−0.03 (6.04e-01)	0.03 (5.42e-01)	0.13 (3.65e-02)	0.00 (9.12e-01)	1			
Lev	-0.11 (5.13e02)	-0.22 (1.14e-05)	0.24 (3.74e-05)	0.32 (8.43e-09)	0.15 (7.39e-03)	−0.14 (1.14e-02)	-0.20 (2.47e-04)	1		
Size	-0.14 (1.65e02)	-0.34 (1.26e-11)	0.47 (2.01e-17)	0.41 (3.84e-09)	0.23 (5.13e-05)	−0.22 (3.97e-05)	0.03 (5.71e-01)	0.25 (6.76e-07)	1	
Age	−0.12 (2.67e-02)	-0.21 (4.64e-05)	0.30 (1.27e-07)	0.27 (6.46e-07)	0.04 (4.30e-01	−0.05 (3.31e-01)	0.05 (3.03e01)	0.13 (1.16e-02)	0.19 (1.41e-04)	1

Table 4.2 Variance inflation factor

Panel with Market-to-book ratio									
Env	**Soc**	**Gov**	**ROA**	**Div**	**Lev**	**Size**	**Age**	**Ctype**	**RepESG**
2.39	1.87	1.17	1.14	1.05	1.11	1.90	1.38	1.60	1.94
Panel with Tobin's q									
Env	**Soc**	**Gov**	**ROA**	**Div**	**Lev**	**Size**	**Age**	**Ctype**	**RepESG**
2.36	1.93	1.24	1.13	1.04	1.15	1.78	1.45	1.93	2.05

4.4 Empirical results

4.4.1 Descriptive analysis

Summary statistics for the research variables are presented in Table 4.3 Summary of descriptive statistics. These data are based on an illustrative review of 4,279 firm-year observations for our 38 airlines. The market-to-book ratio ranges from 0.00 to 3.98, with a mean value of 1.45. This means that airline stock is expensive, and the current market value of airline assets is different from the balance sheet records. Another reason for this high ratio is because of airlines' intangible assets, which is normally ignored in book value. Tobin's q is distributed between 0.00 and 4.06, with a mean and standard deviation of 0.5. The high values for the sampled airlines indicate that their replacement costs are greater than the value of their assets. Return on assets (ROA) is relatively low with a mean value of 0.06, implying the sampled firms' inefficient performance in converting the invested capital into operating profit. As for the ESGs, the overall means is 48.35 which is considered an acceptable performance level. The Gov dimension has the highest average score of 50.82, followed by the Soc with 50.82. This means that, among sustainability measures, initiatives related to board members and executives are considered more often by the airlines. The mean score on the environmental variable is 42.06, showing a weakness in airlines' efforts to integrate policies and systems for environmental management.

Table 4.3 Summary of descriptive statistics

Var/Index	**MB**	**TQ**	**Env**	**Soc**	**Gov**	**Lev**	**ROA**	**Div**	**Size**	**Age**

Mean	1.45	0.5	42.06	50.82	52.18	0.70	0.06	0.16	18,237	40.16
Median	1.27	0.3	42.48	51.86	54.54	0.73	0.03	0.01	15,500	44
Max	3.98	4.6	95.36	79.88	96.07	1.20	0.91	3.29	64,529	100
Min	0.00	0.00	0.21	4.24	7.33	0.00	-0.06	0.00	5,092	1
Std. De	0.79	0.5	21.35	20.28	23.52	0.23	0.11	0.27	14,115	25.93
Skewness	0.76	3.2	-0.39	-0.22	-0.03	-0.71	4.42	4.85	0.91	0.30
Kurtosis	0.41	15.6	-0.91	-0.57	-1.02	1.37	22.76	45.85	0.29	-1.07

4.4.2 The influence of ESG on firm value

As shown in Table 4.4 Empirical results for market-to-book ratio models, the results indicate that the Gov dimension is statistically significant at the 5 percent level; supporting hypothesis H1. This is due to the tangible merit underlying Gov practices such as launching responsible leadership and independent supervision to guarantee maximizing shareholder benefits as well as implementing a sustainability reporting strategy. However, the Soc and Env dimensions are found to be insignificant but negative. This implies that a firm's efforts to build public image and eco-friendly initiatives such as utilizing re-usable resources, innovation and reduce emissions decrease their market-to-book ratio and could potentially pave the way toward financial distress. In particular, only if a firm's allocation method to these activities creates human and social capital and builds intangible assets by greater environmental efficiency, can one expect the firm to be rewarded with higher market-to-book ratio (Serafeim 2020). Therefore, H1 is not supported from these two dimensions. These result are inconsistent with Qureshi et al. (2020) which, for a set of 812 European firms, finds environmental and social disclosures to be more relevant to value than the governance score. Regarding the coefficients of the control variables, leverage, and size both are negative and significant at the 10% level of confidence.

To seek a moderation role of size and age in the existing association between sustainability initiatives and firm value, we include interaction terms between the three Env, Soc and Gov dimensions of ESG and these two variables in panels II, III and IV. Specifically, when interaction terms are added to the models, it is evident that they become considerably different in their coefficients and significances. Despite inconsistencies in the direction, we find that the size factor moderated the relationship between sustainability measures and firm value for the full set and full-service airline panels. Therefore, the relationship is significantly moderated by the size factor which supports H3. The direction for both Env and Gov dimensions is negative implying that bigger airlines' efforts to improve their value through these will have negative results. From the Gov dimension this outcome is confirmed since, for the low-cost panel which is made of relatively smaller firms in comparison to full-service airlines, the sign becomes positive. The interaction between environment and size across the panels is negative and significant (except for Low-

cost panel), which means that the relationship between environmental initiatives and airline value is moderated by company size. For bigger airlines (full-services and the full set of airlines) it is significant and negative meaning that investment in Env activities for these airlines may not be met with an increase in the market-to-book ratio.

Regarding the moderation impact of company age on the relationship between sustainability performance and firm value, we find statistically significant results only for environmental initiatives in the panel involving the full set of airlines. The moderator influences sustainability initiatives in different directions across the panels. This direction is similar for full-panel and full-service airlines since 27 out of 38 sampled airlines are categorized as full-costs. For example, the weighted moderator interaction Env*age is positive for in full panel and full-service panels which is consistent with the view that bigger and older firms have more resources available to contribute to eco-friendly activities. Overall, age is apparently not a significant moderator of the relationship between firm value and its sustainability engagement.

Table 4.4 Empirical results for market-to-book ratio models

Variables	Coefficients	t-value	p-value
Panel I	**Main Effect Model**	Fixed Effects	
Env	-0.00308120	-0.8063	0.421483
Soc	-0.00069569	-0.1889	0.850420
Gov	0.00802102	2.5296	0.012560 *
ROA	-0.98565469	-0.8566	0.393189
Lev	-0.92669272	-1.9175	0.057270 .
Div	-0.11849342	-0.5855	0.559172
Size	-0.41515995	-1.9099	0.058251 .
Age	-0.41499220	-1.4294	0.155182
RepESG	0.34945381	3.0003	0.003209 **
Panel II	**Full Panel**	Fixed-Effects	
Env	0.0971888	2.0265	0.044757 *
Soc	-0.1352667	-2.0201	0.045423 *
Gov	0.0909941	2.1965	0.029827 *
ROA	-0.5448529	-0.4662	0.641823
Lev	-1.1126794	-2.1668	0.032070 *
Div	-0.0961579	-0.4717	0.637907
Size	-0.2863860	-0.8581	0.392395
Age	-0.1547649	-0.3313	0.740933
RepESG	0.3248332	2.7406	0.006995 **
Env*Size	-0.0122752	-2.2468	0.026338 *
Soc*Size	0.0129358	1.8771	0.062745.
Gov*Size	-0.0051428	-1.2760	0.204229
Env*Age	0.0051986	0.9077	0.365719
Soc*Age	0.0025663	0.3422	0.732717
Gov*Age	-0.0093839	-1.8204	0.070991.
Panel III	**Full-Services**	Fixed-Effects	
Env	0.1752520	1.9949	0.04864 *
Soc	-0.1156538	-1.3238	0.18845
Gov	0.0692412	1.2244	0.22355
ROA	0.4738201	0.4527	0.65168
Lev	-1.3578937	-2.5580	0.01196 *

Div	0.0151438	0.0588	0.95324
Size	0.2531895	0.5092	0.61166
Age	-0.5418961	-0.9302	0.35442
RepESG	0.2737154	2.5739	0.01145 *
Env*Size	-0.0175598	-2.1889	0.03082 *
Soc*Size	0.0126794	1.5038	0.13564
Gov*Size	-0.0074265	-1.6241	0.10735
Env*Age	0.0015910	-0.2304	0.81823
Soc*Age	-0.0023289	-0.2861	0.77538
Gov*Age	0.0010822	0.1662	0.86833
Panel IV	**Low-Costs**	Pooling Model	
Env	0.238287	1.1841	0.253680
Soc	-0.546542	-3.0403	0.007796**
Gov	0.024657	0.2469	0.808123
ROA	-1.230319	-0.4633	0.649419
Lev	-0.149126	-0.2158	0.831868
Div	0.018191	0.0532	0.958253
Size	-0.578720	-0.9386	0.361868
Age	-1.077727	-0.5432	0.594484
RepESG	-0.113856	-0.5731	0.574542
Env*Size	-0.017367	-0.6801	0.506157
Soc*Size	0.043819	1.5703	0.135899
Gov*Size	0.002946	0.2801	0.783027
Env*Age	-0.026147	-0.8420	0.412194
Soc*Age	0.056838	0.9551	0.353752
Gov*Age	-0.021053	-1.0811	0.295688

4.4.3 The influence of ESG on FP

Likewise, the results of panel with Tobin's q as dependent variable are presented in Table 4.5 Empirical results for Tobin's Q model. This panel first tests H2 which predicts that FP is more likely to increase if firm undertake ESGs. The results show that both Env and Soc activities are positively and significantly (for the social dimension) linked with FP. The H2 hypothesis therefore gains support in both dimensions. Finding a positive influence for Env and Soc is probable because both initiatives are directly related to the firm's operation and improvement in either could decrease the cost involved in their operations which would consequently enhance their FP. Our results for the Env dimension score is consistent with Duque-Grisales and Aguilera-Caracuel (2019) who also find that a firm's effort to avoid environment risk will be positively rewarded by a higher FP. Also, the results of the social dimension are in line with Qiu et al. (2016); Xie et al. (2019) and Yang and Baasandorj (2017) who also find social disclosure as a driver of financial efficiency.

Gov is found to be negative. This reverse influence of the association between ESG-FP implies that a firm's expenses for setting board and CSR strategy for airlines will not be compensated by a better FP. As in the models for market-to-book ratio as a dependent variable, size is also lower than 0.1. Together with lev, div and age, in this main effect panel it negatively affects the FP. The RepESG dummy variable is also similar to the market-to-book ratio panel in being positive and significant, which could be interpreted as saying

that the greater the number of years firms have been participating in ESG initiatives, the greater the benefit they are obtaining from these activities.

Considering the results for interaction effects of size and age on the association, the results are similar with the market-to-book ratio models. On the one hand, the size factor is found to be a significant moderator for ESG-FP of sampled firms. This indicates that, before undertaking sustainability initiatives, airlines' total assets must be evaluated (especially if the considered sustainability activity is categorized as in the Env dimension). For this ESG sub-factor, size significantly decreases the FP regardless the type of airline. For both big and small companies, it is expected that this moderator decreases the FP for relevant airlines. For bigger companies, the Gov activities negatively influence the association between sustainability measures and FP while for smaller firms (low costs) it found to be a positive moderator of the association. This means that smaller airlines are suggested to invest in leadership and shareholder maximizing initiatives if they consider the sustainability effects. Size is also found to be not a moderator in the case of societal initiatives. Overall, since for Env and Gov dimensions, the ESG-financial performance relationship is apparently significant (in both big and small airline sets), we consider size as moderator which supports H3. Finally, regarding age as moderator, we reached the opposite conclusion. Specifically, it is found to be non-significant for all three ESG dimensions across the panels (but with disperse signs). Given this, it seems that age is not a major factor in the relationship between a firm's performance and sustainability performances.

Table 4.5 Empirical results for Tobin's Q model

Variables	Coefficients	t-value	p-value
Panel I	**Main Effect Model**	Fixed Effects	
Env	8.4086e-05	0.0195	0.984505
Soc	7.5855e-03	1.7761	0.077508.
Gov	-1.4629e-03	-0.4278	0.669360
ROA	1.2236e-01	0.0916	0.927092
Lev	-4.3003e-01	-0.7684	0.443296
Div	-1.6223e-01	-0.7253	0.469252
Size	-8.0518e-01	-3.2909	0.001216**
Age	-1.3315e-01	-0.3870	0.699261
RepESG	3.0252e-01	2.5479	0.011729 *
Panel II	**Full Panel**	Fixed Effects	
Env	0.1125035	2.0665	0.04036 *
Soc	0.0137444	0.1930	0.84722
Gov	0.0519313	1.2873	0.19983
ROA	0.5825599	0.4479	0.65481
Lev	-0.5196154	-0.9276	0.35500
Div	-0.3092335	-1.4020	0.16283
Size	0.1313367	0.3576	0.72111
Age	-0.1214286	-0.2587	0.79621
RepESG	0.2513745	2.1240	0.03518 *
Env*Size	-0.0150643	-2.4733	0.01441 *
Soc*Size	0.0010252	0.1380	0.89042
Gov*Size	-0.0063285	-1.5635	0.11987
Env*Age	0.0088455	1.3878	0.16709

Soc*Age	-0.0045957	-0.5702	0.56934
Gov*Age	0.0015105	0.2926	0.77021
Panel II	**Full-Services**	Fixed Effects	
Env	0.10822037	1.3965	0.1650222
Soc	0.04059882	0.4504	0.6531605
Gov	0.16789143	3.3874	0.0009419***
ROA	0.41422300	0.3586	0.7204880
Lev	-1.20434211	-2.1089	0.0369353 *
Div	-0.75507475	-2.7036	0.0078068 **
Size	1.27326622	2.8093	0.0057581 **
Age	-0.28883805	-0.5518	0.5820759
RepESG	0.26857797	2.2805	0.0242571 *
Env*Size	-0.01221760	-1.7020	0.0912196.
Soc*Size	0.00435026	-0.5059	0.6137896
Gov*Size	-0.01594252	-3.6900	0.0003324***
Env*Age	0.00346161	0.4612	0.6454714
Soc*Age	-0.00019973	-0.0231	0.9816223
Gov*Age	-0.00465805	-0.7082	0.4801546
Panel III	**Low-Costs**	Fixed Effects	
Env	0.7660558	2.5750	0.019074 *
Soc	-0.0450244	-0.1574	0.876670
Gov	-0.6002875	-3.1696	0.005305 **
ROA	1.5733169	0.4182	0.680742
Lev	1.4229825	0.9363	0.361527
Div	-0.1458301	-0.3028	0.765548
Size	0.3434971	0.2675	0.792131
Age	-4.4489506	-1.1341	0.271623
RepESG	0.3344415	0.7138	0.484509
Env*Size	-0.0669633	-2.0948	0.050603.
Soc*Size	-0.0240344	-0.7330	0.473023
Gov*Size	0.0672145	2.6070	0.017834 *
Env*Age	-0.0629068	-1.2866	0.214529
Soc*Age	0.0932622	1.4922	0.152971
Gov*Age	0.0043871	0.1080	0.915161

4.4.4 Robustness test

In addition to the main analysis based on the econometric approach defined in section 3.3, this study also performs a sensitivity analysis to check the robustness of the results. To do so, we follow Moneva et al., 2020; Song et al., 2021) in estimating the alternative models with different time periods to estimate changes from the baseline condition. Specifically, we estimate the models for the limited part of the dataset which contains only the balanced sample (Moneva et al., 2020). We run the regression models for years 2016–2019 where almost all the data points were available (during this period, there were only 77 missing values out of the 1,976 observations—these were filled by the mean of each entity). The results of the model for both market-to-book ratio and Tobin's q as dependent variables are presented in Table 4.6 Empirical results for panel with market-to-book ratio models and Table 4.7 Empirical results for panel with Tobin Q models.

Table 4.6 Empirical results for panel with market-to-book ratio models

Variables	**Coefficients**	**t-value**	**p-value**

Panel I	**Main Effect Model**	**Fixed Effects**	
Env	0.00688604	1.7758	0.07867.
Soc	-0.00527636	-1.3750	0.17207
Gov	-0.00308728	-1.2784	0.20391
ROA	-1.80439855	-1.7085	0.09051.
Lev	-1.03026792	-2.2857	0.02428*
Div	0.36675533	2.0948	0.03859*
Size	-0.10092030	-0.7059	0.48181
Age	-0.50423819	-1.1105	0.26931
RepESG	0.00064202	0.0058	0.99542
Panel II	**Full Panel**	**Fixed-Effects**	
Env	-0.06460538	-1.2282	0.22227
Soc	0.04327144	1.3054	0.19477
Gov	0.03942618	2.2220	0.02856*
ROA	-1.68894024	-1.5845	0.11628
Lev	-1.06429765	-2.3573	0.02038*
Div	0.32133421	1.8265	0.07079.
Size	-0.17113112	-0.8922	0.37444
Age	0.33740661	0.5826	0.56148
RepESG	0.02214816	0.1925	0.84773
Env*Size	0.00509383	0.9691	0.33486
Soc*Size	-0.00379779	-1.0112	0.31436
Gov*Size	-0.00044559	-0.2819	0.77863
Env*Age	0.00666247	1.3803	0.17060
Soc*Age	-0.00379362	-0.6191	0.53728
Gov*Age	-0.01033211	-2.3036	0.02333*
Panel III	**Full-Services**	**Fixed-Effects**	
Env	-0.05382596	-0.4981	0.6200805
Soc	-0.00884222	-0.1869	0.8522939
Gov	-0.01264583	-0.4462	0.6569456
ROA	-3.86484930	-2.5517	0.0130433*
Lev	-2.66991599	-3.4858	0.0008774 ***
Div	0.18437234	0.7471	0.4576324
Size	-0.51669972	-1.1781	0.2429880
Age	-1.85125813	-1.3099	0.1947638
RepESG	0.14541182	0.8346	0.4069653
Env*Size	0.00096779	0.1199	0.9049303
Soc*Size	0.00151939	0.3481	0.7288494
Gov*Size	0.00089523	0.4891	0.6263582
Env*Age	0.01265428	1.0761	0.2858103
Soc*Age	-0.00258308	-0.3088	0.7584748
Gov*Age	-0.00019108	-0.0273	0.9782710
Panel IV	**Low-Costs**	**Fixed-Effects**	
Env	0.0632933	0.4713	0.64310
Soc	-0.0465458	-0.3741	0.71267
Gov	-0.1059357	-1.2740	0.21886
ROA	-0.9166737	-0.4196	0.67972
Lev	-0.4803367	-0.5953	0.55902
Div	0.4365506	1.5749	0.13270
Size	0.0468763	0.0961	0.92448
Age	-0.1161723	-0.0719	0.94351
RepESG	-0.2937250	-1.3687	0.18792
Env*Size	-0.0150544	-1.0253	0.31879
Soc*Size	0.0061474	0.3787	0.70936
Gov*Size	0.0097933	1.1661	0.25880
Env*Age	0.0161772	2.1761	0.04311*
Soc*Age	0.0054048	0.3383	0.73908

Gov*Age	0.0053013	0.5087	0.61713

Signif. Codes: '***' if p-value < 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '.' if p-value < 0.1.

Table 4.7 Empirical results for panel with Tobin Q models

Variables	**Coefficients**	**t-value**	**p-value**
Panel I	**Main Effect Model**	**Random Effects**	
Env	0.0096855	1.9107	0.05604.
Soc	-0.0067958	-1.3123	0.18940
Gov	-0.0071574	-2.2044	0.02749*
ROA	3.1911119	2.1768	0.02950*
Lev	-0.5586963	-1.1268	0.25982
Div	0.0893456	0.3563	0.72165
Size	0.0736137	0.7813	0.43464
Age	0.2265869	1.2389	0.21537
RepESG	-0.0885053	-0.7891	0.43006
Panel II	**Full Panel**	**Random Effects**	
Env	-5.5516e-02	-1.1479	0.25102
Soc	4.1989e-02	1.0861	0.27742
Gov	4.2552e-02	1.7539	0.07945.
ROA	3.5679e+00	2.4218	0.01545*
Lev	-6.7746e-01	-1.3095	0.19037
Div	3.7737e-02	0.1502	0.88061
Size	1.2553e-01	0.6986	0.48482
Age	8.9386e-01	1.9149	0.05550.
RepESG	-5.4435e-02	-0.4593	0.64599
Env*Size	4.9730e-03	1.0014	0.31665
Soc*Size	-5.4363e-03	-1.1886	0.23459
Gov*Size	-1.3115e-05	-0.0059	0.99530
Env*Age	5.2161e-03	0.7720	0.44010
Soc*Age	2.1994e-04	0.0264	0.97895
Gov*Age	-1.3298e-02	-2.3101	0.02088*
Panel II	**Full-Services**	**Random Effects**	
Env	0.00491784	0.0885	0.9294
Soc	-0.01377783	-0.3026	0.7622
Gov	0.02112648	0.7960	0.4260
ROA	0.73813062	0.3944	0.6933
Lev	-0.46835998	-0.6047	0.5454
Div	-0.37789391	-1.2406	0.2148
Size	0.02966399	0.1718	0.8636
Age	0.30630260	0.4620	0.6440
RepESG	-0.03927320	-0.2869	0.7742
Env*Size	-0.00168502	-0.3137	0.7537
Soc*Size	0.00027179	0.0623	0.9504
Gov*Size	0.00013341	0.0651	0.9481
Env*Age	0.00654051	0.7228	0.4698
Soc*Age	0.00159158	0.1617	0.8715
Gov*Age	-0.00848747	-1.2531	0.2102
Panel III	**Low-Costs**	**Fixed Effects**	
Env	-0.1263421	-0.5255	0.60565
Soc	-0.1102380	-0.4950	0.62660
Gov	-0.2399777	-1.6122	0.12432
ROA	7.6179557	1.9480	0.06718.
Lev	-1.3706229	-0.9489	0.35521
Div	-0.5519194	-1.1122	0.28069
Size	-1.0537136	-1.2070	0.24304
Age	3.8613508	1.3342	0.19877

RepESG	-0.5204036	-1.3546	0.19230
Env*Size	0.0020548	0.0782	0.93855
Soc*Size	0.0100679	0.3464	0.73304
Gov*Size	0.0371625	2.4718	0.02365*
Env*Age	0.0226712	1.7035	0.10567
Soc*Age	0.0121706	0.4255	0.67552
Gov*Age	-0.0175407	-0.9403	0.35953

Signif. Codes: '***' if p-value < 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '.' if p-value < 0.1.

As can be seen from the above models, although there are some differences in coefficients and influence directions, in general the results for both models led to similar yield estimations. The results are especially consistent for models with full-service and low-cost carrier's data.

4.5 Discussion

Our study first aimed at testing the separate impacts of ESG activities on firm value and FP. Secondly, it aimed to uncover the moderating effect of firm size and age in the linkage between them. We employed data from 38 airlines retrieved from Eikon for the 2009–2019 period. The sample is broken down based on the firms' business models: full-service and low-cost carriers. The findings are discussed in this section.

4.5.1 Main effects of ESGs on firm value and financial performance

As the initial purpose of this study, we check whether ESG activities drive the firm value and FP for firms operating in the airline industry. In regard to firm value, the empirical result for the Gov dimension supports the stakeholder theory which suggests that an airline's contribution to this initiative could act as a value driver for the firm. In particular, it implies that activities related to the distribution of rights and responsibilities among board of directors and stakeholders as firm participants and ensuring the firm's accountability could create value for a firm. The finding of Duque-Grisales and Aguilera-Caracuel (2019) for a negative effect of Gov differs from our result. In contrast, environmental and social disclosures negatively change market-to-book ratio indicating that investing in these dimensions leads to a decrease in its value. This outcome is not consistent with Qureshi et al. (2020) and Xie et al. (2019) who find that both Env and Soc are relevant and have a positive relationship with firm value.

As for the Tobin's q model, the results of a fixed effect model indicate a positive sign for Env and Soc sub-factors which is consistent with several hypothetical frameworks for the ESG-FP linkage. On this basis, based on both the stakeholder theory and the slack resource theory, allocating available resources to eco-friendly and societal projects will be rewarded by a higher firm FP in the airline industry. Therefore, the use of renewable resources, innovation and reducing emission from Env perspective, as well as an effort to improve human rights or decrease demographic discrimination, training programs and product responsibility in its social aspect, all bring more returns on invested funds. These findings are in line with

the research from the Theodoulidis et al. (2017) and Lee and Park (2010) carried out for the same industry. They are, however, inconsistent with results from a set of 104 multinational firms examined by Duque-Grisales and Aguilera-Caracuel (2019) which supports the view that industry characteristics probably affect the relationship between ESG-FP, and therefore the outcome might vary across industries (Theodoulidis, et al., 2017). Considering control variables in both models, we see that leverage, dividend ratio, size, and age all negatively influence the association between ESG disclosure and FP.

4.5.2 Moderating role of size and age

The empirical results show that firm size significantly moderates the relationship between sustainability disclosure and dependent variables. However, the moderation direction is different across panels, depending on the type of sustainability undertakings, which gains clear support from the argument by López-Pérez et al. (2017) to the effect that a different slope in the association is likely for large and small firms. We find that the interaction term between size and both Env and Gov dimensions is significant and negative for full-services panel. This result is consistent with the view suggesting that size could play a key role in the relationship between ESG and firm value (Udayasankar 2008), however, it goes against the argument suggesting that company size positively influence the resources for providing ESG (Drempetic et al. 2019). This set of airlines is considered as bigger size firms as opposed to low-cost carriers having relatively smaller total assets and therefore being smaller in size. The same finding was found for the panel covering the full set of airlines where, for our dependent variables, both Env and Gov (in most cases) are negative and significant. This finding also goes against the general sustainability viewpoint which considers firms with relatively higher total assets, and therefore bigger size, are likely to sloped positively. In contrast, we find a consistent interaction sign for the Env category in the low-cost panel which supports the sustainability hypothesis that smaller firms may not contribute to sustainability as much as do their bigger counterparts (Waddock & Graves, 1997). The practical interpretation of this finding is that managers of low-cost airlines may expect negative market-to-book ratio and financial return if they decide to invest in environmentally related initiatives.

The current study also tests the potential moderating role of firm age. Full-service carriers are considered as older firms in that the low-cost idea is relatively new in the airline business. Our findings show that, although statistically insignificant (except for governance dimension in full panel), it somehow moderates the linkage of ESG initiatives and the study dependent variables. The interesting detection for age is the direction of its interaction term which, in most cases, is found to be consistent with expectations from the sustainability hypothesis. As a notable example, for both market-to-book ratio and Tobin's q estimations, the direction of interaction term for environment disclosure is positive (negative) for full-service (low-cost)

carriers. This is consistent with the idea that older (younger) firms have positive (negative) slope with more (less) collaboration in sustainability activities (Withisuphakorn and Jiraporn 2015). Moreover, this result supports the business strategy of low-cost airlines in which the main focus is on tangible cost-reduction operations (Seo et al. 2015). From this viewpoint, low-cost airlines investment on environmental activities probably would not offset the cost involved in these operations, although they do for full-service carriers.

4.6 Conclusion

The underlying motivation of the research topic is to analyze the impacts of ESG on FP and value in the airline industry. Although the topic has been widely investigated in recent scientific literature across industries, the contributions in an air transport context have been limited. To address the gap, this study aims at providing insights on the relevance of implementing ESGs for managers and executives of airlines who plan to improve financial efficiency. We further investigate whether firm size and age might play a moderating role in this association. The set of data from 38 airlines retrieved from Eikon for years 2009–2019. Our empirical results suggest that ESG initiatives affect firm's market-to-book ratio and FP in opposite directions. For our sampled airlines, we find that the outcome for funding social and environmental operations would be a decline in firm's market-to-book ratio, but increase in its Tobin's Q. This suggests that, if managers are considering investing in these sub-factors to enhance financial performance, they may expect a low market-to-book ratio for their equity. We also find that the moderating role of firm size in the relationship between ESG and dependent variables is significant. Firm age may also overlap the association and influence the firm's strategic decisions related with sustainability initiatives but, in general we did not find it to be a significant moderator.

Our results are extremely relevant to both the academic literature and to airline executives. From an academic perspective, the study contributes to an advance in the association between ESG and FP in tourism and airline literature. Here, we first provide empirical evidence for both stakeholder theory and resource-based theory which is based on both approaches, implementing sustainability criteria have implications for FP. Also, since researchers in the field have paid relatively little attention to investigating moderator variables, we attempted to fill the gap by empirically testing the potential roles of firm size and age. Therefore, our findings could be taken into consideration while studying the topic in this context.

Executives and managers of airlines may also find these results interesting and informative in regard to their sustainability strategy. Specifically, our findings could help the managers to allocate available resources to ESG activities by adopting more efficient and robust approaches. The current study also highlights the potential moderation role of size in building a sustainability scheme. We provide evidence for managers of full-service airlines to consider prioritizing societal over environmental and governance

activities when deciding to contribute to sustainability initiatives. So, our study findings provide policy implication for airline executives potentially allowing them to better allocate and utilize their firm's resources. Since this study has focused on a small proportion of airlines over a short period of time, future research might cover a larger sample of airlines over a longer period. Thus, broadening the scope of the analysis would provide a more comprehensive view on the topic. Additionally, it is suggested that future studies on the current topic may test for the potential moderating effect of leverage, return on assets, or dividends.

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Appendix:

Appendix. 1 Thomson Reuters Eikon's ESG categories

Environmental	***Social***	***Governance***
Resource Use	Workforce	Management
Emissions	Human Rights	Shareholders
Innovation	Community	CSR Strategy
	Product Responsibility	

Appendix. 2 Sampled Airlines

Country/Region	Company Name	Stock code	Date of incorporation
Germany	Lufthansa	823212 (LHA)	06/01/1953
Hong Kong	Pacific Airways	293	17/10/1948
France	KLM	FR0000031122 (AIRF)	31/12/1954
Singapore	Singapore Airlines	C6L (SIAL)	27/01/1972
Sweden	SAS AB	SE0003366871 (SAS)	31/12/1945
United Kingdom	Easy Jet	B7KR2P8 (EZJ)	23/03/2000
Republic of Ireland	Ryanair	IE00BYTBXV33 (RYA)	04/06/1996
Japan	ANA Holding Group	9202	26/12/1952
United States of America	Alaska Air Group Inc	000011659109 (ALK)	14/03/1985
Thailand	Thai Airways	THAI	28/03/1960
Taiwan	China Airlines	2610	06/09/1959
South Korea	Korean Air	003490	18/06/1962
Taiwan	Eva Airways	2618	06/04/1989
China	China Southern Airlines	600029	24/03/1995
Brazil	Gol Transportes Aéreos	GOLL4	11/03/2004
China	Air China	601111	26/03/2006
Canada	Air Canada	000008911877 (AC)	23/11/2006
United States of America	JetBlue	000477143101 (JBLU)	23/08/1998
United States of America	Delta Air	000247361702 (DAL)	15/03/1967
Chile	LATAM Airlines	LTM	07/08/1986
Panama	Copa Holdings SA	000000000000 (CPA)	05/05/1998
United States of America	United Airlines	000910047109 (UAL)	29/12/1968
Japan	Japan Airlines	9201	31/07/1951
Turkey	Turk Hava Yollari	THYAO	29/01/1960
Malaysia	Airasia Group	5099 (AIRA)	23/08/2017
United Kingdom	Consolidated Airlines Group SA	B5M6XQ7 (ICAG)	23/12/2009
Australia	Qantas Airlines	QAN	17/01/1934
Canada	ACE Aviation	00000440P409 (ACEh)	13/12/2007
China	China Eastern Airlines	600115	13/04/1995
United States of America	SkyWest Inc	000830879102 (SKYW)	01/03/1972
United States of America	Hawaiian Airlines	000419879101(HA)	23/04/2002
New Zealand	Air New Zealand	AIR	25/04/1940
United States of America	Spirit Airlines	000848577102(SAVE)	07/03/1994

Panama	Avianca Holding	PAI69PA00017(AVT_p)	02/03/2011
India	Interglobe Aviation	EQINDIGO (INGL)	12/01/2004
Australia	Virgin Australia	VAH	29/12/2000
Switzerland	Wizz Air	BN574F9 (WIZZ)	02/06/2009
China	Spring Airlines	601021	31/10/2004

Appendix. 3 Description of variables

Variable	Definition	Description
Dependent Variables		
MB	Market-to-book ratio	Natural logarithm of security's price divided by its book value per share actual.
TQ	Tobin's q	Natural logarithm of Tobin's q = market value / total assets
Explanatory Variables		
Env	Environmental pillar score	Thomson Reuters score for environmental disclosure.
Soc	Social pillar score	Thomson Reuters score for social disclosure.
Gov	Governance pillar score	Thomson Reuters score for governance disclosure.
Moderating Variables		
Size	Firm size	Natural logarithm of total assets.
Age	Firm age	Natural logarithm of number of years since company's foundation (start doing business).
Control and Dummy Variables		
ROA	Return on assets	It measures a company's operating efficiency regardless of its financial structure (in particular, without regard to the degree of leverage a company uses) and is calculated by dividing a company's operating profit to financing costs by total assets.
Lev	Leverage ratio	Defined as total liabilities over total assets.
Div	Dividend pay-out ratio	Defined as the average gross dividends-common stock over 5 fiscal years divided by average of income available to common excluding extraordinary items for the sample period and is expressed as percentage.
RepESG	ESGs reporting	Number of years the airline has been reporting ESG scores.
Ctype	Type dummy	The dummy for type of airline, i.e., whether it is full-service or low-cost one.

Appendix. 4 This study followed the econometric strategy according to Princeton panel data analysis (Torres-reyna 2010), to verify the relevant fit predictor in the environment of R-studio software (RStudio Team 2020), using utilities in the R-package 'plm'(Croissant and Millo 2008).

Chapter 6: Sustainability in supporting firm value during Covid-19 at the air transport industry

Chapter 5.

The role of firm characteristics in implementing sustainability initiatives

UNIVERSITAT ROVIRA I VIRGILI
FIRM VALUE AND PERFORMANCE ANALYSIS: IMPACT AND IMPLICATIONS OF IMPLEMENTING SUSTAINABILITY INITIATIVES FOR THE AIRLINE INDUSTRY
Yaghoub Abdi

5. Chapter 5. The role of firm characteristics in implementing sustainability initiatives

Empirical Paper

How financial performance influences investment in sustainable development initiatives in the airline industry: the moderation role of state-ownership

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5.1 Introduction

Seventeen United Nations Sustainable Development Goals (SDGs) were proposed by representatives from more than 150 countries in 2015 leading to so called "United Nation's 2030 agenda for Sustainable Development" as corporation framework for "shift the world on to a sustainable and resilient path". Collectively, the SDGs require governments, corporations, and organizations to incorporate sustainability initiatives in their management practices. This led the stakeholders and investors to eagerly demand the development and adaptation of SDGs in addition to typical financial rewards when making business and investment decisions. The trend seems to be more popular with the outbreak of the Covid-19 pandemic, where stakeholders and institutional investors are shifting their focus from profit-making to sustainable and ethical means of investing. Consequently, sustainable development strategies have been gradually adapted to every type of business seeking an efficient and responsible environment to show their commitment to stakeholders' benefits and maximize their wealth. However, despite that business is the key factor to meet SDGs, the feasibility of this scenario needs the detailed measurement and effective management of both financial and sustainability risks in investment portfolio (Folqué et al., 2021; Rivera et al., 2017). This has made companies to re-visit the concept of financial performance as business model drivers and also re-evaluate the balance between profitability and sustainability at their business strategy (Bryson & Lombardi, 2009). As for the airline industry, the awareness of sustainability issues and climate change is increased since the industry is under considerable public pressure to allocate more resources and contribute more to sustainable development initiatives due to their extremely large environmental footprint (Kim et al., 2020). In response, 38% of the top 100 airlines now publish a corporate sustainability report—this includes six airlines who disclose their contribution to corporate sustainability in their annual report (Heeres et al., 2018). Such a reports are quite critical in showing firm's effective communication of their commitment and performance on sustainability issues (Jadoon et al., 2020). However, there is disparity to report

corporate commitment to SDGs. Corporate social responsibility (CSR), ESG, GRI, and sustainable performance have been used interchangeably (Do-Prado et al., 2020).Most of these companies and stakeholders now consider the ESG disclosure as business community version of incorporating sustainable development practice into daily practices of organizations to better identify strategic opportunities and meet competitive challenges which will eventually integrate with SDGs. ESG criteria have also been used for addressing the increasing concern of the stakeholders (Sharma, Panday, and Dangwal 2020). For a business, by involving the stakeholders into the business, corporations could exit hazardous business, bear less liability and reduce the life-cycle cost of products, and provide the limited resources or leadership in assuming rules or standards representing companies' own policies (Moon, 2007). This study uses the ESG disclosure as a proxy of sustainable development and corporate stakeholder commitment.

The presence of sustainable development standards can impact the financial status of the firm. On this basis, an increasing number of studies are focusing on the topic and attempting to provide managerial insights for handling the issue better. However, these studies mostly reflect the impact of ESG implementation on firms' financial performance, and research on the determinants of corporate sustainability has received insufficient attention (Chih et al., 2010). Empirical studies have shown that sustainability activism varies across firms, whole industries, and over time (Gray et al., 1996; Reverte, 2009). In this regard, a firm's financial performance, risk, size, ownership, and industry specific characteristics are highlighted among the possible determinants (Crisóstomo & Freire, 2015). Also, Cormier et al. (2005) argued that a firm's sustainability disclosure is subject to a range of characteristics influencing the cost and benefits of implementing these standards and its evolution in a broader context. Among these characteristics, a review by Garde-Sanchez et al. (2018) underlined the necessity for advances in sustainability issues in state-owned enterprises (SOEs), given their importance as economic drivers in the market. Some studies (Backx et al. 2002; López-Bonilla & López-Bonilla, 2008) shed light on the influence of ownership structure on airline performance. However, to the best of our knowledge, no study specifically considers the role of ownership in the sustainability approach of the airline industry. In the light of these factors, the objectives of this study are twofold. First, we investigate the influence of FP as the main factor together with firm-related characteristics of size and age on sustainability measure. Second, this study further explores the moderation effect of SOE on the relationship between FP and ESG disclosure.

This paper contributes to both the theoretical and managerial aspects of the literature. First, from a theoretical perspective, we provide additional empirical evidence for the role played by FP and SOE on ESG. In addition, following the relevance of ownership structure in the implementation of ESG (Moneva

et al., 2020), the current study offers some insights on the factors which are influential in mediating the FP-ESG association for airline industry. Second, from a managerial standpoint, given that firms in the tourism industry make significantly more investment in sustainability than other industries (Singal 2014), our research adds value by indicating how the business and society fields might make progress on ESG. This study offers useful insights for airline industry practitioners to better understand the influence of various factors in relation to sustainability practices and to improve the managerial social decision process. Furthermore, it provides useful information for assessing the sustainability of airlines to investors considering eco-investing in the industry.

The structure of this study is as follow: Section 2 briefly reviews the conceptual background of the research and develops the hypotheses; Section 3 describes the design of the sample, variables, and econometric approach; Section 4 provides the estimation results. A Discussion and Concluding Remarks are given in Section 5. Finally, Section 6 considers the implications and future avenues for research.

5.2 Literature and hypotheses development

5.2.1 SDGs in the airline industry

Airline industry is frequently considered for its contribution to sustainable development (Daley 2009). This is due to the fact that air transport benefits the society in bridging people and places and assists in achieving Millennium Development Goals by improving human well-being. The necessity to address current sustainability challenges has given an important role to corporate governance in making decisions about ESG disclosure (Hossain & Reaz, 2007; Lagasio & Cucari, 2019). The trend is to react to the rising demand for information by adjusting the semantics in regard to the non-financial operation of companies. As a result, following the several internationally promoted frameworks—such as SDGs, global reporting initiative (GRI) and sustainability reporting guidelines (SRG)—ESG has been introduced into the investment process as an analytical tool for assessing a firm's state of sustainability (Hill 2020). It is also increasingly considered by investors, academia, and industry practitioners (Folqué et al. 2021).

The aviation industry is considered to be one of the most challenging industries in terms of environmental and sustainability issues (McManners, 2016a). Airplanes generate the main greenhouse gas, carbon dioxide, and directly discharge it into the air. According to an air transport action group report, flights emitted around 895 (915) million tons of CO2 in 2018 (2019), which is roughly 2% of man-made carbon emissions (ATAG 2018). With this in mind, the awareness of climate change and sustainability has steadily increased and airlines, and other industries, began to launch ESG initiatives (Cowper-Smith & de-Grosbois, 2011).

Overall, the issue is crucial and is urgent for airlines because the business perspective for these firms is polarized between making progress in the sustainability dimension and managing the alliance with government, industry counterparts, and passengers (McManners, 2016b; Daley, 2010).

5.2.2 SDGs and firm business strategy

The degree to which firms include sustainable development goals, and how much they are committed to create value for different stakeholders (employees, consumers, communities, etc.) in their strategies shows the possibility to connect business and society (Lopez 2020). From this perspective, firms may choose either a traditional profit maximizing approach or take a transformational position by integrating their expectations through the SDGs strategy. Companies which embrace the SDGs and implement them into their business strategy are mindful of their need to develop specific activities and programs based on their commitments to improve the relationship and create an engagement with their interest group (Cole & Chicksen, 2018). It means that companies through making fundamental changes in consumption and production patterns including introducing technologies, innovations, social and environmental projects can create a positive impact in different areas where firms are involved (Assembly 2015). Therefore, the SDGs appear as management innovation idea to "mash-up" sustainability with business strategy. Now that it has been more than three decades since the initial formulation of sustainability idea by the World Commission on Environment and Development (WCED) report known as "Our Common Future" or "Brundtland Report" in 1987, we see its convergence and overlap with business strategy. This change of perspective was also remarked in the literature by developing theories to justify integrating sustainability innovations into business strategy. Notably, stakeholder theory focuses on the relationship between a firm and all involved bodies in its business domain including customers, investors, community, etc. Stakeholders are "any group or individual who can affect or is affected by the achievement of firm's objectives including stockholders, creditors, employees, customers, suppliers, public interest groups, and governmental bodies" (Freeman, 1984; Roberts, 1992). If an organization manages to successfully satisfy the demands of its stakeholders, the organizational sustainability will be achieved. By supporting this, as Garvare & Johansson (2010) noted "Global sustainability will be promoted if organizational sustainability is achieved without compromising the ability of interested parties to meet their need, both present and future". This way, market success could be obtained via satisfying stakeholders' expectations, investment in building an internal knowledge base and innovative system, promoting sustainability in business operations, and development of a win-win business strategy aligning firm operations to support objectives and activities. In turn, regardless of the

strategy corporation takes, surviving in the business demands the use of all firm resources to assist this end (Taylor, & Oinas, 2006). Therefore, addressing the stakeholder benefits and managing the association with them could strengthen effectiveness of its decision and strategies (Amaeshi and Crane 2011).

To sum up, a emphasizing the needs of all types of stakeholders and build an organizational atmosphere to enhance the transparency and stakeholders' awareness in regard with sustainable development issues together with sustain employees' development and empowerment are the main characteristic of a sustainable organization.

5.2.3 FP and ESG

Within the current literature two separate research lines study the ESG-FP association. One is related to the consequences of management decisions in relation to sustainability initiatives for firm's FP and value, while the other discusses whether it is FP or value that drive ESG implementation. For the first orientation, a growing number of studies argue that involvement in ESG has financial implications for the firm (e.g., Lee et al., 2013; Zeidan & Spitzeck, 2015; Weber, 2017; Singh & Misra, 2021; Yu & Huo, 2019; Tanin et al., 2019; Okafor et al., 2021). For the second orientation (related to the discussion whether FP is a key driver or main barrier of sustainability activities), the empirical evidence is very limited (Moneva et al., 2020; Singal, 2014), especially in the airline industry. Waddock & Graves (1997) proposed the slack resources theory (SRT) as a benchmark for this argument. They argued that firms with higher FP are likely to have more funds to invest in ESG practices. Conversely, lower FP limits a firm's capability to dedicate resources to ESGs. Therefore, the availability of slack resources would result in higher sustainability performance arising from the allocation of these funds, and consequently, higher FP should result in better ESG.

In addition, the resource-based view is that ESG is seen as one of a firm's competitive advantage tools. These resources are any assets that a firm employs which help it achieve its goals or good performance in its key success factors (Barrutia & Echebarria, 2015; Bryson et al., 2007). From this perspective, a firm's sources of competitive advantages are a set of tangible, and intangible, basic resources such as high quality and committed employees, acceptance in the community, and reduced risk exposure which work together coherently to enable the organization to attain its goals (Barrutia & Echebarria, 2015; Godfrey, 2005). In a rational market, disclosure of ESG pillar scores may give firms a competitive advantage (Xie et al., 2019; Porter & Kramer, 2006; Lourenço et al., 2012). Empirically, the idea is supported by certain studies (Lim et al., 2007; Haniffa & Cooke, 2005; Singal, 2014; Gamerschlag et al., 2010), however, other studies argue that higher FP leads to a lower commitment to sustainability issues practices (Moneva et al., 2020). Therefore, findings on this stream are also inconclusive.

Given that SRT provides convincing justification for the FP-ESG association, agency theory is also applied to explain the relationship from a different perspective. It emphasizes managerial opportunism in contributing to sustainability activities for their own personal agenda, egocentricity, and desire to be known as philanthropists (Benabou & Tirole, 2010). Thus, there is a need to monitor and control managers to ensure that shareholders' interests are met (Jensen & Meckling, 1976; de-Villiers & Dimes, 2021). Managers could increase or decrease sustainability investments depending on the state of a firm's financial returns (Makni et al. 2009). The theory suggests that strong corporate governance mechanisms better align the interests of managers and shareholders and improve a firm's FP (Grove et al., 2011). Conversely, firms will be less likely to contribute to sustainability practices if they are suffering from weak financial performance (Waddock & Graves, 1997).

Taken together, despite their differences in objectives, the above thoeries complement each other and signal that a firm's FP offers virtuous justifications for its particapation in ESG because it is impossible to carry out these activities without available funds. To validate the above theoretical claims and empirical findings, we hypothesise the relationship between FP-ESG as follows:

H1: For airlines, financial performance positively influences ESG.

5.2.4 The role of government and ESG

It is argued that sustainability initiatives are better managed by governments due to their superior ability to handle these issues (Gillan et al. 2021). Particularly, considering their commitment as public agents, governments are motivated to implement ESG investing to avoid financial risks resulting from investment in poor environmental and governance performance, going beyond mere financial return in providing for a country's population and addressing concerns related to long-term benefits for future generations (Hill 2020). Among the public sector group of organizations, SOEs deserve special attention (Garde-Sánchez et al. 2018). In the airline industry, despite deregulation, some seventy major airlines are still fully or partially controlled by the governments at the beginning of third millennium (Doganis 2001). The vast majority of these state-owned airlines suffer from what has been known as "distressed state airline syndrome" which is a political and organizational malady due to the issues such as substantial losses (e.g. large accumulated debts, undercapitalized and indirect subsidies), bureaucratic management, poor service quality, etc. (Doganis 2001).

The state of implementation of sustainability initiatives in SOEs is reflected in academia. The positive view, derived from legitimacy theory, argues that state intervention has a positive impact on the ESG disclosure level. On this basis, political legitimacy is among the necessary factors for a firm's survival and it is achieved by adhering to the government policy (Marquis and Qian, 2014; Wang et al., 2018). Therefore, in places where sustainability reporting is mandated by the government, publishing the ESG performance is a source of legitimacy for a firm. Cai et al. (2017) find empirical evidence for increased sustainability disclosure among Chinese state-owned companies. Wang et al. (2018), as another example, studied how political intervention influences the ESG disclosure score and find that SOEs are more likely to report their score than are their private counterparts. In addition to the direct effect of SOE on ESG, it has been shown that public ownership also can moderate the FP-ESG relationship (e.g. Peng & Yang, 2014; Eforis & Uang, 2015; Long et al. 2020).

To complete the argument about sustainability in state-owned firms, it is worth commenting on the positive SOE-FP linkage. Shleifer & Vishny, (1997) argue that state ownership is the efficient way to avoid problems such as monopoly power, externalities, and distributional challenges by controlling the firm's decision-making and enhancing efficiency. Le and Chizema (2011) also highlighted the positive SOE-FP relationship due to financial support and administrative support from the state. State ownership, when firm operate in high debt and equity ratio environment, can function as additional governance mechanism to alleviate negative impact of debt and may moderately benefit to firm performance (Le & O'Brien, 2010). This characteristic is matched with the airline industry since it is considered as capital-intensive industry. Therefore, based on the above argument, we propose the positive association between both fully and partially state-ownership structure and sustainability disclosure. In addition, we also project that state ownership plays a positive role in the FP-ESG linkage.

H2: For airlines, state-ownership has a positive relationship with ESG.

H3: For airlines, governmental controls (or having more than 50 percent ownership by state) are likely to contribute more in ESG scores.

H4: For airlines, state-ownership positively moderates the effect of financial performance on ESG.

5.2.5 Firm's size, age and ESG

Size is a critical factor helping the company to manage risks arising from becoming dependent on suppliers (Davis & Cobb, 2010). For example, a firm's executives may increase its size, leading to a rise in

compensation measures and assisting in paving the way to adopt risk-avoidance strategies (Jung et al. 2016). Also, larger-size firms have the ability and slack resources to minimize supply chain disruption challenges by executing buffering strategies (Bode et al. 2011). Based on the slack resource theory, larger companies are considered to take advantage of economies of scale to increase FP (Zott & Amit, 2007; Gelles & Mitchell, 1996). So, size is relevant to a firm's sustainability performance. Larger firms enjoy more available resources than do their smaller counterparts (Gupta, 1969; D'Amato & Falivena, 2020), and so they are able to invest more in sustainability projects. In addition, bigger firms are expected to have a well-defined strategy and goals to monitor their business, consequently, should be better equipped to handle sustainability projects. Based on these assertions, the following hypothesis is proposed for size:

H5: For airlines, firm size positively influences ESG.

Age is also likely to act as an intervening variable influencing the sustainability activities of the firm and must be taken into account in empirical studies since it represent some aspects of stakeholder power, strategic standpoint, and economic performance (Roberts, 1992). He argued that, over the course of the time as a firm matures, its reputation and background in sustainability participation makes it become entrenched. Therefore, it is directly tied into these initiatives and any withdrawal from its community commitments will be very costly, raising doubts about sponsorship and society engagement among its stakeholders (Moore 2001). On this basis, younger firms are less concerned about their public and social image and are more concentrated on financial performance. Consequently, this group of firms are expected to prefer profitability to sustainability-related initiatives (Peloza, 2006; Yang & Baasandorj, 2017). This argument leads us to propose the H6 as follows:

H6: For airlines, firm age positively influences ESG.

5.3 Research methodology

5.3.1 Data collection

The data were retrieved from two sources. First, we started the inquiry with the Thompson-Reuters Eikon platform. In regard to the ESG data, this database collects publicly reported information and publishes a combination of ten relevant data points, reflecting the firm's sustainability activities, in the form of an ESG score. While retrieving these data, we discovered that not all firm-year observations were available because those airlines started to implement sustainability standards in different years. We selected 2008–2019 as the longest possible period and found 36 ESG-rated airlines whose number of observations ranged from

four (JetBlue) to twelve (Lufthansa) years. Additionally, due to missing data for financial variables, we referred to airlines' official annual reports as the second data source to fill in as many missing values as possible. Before estimating the models, we checked the distribution of explanatory and control variables for normality. We detect outliers and remove them from the dataset. The final dataset consisted of 432 observations in the form of unbalanced panel data for the 36 sampled airlines (see Appendix A).

5.3.2 Main variables

ESG is used as a dependent variable. It is measured as a score ranging from 0 to 100 based on a firm's performance on the environmental, social and governance dimensions. Although a firm's participation level in these three sub-factors could be different (Duque-Grisales & Aguilera-Caracuel, 2019), we consider the overall ESG score as being representative for the sampled firms. To estimate the determinants of ESG, we used four main independent variables: FP, SOE, age and size. Following the related literature (e.g., Lee et al. 2013; Lahouel et al., 2019; Yang & Baasandorj, 2017), we use Tobin's Q (TQ) to represent financial performance. This variable is considered as fulfillment of the economic activities of the firm and measured by accounting indicators (e.g. return-on-assets, return-on-equity, net profit, etc. (Mucharreira et al. 2019). Different formulations of TQ have been noted in the literature but, as pointed out by Pruitt & Chung (1994), the yields tend to be similar. Empirically, we follow the approach of Aksoy et al. (2020) who measure TQ as the (sum of market value and total debt minus current assets) over total assets.

Next, the study considers state ownership as the second ESG-determinant. We introduced the SOE which is computed using a dummy variable that assumes the value "1" if the state has a share in its ownership. Then, to pursue the significance of totally controlled shares by states, we defined another binary variable where "1" indicates whether a respective government holds at least 50% of the shares of an airline and "0" otherwise.

We also interpret the results for the two firm-level characteristics of size and age (the third and fourth variables) since the literature have suggested them as important factors regarding sustainability-related decisions. Firm size has been studied in works by Yang & Baasandorj, (2017); Lee et al. (2013), and Ding et al. (2016). While different proxies have been used for size, following Lee et al. (2013), we used the natural log of total assets. Finally, a firm's age has been utilized as the last independent variable. It has been used as an important factor for sustainability decision-making e.g. D'Amato & Falivena (2020); Yang &

Baasandorj (2017) among others. We consider the year the airline started doing business as the basis for calculating its age.

5.3.3 Control variables

The set of control variables incorporated in our analysis are profitability, leverage, dividend, and type-of-airline. Return-on-assets (ROA) is a proxy for a firm's operating profitability. It is measured as the company's operating profit (prior to financing costs) divided by total assets. Firm with higher profitability are expected to have more chances to invest in sustainability initiatives (Waddock & Graves, 1997; Kim & Lee, 2020). Leverage is another control variable widely proposed in literature to control the capital structure of firms (Kraus & Litzenberger, 1973). According to Artiach et al., (2010) the level of debt reflects the importance of financial stakeholders for a firm. Debtors as capital providers are an influential group of stakeholders and managers are likely to prioritize their concerns. Higher leverage can lead to neglecting the concerns of less powerful claimants. So, a negative sign is expected for the leverage coefficient. Consistent with Lee et al. (2013) and Yang & Baasandorj (2017), we use the debt ratio (defined as total liabilities over total assets) for a firm's leverage. Dividends are considered as an illustrative channel for conveying wealth to shareholders, as well as signaling a firm's financial status to investors (Moon et al. 2015). So we expect a positive relationship between performance and dividends. Flag-carrier is also introduced as control variable when considering the airline type (Gollnick & Schmitt, 2016) since the majority of state-owned airlines are flag-carriers for their respective countries. A dummy variable is introduced when the airline is a flag-carrier for its state. It is measured as a binary variable where "1" designates a flag-carrier ("0" otherwise). The complete set of variables used in this study can be found in Appendix B.

5.3.4 Regression models

Two panel models are proposed as main effects (Eq.1) and interaction model (Eq.2) to test the statistical relationship between variables. In Model 1, we investigate how ESG is influenced by FP, SOE and firm-level characteristics of age and size. In Model 2, we test the moderating role of state ownership in the FP-ESG association where the interaction term between TQ and ESG is included. The study conducts descriptive and correlation analysis to explore the properties of the variables and uses econometric techniques to formulate the regression equation to test the hypotheses.

Model 1:

$$\mathbf{ESG_{it}} = \boldsymbol{\alpha} + \boldsymbol{\beta_1 TQ_{it}} + \boldsymbol{\beta_2 ROA_{it}} + \boldsymbol{\beta_3 Lev_{it}} + \boldsymbol{\beta_4 Div_{it}} + \boldsymbol{\beta_5 Size_{it}} + \boldsymbol{\beta_6 Age_{it}} + \boldsymbol{\beta_7 Flag_{it}} + \boldsymbol{\beta_8 SOE_{it}} + \boldsymbol{\beta_9 SOE(pct)_{it}} + \boldsymbol{\varepsilon_{it}} \quad (1)$$

Model 2:

$$\mathbf{ESG_{it}} = \boldsymbol{\alpha} + \boldsymbol{\beta_1 TQ_{it}} + \boldsymbol{\beta_2 ROA_{it}} + \boldsymbol{\beta_3 Lev_{it}} + \boldsymbol{\beta_4 Div_{it}} + \boldsymbol{\beta_5 Size_{it}} + \boldsymbol{\beta_6 Age_{it}} + \boldsymbol{\beta_7 Flag_{it}} + \boldsymbol{\beta_8 SOE_{it}} + \boldsymbol{\beta_9 TQ * SOE_{it}} + \boldsymbol{\varepsilon_{it}} \quad (2)$$

We apply two tests to detect the best fit predictor for each model based on Torres-reyna (2010). First, Breusch-Pagan's multiplier test (LM-test) allows us to select between Pooled-OLS or Panel-Data estimation. Second, if panel effects exist, the Hausman Test selects between Fixed-effects or Random-effects models. Results showing p-value of less than 0.0001 support the choice of fixed-effects for Model 1. However, since the model includes a number of time-invariant binary variables (such as carrier type) or which change slightly (e.g. state ownership), in the standard panel data framework the estimation can be carried out using the least-square dummy variable (LSDV) with a fixed-effect approach (Heshmati et al. 2018). Eq.2 produces an F-statistic of 1.0857 with a p-value of 0.42. This suggests a pooled-OLS model. The result of diagnostic tests for both models can be found in Appendix C.

5.4 Empirical analysis and results

5.4.1 Descriptive analysis

Summary statistics for the research variables are presented in Table 5.1 Descriptive statistics. The ESG score theoretically can be 100, but the actual maximum is 88.91 (mean value 47.52), which indicates that the ESG for our full sample of airlines has a less than average relative score. Another notable feature for ESG is the high standard deviation for the sampled airlines which means that airlines have different sustainability performances. TQ is distributed between -0.89 and 4.11, with a mean and standard deviation of 0.58 and 0.51. The high measure for the sampled firms indicated that the studied airlines' replacement costs are greater than the value of their assets. Return-on-assets (ROA) is relatively low with a mean value of 0.04, implying an inefficient performance by the sampled firms in converting the invested capital into operating profit.

Table 5.1 Descriptive statistics

Var	TQ	ESG	Lev	ROA	Div	Size	Age
Mean	0.58	47.52	0.74	0.04	0.19	18,23	40.31

Med.	0.53	47.60	0.75	0.03	0.04	15,50	44
Max	4.11	88.91	2.40	1.09	3.29	64,52	100
Min	- 0.89	6.81	0.00	-0.42	0.00	5,09	0.00
SD	0.51	18.81	0.22	0.10	0.33	14,11	25.67
Skew.	2.14	-0.28	0.72	4.90	4.26	0.91	0.23
Kurt.	11.5	-0.89	11	51.06	28.45	0.29	-1.08

5.4.2 Correlation analysis

Many robustness tests have been proposed before executing panel regression analysis. This is due to the problems that plague these models such as outliers (biasing the slope of regression) and autocorrelation. To identify potential endogeneity, we calculated the correlation matrix and variance inflation factor (VIF) for the main model. The correlation coefficient measures the strength and direction of a linear relationship between two variables. Table 5.2 Correlation matrix summarizes the correlation matrix of the variables employed. It can be seen that the absolute values for all variables are under 0.5, indicating the absence of a significant relationship between some variables. As for the VIF, it can be seen from Table 5.3 VIF that, since all values are smaller than 10, our data do not suffer from multicollinearity. We also applied the Pesaran-CD test to check the cross-sectional dependence in panels. The p-value of 0.07 confirms that the residuals are not correlated across entities.

Table 5.2 Correlation matrix

	ESG	**TQ**	**ROA**	**Div**	**Size**	**Lev**	**Age**
ESG	1	-	-	-	-	-	-
TQ	-0.36 (1.62e-11)	1	-	-	-	-	-
ROA	-0.2 (3.66e- 4)	0.24 (1.10e- 6)	1	-	-	-	-
Div	-0.15 (1.25e- 2)	0.064 (2.37e- 1)	0.06 (0.272)	1	-	-	-
Size	0.48 (6.39e-20)	-0.23 (1.79e-06)	-0.072 (0.153)	-0.16 (2.08e- 3)	1	-	-
Lev	0.43 (1.8e-15)	-0.26 (3.39e-08)	-0.16 (0.0013)	-0.32 (9.51e-10)	0.32 (1.22e-11)	1	-
Age	0.22 (9.31e-5)	-0.16 (1.18e- 3)	-0.06 (0.233)	-0.061 (2.52e- 1)	0.14 (5.01e- 3)	0.14 (4.15e- 3)	1

Table 5.3 VIF

Full Panel								
TQ	**ROA**	**Lev**	**Div**	**Size**	**Age**	**Flag**	**SOE**	**SOE (pct)**
1.06	1.15	1.24	1.04	1.25	1.42	1.53	1.44	1.17

5.4.3 Empirical results

Table 5.4 Empirical results for the regression analysis present the results for H1 to H6. From the main model (Eq. 1), we found that a firm's financial performance has a negative impact on ESG. This effect is statistically significant with a p-value of 0.04 implying that, contrary to our prediction, H1 is actually rejected with 5% significance. While both return and sustainability engagement are important, our findings suggest that airlines should not seek both simultaneously. The coefficient for the effect of SOE on the sustainability measure is negative and significant (p-value <0.01). Therefore, H2 is rejected, suggesting that state-owned airlines did not appear to conduct ESG initiatives. The same is true for fully controlled airlines (SOEpct) but the magnitude of changes in ESG score for this group is lower (-0.9440).

Consistent with former investigations on sustainability initiatives, we find that firm age is a significant predictor of the extent of ESG engagement. The variable positively influences ESG with a coefficient of 1.3 (p-value <0.01). Therefore, H6 gains support. Firm size is also positive, but non-significant, in the main model. This means that sustainability hypothesis (H5) gains support for this variable as well. Considering control variables, the effect of dividends produces a statistically significant result. The finding is consistent with the view that high dividend payout firms are more likely to disclose ESG scores. Consistent with the literature, the coefficient for leverage is negative (although non-significant). It is commonly observed that air transport industry has high degree of financial leverage since airlines may use great amounts of long-term debts to finance the tangible assets (Gritta et al. 2006). Therefore, debtholders become a crucial group of stakeholders of the firm so that the management teams may prioritize their concerns to creditors rather than implementing costly ESG initiatives. Thus, higher levels of financial leverage can lead to less contribution in ESG activities for the airline industry. However, when the interaction term is added, it becomes highly positive and significant which means that highly leveraged state-owned firms, are more likely to consider ESG disclosure to address claims from all investors.

To test the moderating effect of state-owned airlines, we added the interaction term between TQ and SOE. This resulted in the slope of TQ becoming positive but not significantly different from zero (p-value=0.45>0.1), while the interaction term became positive and had a significant impact on the dependent variable (t-value=1.81; p-value<0.1). Therefore, Hypothesis 4 gains support. Accordingly, we conclude that the SOE factor moderated the relationship between sustainability measures and financial performance. These results are in line with the argument that the relationship between ESG disclosure and financial performance may be influenced by the ownership structure of the firm in such a way that non-state-owned companies may not benefit from higher financial performance as much as do their state-owned counterparts. This finding is innovative since the relationship is rarely investigated, and it can be considered as a major contribution to the literature. Thus, SOEs are able to respond better to their shareholders for the implementation of ESG initiatives by achieving higher financial performance. A summary of the regression results is provided in Table 5.4 Empirical results for the regression analysis.

Table 5.4 Empirical results for the regression analysis

Variable	Model 1(Full Panel with Dummies)			Model 2 (Interaction Effect)		
	Coeff.	t-value	p-value	Coeff.	t-value	p-value
TQ	-1.3436	-2.004	0.045886 **	0.966080	0.7529	0.4519700
ROA	0.6238	0.112	0.910957	-10.930923	-0.9226	0.3568369
Lev	-5.2907	-1.515	0.130676	30.166716	4.9779	9.904e-07 ***
Div	2.7128	2.058	0.040359 **	3.622349	1.2632	0.2073042
Size	0.7522	0.872	0.383999	-1.186154	-1.1495	0.2511036
Age	1.3476	11.379	<2e-16 ***	0.015670	0.3303	0.7413375
Flag	-50.9899	-6.425	4.50e-10 ***	-10.251715	-4.0629	5.931e-05 ***
SOE	-22.0734	-6.690	9.29e-11 ***	7.892236	2.1304	0.0338065 **
SOE (pct)	-0.9440	-0.317	0.751491			
TQ*SOE				5.621842	1.8136	0.0705622 *
Model	Fixed effects			Pooling		
Adj. R^2	0.25			0.11		

† Signif. Codes: '***' if p-value < 0.01; '**' if p-value < 0.05; '*' if p-value < 0.1

Also, given the estimated results for the interaction model, in Fig. 1, we plot the marginal effect of being state-owned (SOEs) or non-state-owned (non-SOEs) on the relationship between FP and ESG. We see that

the negative slope of two lines suggest that the FP is negatively associated with the ESG. However, the red line (SOEs) and the blue line (non-SOEs) are not parallel. It means that having the same FP, the level of ESG participation is different according to the type of ownership. The slope for non-SOEs (blue line) is steeper than the SOEs (red line) indicating that the negative association is weaker in the state-owned airlines. Therefore, sate-ownership positively moderates the FP-ESG association.

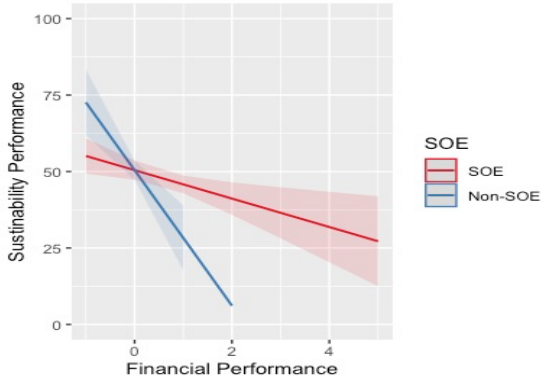

Figure 5-1 Interaction plot

5.5 Discussion and conclusion

Sustainable development strategies are gradually becoming a paradigm change in the businesses. Thus, it is not only about to decelerate harmful climate side-effects of doing business, but it should also benefit stakeholders across the business. The main purpose of this paper is to investigate how airlines' FP, SOE (fully and partially), size, and age influence the ESG performance of airlines, and the moderating effect of state-ownership on this ESG-FP association. We employed data from 36 airlines retrieved from Eikon for the years 2008–2019. Our empirical results suggest that a firm's FP negatively and significantly affects its ESG disclosure.

The negative impact of FP on ESG implies that, when an airline makes excess returns, it may give low priority to implementing an ESG agenda. In other words, this negative link may indicate that the higher cost of improving its ESG score will be seen to decrease financial performance. Overall, the finding confirms the view that more sustainable firms tend to experience lower profits, which hurt stakeholder wealth, and consequently they have fewer available resources to increase investment in ESG (Makni et al. 2009). Because the firm does not consider the ESG activities as either a revenue generator or a value driver, it consequently tends to focus less on sustainability issues such as reducing emissions, protecting human

rights, increasing diversity of board, and protecting shareholder rights. Increased engagement in sustainability initiatives not only does not result in financial return maximization, but also is associated with reduced FP. This may affect the investors perception of the degree of success of an airline since they assume its TQ is a sign of its returns and a valuation which gives an expectation for share ownership. As for the firm itself, higher profitability and earning prospects are related to lower participation in sustainability initiatives. Consistent with the recent study by Moneva et al., (2020) for a group of tourism-related industries including airlines, our finding refute the SRT argument indicating that an airline's willingness to contribute in ESG initiatives is not determined by FP. The results are also in line with Sun et al. (2019) and Chen et al., (2018) who argue that FP seems to be a secondary factor in the ESG decision. However, this is not consistent with the study by Singal (2014) which predicted that investment-grade firms in the tourism industry are likely to contribute more to sustainability practices than their financially weaker counterparts.

Our findings for state ownership are twofold: first, our main effect model shows that having state shares (both partially/fully state-shares) in its shareholder structure is negatively and significantly (although not for fully state-owned) correlated with a firm's sustainability performance. This means that, when state shares in an airline increase, its engagement in ESG initiatives tends to decrease. These results contradict the sustainability viewpoint which assumes that state-owned firms consider ESG reporting as a strategic instrument for improving the efficiency of their transactions with shareholders which, in this case, is to obtain legitimacy to satisfy investor expectations (Argento et al. 2019). This supports the view that many financially distressed airlines are suffering from poor service quality, both in the air and on the ground, due to ethnical and organizational problems such as maladministration, insufficient staff, and strong unions (López-Bonilla & López-Bonilla, 2008). Another possible reason for this is that the sampled airlines are located within different countries having different regulation systems which either do (or do not) require them to report their sustainability performance.

Second, the results show that state ownership positively and significantly moderates the ESG-FP relationship. This is consistent with the view that state ownership could play a key role in sustainability participation of the firm (Zu & Song, 2009). This is also in line with the argument that state intervention had a positive influence on the ESG disclosure level of firms (Cai et al. 2017; Wang et al. 2018). Based on the view, in comparison with non-state-owned firms, SOEs could achieve higher FP levels. Thus, the SOEs could better meet the shareholder expectation of participation in sustainability initiatives while having a reasonable FP level. The finding, however, is inconsistent with that of recently conducted study by Long et

al. (2020) which, for a set of Chinese listed firms, finds that corporate sustainability influences FP more positively in non-state-owned firms than it does in state-owned ones. In addition, Peng & Yang (2014) found that ownership concentration plays a critical monitoring role in the ESG-FP association which is contrary to our empirical results.

In addition, the current study reveals that both firm size and age (even though the size factor was not significant), are relevant factors for ESG participation. This is consistent with the sustainability hypothesis claiming that larger (Garde-Sánchez et al. 2018; Udayasankar, 2008) and older (D'Amato & Falivena 2020) firms tend to participate more in ESG and vice versa.

The current paper contributes to the literature by providing augmenting the limited empirical studies on factors that drive sustainability for airlines. It, therefore, assists in the advancement of sustainability initiatives influencers in airline literature by providing empirical evidence in this context. These approaches have discussed the relevancy of implementing sustainability for firms across industries. Executives and managers could benefit from these results to allocate available resources to ESG activities through adopting more efficient and rigorous approaches.

5.6 Implications, limitations, and future research

This paper contributes to both the wide-ranging academic debate and practice perspectives. From a theoretical viewpoint, the findings echo the existing literature on the FP-ESG association indicating that firm's FP negatively influence the implementing of ESG initiatives and "It is not easy being green". It is also among the few studies considering state ownership and its moderation effect in a research agenda to link FP- ESG. Additionally, this paper focuses on the airline industry which is one of the most challenging industries in regard to sustainability. To conclude, the research theme covers a key concept with an impact on reaching SDGs by providing new findings and perspectives across the industry.

Similarly, as the main contribution of this study, executives and managers of airlines may also find these results informative considering their business strategy in facing the growing sustainability agenda and contribution to sustainable development. Notably, considering the structure of the airline industry, we set the study implications from both business strategy and public policy horizons. Given that the current business strategy of airlines is ineffective as most airline companies experience low revenues which prevents the industry from expanding, business model modification is vital to meet the sustainable development goals (Nzuva 2020). Therefore, achieving an excess return, should not hide the long-term

benefit of ESG participation and the higher cost of strengthening its shareholder commitment will be paid off by permanent benefits of sustainability. Consequently, airlines indeed do need to face pressure to address stakeholders' interest as they incur costs and public issues regarding future economic disadvantage. In such a scenario, Scholtens & Zhou, (2008) argue that the corporation is advised to create an optimized model to cover both stakeholder benefits and shareholders. In this way, the cost of sustainable development activities would be offset by benefits of responsible investments with coherence between firm policies, management structure and commitments to common goods (Rivera et al., 2017). In this sense, according to McKinsey (2020), the ongoing Covid-19 pandemic has brought up a new era for the aviation industry, giving the industry the best chance to address sustainable development goals. The logic behind the claim is now that the air transport has lost its growth capacity by roughly 75 percent, it will undergo structural changes in terms of demand and degree of industry consolidation, along with unprecedented government support to rebuild itself. This transformation provides an opportunity to initiate sustainable development strategy, which may protect the industry against unforeseen events such as health crisis (e.g., current pandemic and SARS), global economic crisis (e.g. the global financial crisis in 2008) and terror attacks (e.g. the September 11 attack). Specifically, airline companies are suggested to take a multi-stakeholder approach and create a regulatory strategy to overcome the current challenges and address SDGs. In this sense, our findings provide insights for managers considering allocating available resources to ESG activities through adopting more efficient and robust approaches which consider the firm's characteristics in terms of its business model and ownership structure. Specifically, we provide evidence for airline managers that considering ESG initiatives would cost their FP. Thus, unlike the traditional investor view which considers the absolute ruling power of owners, there are increasing demands that corporate policy should be shaped in the light of an institution's social responsibilities (Coffey & Fryxell, 1991) Airline executives should make an effort to find the optimal solution to proactively engage in sustainability initiatives while not allowing their firms to financially suffer from this participation. This provides an insight to these executives on how to integrate ESG initiatives into their strategy and improve future scenarios and sustainability opportunities (and risks). This way, they would be able to control increasing market and stakeholder pressure to enclose sustainability information. For example, the success of airlines is tied to the possibility of minimizing costs as the most apparent obstacle to go green. Naturally, incremental innovation provides a potentially better strategy by focusing on the competitive advantage and increasing eco-friendly service via encouragement of innovative products and technological development. The view is well supported by the sustainable business strategy for the sector in so called "Waypoint 2050"

by (ATAG 2020): "Aviation has a strong history of solving challenges through technological innovation. From the first forays into powered flight, to the jet engine, use of composites and 3D printing, constant improvements are part of the sector's DNA. Responding to the climate change challenge is no different". In this sense, turning to sustainable aviation fuel could be an option for industry practitioners. This is aligned with SDGs and industry characteristics because fossil fuels account for 20 to 30 percent of airline operation costs (one of the single cost items) (McKinsey 2020). Stakeholders in the air transport industry appear to support the commercialization of sustainable and alternative fuels, which will help airlines to save costs (IATA 2014). Also in line with stakeholder theory, a firm's ownership structure forms a part of the general strategy to link the firm with external stakeholders and could play a significant role to upgrade its reputation, legitimacy and credibility (Aksoy et al. 2020). Therefore, considering the research results that state ownership positively moderates the effect of economic performance on investment in sustainable development initiatives, it seems that improving SDGs in state-owned airlines is less costly. Accordingly, this could be translated to certain strategic business policies for this group of airlines with state shares showing their competitive advantage to proactively involved in incorporating sustainable development initiatives. This also favors the state ownership concentrated airlines to have an alignment of interests among firm stakeholders and sustainable investment. Specifically, this type of airlines with managerial governance are having access to large liquid capital markets and generate economic performance (Carney and Dostaler 2006), thus, mitigating the risk of green investment.

In terms of the public policy of the airlines as inferred from research results, higher financial performance cannot encourage airlines to participate in sustainability initiatives, we suggest the following initiatives. Initially, it must be noted that obtained results are based on analysis of roughly one-third of the airlines listed in the Thomson Reuters Eikon database, which means that a large gap exists in term of ESG data in the sector. This is because in most countries where these airlines are headquartered, sustainability reporting is a voluntary activity. The discussion set out by suggesting that policymakers at national and international levels may consider more restricted roles in encouraging industry practitioners to seriously contribute to sustainability issues. In particular, the desire for policy change is more in demand for air transport as a sustainability-sensitive industry, because not issuing sustainability performance might create information asymmetry between airline's principals and agents (Karaman et al. 2018), which can be reduced by sustainability reports as an "information bridge" (Luo et al. 2015). Given the ample long-term benefits of sustainability reporting such as its internal contribution to agenda setting, staff motivation, better liability management, as well as external reputational maximizing implication (Hooper and Greenall 2005), the

study reminds of the necessity of coordinated action to develop an obligatory reporting framework that can appreciate SDGs. Indeed, as Bhattacharya & Sen, (2004) suggested, at the strategic formulation of sustainability, industry practitioners need to ensure that implementation of such an activity induces a clear sense of financial returns or "doing good". In doing so, they are suggested to apply the efficient measurement models that precisely estimate the impact on a corporation's relevant stakeholders including its customers. Because the overall evaluation of consumers as source of generating value for airlines is clearly affected by a firm's sustainability record. Air transport is inherently vulnerable to sustainability criticism because of its operations (e.g. contribution to climate change by CO2 emission, air pollution and noise production). Therefore, practitioners need to engage high level of SDGs initiatives to appease a variety of stakeholder groups. This led to our second policy note, which is that international agencies and organizations may propose sustainable economic development strategy opportunities to airline firms to offset the cost of these shareholder initiatives. One possible solution is to work with governments to provide adequate economic support (Nzuva 2020). Combined with mass media communicating proactive sustainable airlines to increase their visibility and reputation. Consequently, this induces loyalty and positive word of mouth among all stakeholders, and creates the competitive edge for them (Madanaguli et al. 2021). Finally, sector investors are advised to understand that rewards of green investment do not necessarily come with an immediate impact on their targeted firm but with time and from benefits of meeting SDGs.

Future research in this area may study bigger samples to compare with the sampled firms in the current study, and possibly over a longer period, to conduct richer and more in-depth empirical research. A more detailed and precise analysis of the influence of parameters considered in this study would be enlightening and perhaps suggest ways of better promoting sustainability practices in the airline industry. Another interesting avenue for future research is to separate ESG scores into its three environmental, social, and governance pillars and examine the topic for each component. Firms may target different types of pillar green management, leading to different levels of financial management (Yu & Huo, 2019). Finally, since in this research we have focused only on state ownership, future research can extend this to analyzing the impact of other types of ownership structure on ESG disclosure.

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Appendix A

Sampled Airlines

Country/Region	Company Name	Stock code	Date of incorporation
Germany	Lufthansa	823212 (LHA)	06/01/1953
Hong Kong	Pacific Airways	293	17/10/1948
France	KLM	FR0000031122 (AIRF)	31/12/1954
Singapore	Singapore	C6L (SIAL)	27/01/1972
Sweden	SAS AB	SE0003366871 (SAS)	31/12/1945
United Kingdom	Easy Jet	B7KR2P8 (EZJ)	23/03/2000
Republic of Ireland	Ryanair	IE00BYTBXV33 (RYA)	04/06/1996
Japan	ANA Holding Group	9202	26/12/1952
United States of America	Alaska Air Group Inc	000011659109 (ALK)	14/03/1985
Thailand	Thai Airways	THAI	28/03/1960
Taiwan	China Airlines	2610	06/09/1959
South Korea	Korean Air	003490	18/06/1962
Taiwan	Eva Airways	2618	06/04/1989
China	China Southern Airlines	600029	24/03/1995
Brazil	Gol Transportes Aéreos	GOLL4	11/03/2004
China	Air China	601111	26/03/2006
Canada	Air Canada	000008911877 (AC)	23/11/2006
United States of America	JetBlue	000477143101 (JBLU)	23/08/1998
United States of America	Delta Air	000247361702 (DAL)	15/03/1967
Chile	LATAM Airlines	LTM	07/08/1986
Panama	Copa Holdings SA	000000000000 (CPA)	05/05/1998
United States of America	United Airlines	000910047109 (UAL)	29/12/1968
Japan	Japan Airlines	9201	31/07/1951
Turkey	Turk Hava Yollari	THYAO	29/01/1960
Malaysia	Airasia Group	5099 (AIRA)	23/08/2017
United Kingdom	Consolidated Airlines Group SA	B5M6XQ7 (ICAG)	23/12/2009
Australia	Qantas	QAN	17/01/1934
Canada	ACE Aviation	00000440P409 (ACEh)	13/12/2007
China	China Eastern Airlines	600115	13/04/1995
United States of America	SkyWest Inc	000830879102 (SKYW)	01/03/1972
United States of America	Hawaiian	000419879101(HA)	23/04/2002
New Zealand	Air New Zealand	AIR	25/04/1940

United States of America	Spirit Airlines	000848577102(SAVE)	07/03/1994
Panama	Avianca Holding	PAI69PA00017(AVT_p)	02/03/2011
India	Interglobe Aviation	EQINDIGO (INGL)	12/01/2004
Australia	Virgin Australia	VAH	29/12/2000

† The codes in parenthesis are refinitiv identification code (RIC) of airlines in Eikon database framework

Appendix B

Study Variables

Variable	Definition	Description
Dependent Variable		
ESG	ESG score	Thomson Reuters score for an overall company score based on its self-reported information in the environmental, social and corporate governance pillars.
Explanatory & Control Variables		
TQ	Natural logarithm of Tobin's Q	Tobin's Q= market value + total debt – current assets / total assets
ROA	Return-on-Assets	It measures a company's operating efficiency regardless of its financial structure.
Div	Dividend pay-out ratio	Defined as the average gross dividends-common stock over 5 fiscal years divided by the average of income available to common excluding extraordinary items for the sample period and is expressed as percentage.
Lev	Leverage Ratio	Defined as total liabilities over total assets.
Size	Firm Size	Natural logarithm of total assets.
Age	Firm's Age	The number of years since company's foundation (start doing business).
SOE	State-ownership	It is computed by a binary (dummy) variable, where "1" indicates whether the airline holds a government share in its ownership structure.

SOEpct	State-ownership Percentage	It is measured by the proportion of government shares to total shares where "1" indicates whether at least 50% of the shares of an airline holds by the government and "0" otherwise.

Appendix C

Diagnostic Tests

Model 1	**Pooling vs Random-Effects**	**Pooling vs Fixed-Effects**	**Fixed-Effects vs Random-Effect**	**Favorable Model**
	Lagrange Multiplier Test - (Honda) for unbalanced pane ls	F test for individual effects	Hausman Test	**Fixed-Effect Model**
	p-value < 2.2e-16	**p-value < 2.2e-16**	**p-value = 1.286e-06**	
Model 2	**Pooling vs Random-Effects**	**Pooling vs Fixed-Effects**	**Fixed-Effects vs Random Effect**	**Favorable Model**
	Lagrange Multiplier Test - (Honda) for unbalanced pane ls	F test for individual effects	Hausman Test	**Polling OLS Model**
	p-value < 2.2e-16	**p-value = 0.4268**	**p-value = 3.654e-09**	

Chapter 6.

Sustainability in supporting firm value during Covid-19 at the air transport industry

Chapter 6: Sustainability in supporting firm value during Covid-19 at the air transport industry

Empirical Paper

Exploring the role of sustainability in supporting firm value during industrial crisis in the airline industry: Evidence from Covid-19

To be submitted in near future!

5.1 Introduction

Before 2020, based on the released data the air transport industry had become one of the most important sectors in the world economy based on its share in global GDP and creating jobs worldwide (IATA, 2018). However, the emergence of Covid-19 pandemic in early 2020 has brought financial devastation and uncertainty in the airlines' business activities. This was due to the fact that most countries adopted complete or partial lockdown approaches to mitigate the spread of the disease and ameliorate its negative effects. As all airline business activities are categorized in so called "contact-intensive services", these unprecedented measures had a profound impact on the number and purpose of trips and modes of travel (Yang et al., 2021). Although the governmental policies have diminished and many countries in Europe and North America have entered the endemic phase of the pandemic, the Covid-19 is likely to continue especially as vaccines' immunity wanes resulting in spurring limit changed in the public behaviour (McKinsey, 2022).

In such a circumstance of uncertainty, awareness of all relevant factors that promote and restrict travel is critical for industry practitioners to formulate business strategies that probably help attract customers during and after the crisis (Shin et al., 2022). In addition, professionals also are interested in discovering how destructive the pandemic has been on the firms' financial performance across industries. On this basis, an increasing number of academic studies are focusing on the issue to provide a thorough understanding and attempt to deliver managerial insight for handling the issue better (e.g., The Covid's effect in changing travel behaviour (Yang et al., 2021), the pandemic's impact on firm risk considering its capital structure (Huang and Ye, 2021); corporate immunity to the Covid-19 (Ding et al., 2021), etc.). There are also studies considering the mechanisms such as CSR under which firms could alleviate the damage from Covid-19 such as Albuquerque et al., (2020); Yoo et al., (2021); Huang & Ye, (2021) among others. For example, Bae et al., (2021) studied the association between CSR and stock market performance of 1750 US firms during the pandemic and ,albeit weak, found that when CSR complaint with company's institutional environment, the stock return is more positive. Similarly, Yeon et al., (2021) for a sampled US hotel, casino and restaurants support the argument by finding the "insurance-

like" protection of CSR for firm returns at the recent pandemic time. However, while most of these studies have reported how the impact of the pandemic outbreak on firms, more attention is needed to explore a way that could alleviate that impact (Qiu et al., 2021).

The literature has reported that the pandemic had an immediate impact on the stock price index and firm value across industries. For instance, in just over a month starting from February to March 2020, the Dow Jones Industrial Average in the US and the Australian ASX200 index were dropped by 36 and 24 percent, respectively (Huang and Ye, 2021). Likewise, the stock price for most airlines, transportation, and hospitality companies dropped while exhibiting more significant volatility than other businesses (Farooq et al., 2022). Market value is a basis for many financial ratios in measuring the current performance of a company and provides insight on the future business condition of affirm (Hirschey and Wichern, 1984), thus, it is very important for the management to safeguard it within the firm. The pandemic has destroyed shareholder value. It did so directly through clean-up costs and fines but also via lingering reputational damage (McKinsey, 2020c). Therefore, proposing managerial orientations to save firm value would be a great contribution to both theory and practice. Environmental, social and governance (ESG) has emerged as an agenda to secure the long-term benefit of the business. Academic attention so far has been mainly concentrated on how ESG correlated with the firm performance and stakeholders' value (e.g. Lee et al., 2013; Zeidan and Spitzeck, 2015; Weber, 2017; Singh and Misra, 2021; Yu and Huo, 2019; Tanin et al., 2019). Taking general perspective, one can conclude that majority of the research works on this topic have reported that promoting ESG activities is positively associated with firm's financial performance (Gillan et al., 2021), and also increase shareholders' welfare (Huang and Ye, 2021).

In addition, contribution to sustainability activities is also linked with negative volatility of stock prices when unexpected negative event occurs and immunises firm's benefits against risks (Yoo et al., 2021; Huang and Ye, 2021; Albuquerque et al., 2020; Ding et al., 2021). For example, Yoo et al. (2021) showed that higher levels of ESG score (especially environmental pillar) is associated with additional returns and lower stock price volatility during the current pandemic time. Similarly, Yeon et al. (2021) examined the moderating role of sustainability activities on the association between the Covid-19 and stock returns using the sample of hotel, casino, and restaurant firms, and found a support for the "insurance-like" protection role of CSR activities at this turbulent time. However, despite of some attempts to deepen understanding of the role implementing sustainability standards play at the crisis time, more empirical investigation is needed to make a judgment (Yoo et al., 2021). Moreover, given that each industry is made of a group of firms operating at the same circumstance with sharing a similar business type and differ from other industries, sustainability activities are likely to make different impacts across different industries. Therefore, studies concentrating on a specific industry could provide more detailed insights on that section. Particularly for airline industry, there is a lack of studies replying

on the degree to which sustainability implementation has been protecting stock values during the pandemic.

Academics have also argued about the significancy of business model when discussing contributing to sustainability activities. The argument is to show that incorporating sustainability initiatives into business cases should also guarantee economic success and competitive advantage to create sustainable business model (Rotondo et al., 2019). There are only a few studies focusing on the performance difference of these two types of airlines in a crisis and risk-adjusted time. Flouris and Walker (2005) studied the performance of US full-service and low-cost business models in the aftermath of 9/11 terrorist attacks. They found that low-cost airlines significantly performed better having more flexibility from operational perspectives. However, full-service airlines are generally obtain higher performance scores based on stock market indicators (Zhang et al., 2021). This difference may arise from emphasizing on service quality and sustainability activities leading to improved firm image and reputation by full-services (Seo et al., 2015). The difference that business model can made in market performance of airlines at the crisis time is also proved during the Covid-19. For example, Kökény et al., (2021) argue that low-cost airlines might be more vulnerable during the unexpected negative time than full-services. This study also considers the significancy of business model in moderating role of ESG activities on market performance during the Covid-19.

In the light of this background, in this study, we initially examine the impact of Covid-19 on firm's financial performance measured by stock returns during the pandemic period. We further explore the moderating impact of ESG initiatives on the relationship between Covid-19 and firms' stock returns to investigate whether a firm's investment in ESG initiatives provides resilience during a crisis. In so doing, this study made an additional effort to analyse both overall impact of ESG combined scores as well as the individual impact of ESG pillars (environmental, social and governance) to find out if each ESG pillar leads to different results. We consider that this research provides a meaningful and significant contribution to the existing literature, and also offers practical implications because with a detailed knowledge concerning the general airline industry and later dividing the sample based on the business type of selected companies, industry practitioners could benefit from the findings looking for the best business decisions making them as successful as possible.

The structure of this study is as follow: Section 2 briefly reviews the relevant literature and develops the hypotheses; Section 3 describes the design of the data and study variables; Section 4 provides the detail on econometric approach and presents the empirical results. And a discussion and concluding remarks are given in Section 5.

5.2 Literature review and hypotheses development

5.2.1 The impact of Covid-19 on airline firms market value

Stock markets are highly sensitive to unprecedented events (Ganie et al., 2022). Among the unpredicted events, pandemic and health related news clearly affect the financial markets (Orhun, 2021). From this perspective, severe acute respiratory syndrome (SARS) and Covid-19 as infectious diseases appeared to have a significant adverse effect on the stock values. It is because such risks disrupt business operations regardless of the industry in infected countries. Given the contagiousness of these diseases, governments of infected countries adopted different measures to curb the spread of the virus including limit contacts (such as stopping unnecessary movement out of the home, stopping public transport, school and university closure, and strict social distancing measures) (Aharon and Siev, 2021). Such restrictions immediately effect the economy. The airline industry is one of the first to suffer because of the dramatic drop in passenger demand. Due to the Covid-19 outbreak the market value of airlines shrank significantly (Maneenop and Kotcharin, 2020).

The topic has attracted considerable academic attention in tourism and hospitality field including airlines (Chen et al., 2022). These studies investigated, by comparing the situation before and after the outbreak, to what extent the firms in this industry may suffer (Liew, 2020), how severe is the impact and what the impact on stock price volatility may be (Deb, 2021), and by comparing stock returns for the airline industry with the whole market return (Maneenop and Kotcharin, 2020). Different events and daily data sets were selected in these studies. For example, Liew (2020) observed the rapid decline in profit of the airline and tourism related business by monitoring statistics derived from three leading consolidators, namely, hotel accommodations, airline tickets, and travel service services. Deb (2021) found that Covid-19 had an unprecedentedly severe effect on the stock price movements of airlines. He further proposed a method to predict the market reaction to similar events especially in the short-term. Finally, Maneenop and Kotcharin (2020) found that airline share prices reduced more significantly than the whole return of market following the pandemic major news announcements ?. Studies in this domain have highlighted the necessity of policy designs to alleviate the impact of the pandemic in the airline industry. Considering that the airline industry has been considered as one of the most damaged industries due to Covid-19, this study postulates a negative impact of Covid-19 on stock returns of airline firms.

H1: The Covid-19 has a negative impact on airlines' performance.

5.2.2 The modeling role of ESG

Recent academic debates criticized the classic "shareholder value" maximization as the ultimate goal of a business and in addition to the shareholder owner discuss its broader and long-term success in a form of "stakeholder value" development (Bose et al., 2022). Stakeholder view argues that making an sustainable investment to maintain sustainable societies will be paid off by latter's support for how firm's conducting their operations and increases their value (Deng et al., 2013; Bose et al., 2022). The core to the interest of various groups of stakeholders is a firm's performance in societal and environmental aspects which is assessed via corporate social responsibility (CSR) activities (Theodoulidis et al., 2017). The term, CSR, was first formalized by Bowen (1953) as a set of the obligations to pursue politics or to follow lines of action in decision-making which are desirable in terms of objectives and values of society. The term later structured in Carroll (1991) who defined four specific aspects of economic, legal, ethical and philanthropic activities. Further, he adjusted the framework by mixing two ethical and philanthropic sub-fields to create new three dimension framework with economic, legal and ethical categories (Schwartz and Carroll, 2003; Lee et al., 2013). In other words, CSR is as a voluntary corporate commitment to exceed the explicit and implicit obligations imposed on a company, based on social expectations of conventional corporate behaviour (Falck and Heblich, 2007). Environmental, social and governance (ESG) scores have appeared as an important pillar of CSR for development of sustainable strategies that affect the financial performance of multinational firms (Eccles and Serafeim, 2013; Duque-Grisales and Aguilera-Caracuel, 2019). Investors are increasingly looking for firm activities called sustainability related activities or sustainable development standards which bring the environmental health, give the sense of social responsibility, and address issues at their corporate governance which are jointly captured by the acronym ESG (Gillan et al., 2010). According to the Thompson Reuters Eikon (2019) guidance, the first component of ESG is environmental pillar (Env) which accounts for a consequence of a company's operations on living and non-living natural systems, including air, land, and water, as well as complete ecosystems. The Env reports how well a firm utilizes the best management practices to avoid environmental risks and takes advantage on environment innovation opportunities to generate long-term shareholder value. The social component (Soc) assesses a firm's capacity to generate trust and loyalty with its workforce, customers, and society. These two features (i.e., trust and loyalty) could be achieved by showing its commitment to develop the best working conditions for the workforce, provide different services and safety of its license to operate for its clients and respect the value of the community. Finally, the governance pillar (Gov) addresses a firm's governing settings, systems, and processes, to make sure that its board members and practitioners are working in the interests of its long-term shareholders. The Gov capacity entails using methods and innovative practices to direct and control the firm's rights and responsibilities through the creation of incentives, as well as checks and balances in order to generate long-term shareholder value.

The topic has been well discussed in academic investigations to introduce an applicable sustainability framework since the 1950s (Stevenson and Marintseva, 2019). Within this line of research, the particular attention is given to the association between implementing sustainability activities with firm financial performance. Studies on the association between financial performance and sustainability disclosure are yet to produce conclusive results (Jadoon, 2020; Lee and Park, 2010). In this regard, there are contributions concluded with existing a positive relationship between sustainability disclosure and financial performance (e.g. Eliwa et al., 2019; Pavlopoulos et al., 2019; Aouadi and Marsat, 2018; Li et al., 2018; Brogi and Lagasio, 2019; Qureshi et al., 2020; Long et al., 2020). These studies argue that sustainability activities can assist a firm to better meet stakeholder interests (Lee et al., 2013). In general, the positive impact of sustainability reporting for a firm could be classified in five major benefits of 1. Promoting firm's reputation, 2. Gaining a competitive advantage, 3. Enhancing transparency, 4. Enabling comparison with competitors, and 5. Assisting employees in recognizing the firm's sustainable development activities (Herzig and Schaltegger, 2006; Buallay, 2019). Rooted in work by Freeman (1984), the other category of empirical studies resulted in a negative relationship between implementing sustainability activities and financial performance (e.g., Duque-Grisales and Aguilera-Caracuel, 2019; Moore, 2001; Buallay, 2019; Lee et al., 2009). This negative direction is probably due to the costs related to the implementation of these initiatives which are not reflected in a FP because these practices are not performed in the correct manner or because there is not enough institutional support to render them more visible, thus not ensuring approval from stakeholders. This research stream highlights the necessity of more thorough investigation on the relationship (Seo et al., 2015). Malik (2014) summarizes empirical studies from both positive and negative consequences of sustainability reporting on firm performance and consistent with the encouraging side, supports the value-enhancing possibilities of sustainability engagement.

The academic literature also emphasizes on considering various perspectives of the industry stakeholders when discussing crisis management (Carlsen and Liburd, 2008; Miguel et al., 2022). Stakeholders are defined as all those who can affect, or are affected by the achievement of organizational objectives (Freeman and David, 1983). Based on this theory, if a firm manages to successfully meet the demands of its stakeholders, organizational sustainability will be achieved (Garvare and Johansson, 2010). Therefore, considering that the stakeholders' benefits are assessed through a firm's contribution to sustainability activities, the theorists examine how firms treat their stakeholders specifying which corporate activities are consistent and which are inconsistent with shareholder benefits (Driver and Thompson, 2002; Campbell, 2007). In addition, the theory also suggests that a firm to better satisfy the wishes and desires of its stakeholders, also attempt to avoid activities reducing the ability of interested parties such as future generations to meet their needs (Garvare and Johansson, 2010). Indeed, stakeholder theory, sustainability and quality management are closely tied to form effective stakeholder management for a firm. On this basis, Roberts (1992) argued

that stakeholder theory provides an avenue to integrate hypotheses regarding sustainability activities and firm value. These sustainability activities aimed to support stakeholder reciprocation or extend the innovative capacity of the corporation lead to superior financial performance (Vishwanathan et al., 2020; Cardillo et al., 2022).

In this context, Godfrey (2005) provides another hypothesis of how sustainability activities can generate an insurance-like protection during a negative event through creating moral capital or good will. In this regard, firms with higher level of moral capital or goodwill could be considered more trustworthy (Yeon et al., 2021). With the distractive impact of the pandemic on the stakeholder value of firms, this function of sustainability activities has received growing attention and it has become a core of recovery plan in many countries (Bae et al., 2021). It is believed that high level of sustainability investments for a firm means that it can provide more support for respective stakeholders, and also it has higher potential to fulfil the implicit commitments with its stakeholders (Cheng et al., 2014; Gao et al., 2016; Bose et al., 2022). The rationale of this claim has been documented in Yeon et al., (2021) where they develop the cognitive dissonance theory based on Festinger (1957). According to this view, stakeholders will struggle in their attitude about the firm when crisis happen resulting in mental discomfort feeling. This encourage them to only pay attention to the released information which is in line with their prior positive attitude of the firm. This cognitive process lead the stakeholders to manipulate their mental information processing toward the direction they prefer (Kunda, 1999), which consequently discounted or filter the unpleasant news related with the crisis via this cognitive bias process (Sohn and Lariscy, 2015).

A few available empirical investigations provide supporting evidence for the argument. For example, Yi et al., (2021) find the positive association between CSR activities and firm returns for the sample of Chinese companies during the Covid-19 pandemic. For a broader sample including 6700 companies from 61 countries, Ding et al., (2021) confirmed that firms with higher pre-Covid-19 sustainability rating were more resilient to the negative wave of the pandemic. As for the hospitality industry, Charles et al., (2021) provided more empirical evidence to the debate where they showed that engaging in sustainability activities alleviate the negative effects of the pandemic and increases the stock returns of Chinese firms including airlines. From this argument, one manifest that sustainability activities could enhance the firm's bond with its stakeholders which allow it to more effectively work in respond to the pandemic (Ding et al., 2021).

Thus, this study followed the theoretical claims and empirical findings, to test the moderating effect of sustainability activities on the association between firm performance during the Covid-19 pandemic.

H2: ESG positively moderates the negative effect of Covid-19 on airlines' stock performance. In other words, the negative effect of Covid-19 on airlines' stock performance decreases as airlines' ESG investments increase.

5.2.3 Significancy of business model

For studies focusing on airline industry, the type of airlines has been discussed to linking corporate sustainability and financial performance such as Seo et al. (2015), Rotondo et al., (2019), Abdi et al., (2021) and Yang and Baasandorj (2017). The topic is quite relevant since in transportation industry the nature of operation affects the sustainability performance (Borghesi et al. 2014). Studying low-costs and full-services is justified as these two types of airlines are significantly different in terms of strategic business model including operation and management practices, leveraging organizational capabilities and reconceiving the value creation (Flouris and Walker, 2005; Kökény et al., 2021). Low-cost airlines have shown strong financial performance by efficient allocation of resources and reducing operation costs, while full-service airlines are known through offering high-quality products and services to target superior value consumers (Seo et al., 2015). Therefore, the airline's type could impact the way it is allocating its resources based on its business strategy including sustainability activities. It is argued that in term of sustainability activities, low-cost airlines place less emphasis on consequences of their operation on environment and produce noise (Rotondo et al., 2019). This is due to the fact that for low-cost airlines' operational efficiency saving could not offset non-operational investment on sustainability initiatives (Nidumolu et al. 2009). Full-service carriers are found to be more environmentally friendly than low-cost counterparts (Hagmann et al. 2015). This type of air carriers are characterized with high expectation in term of sustainability activities with respect to stakeholders' view (Seo et al. 2015).

Considering firm performance during unexpected crisis time, Zorn (2001) argued that low-cost airlines are more resilient during the economic crisis. Flouris and Walker (2005) later confirmed this result by examining the market perception of the viability of low-cost airlines against full-service counterparts in the aftermath of 9/11 terrorist attack. They found that the low-cost airlines provided significantly more financial and operational flexibility than full-service airlines. However, most recently, Kökény et al., (2021) in testing the significance of European airlines' business model for their stock market performance during the Covid-19, found that European full-services significantly performed better than low-costs.

Although both types of airlines suffered significantly during the Covid-19 pandemic, we consider the above finding of prior studies in convincing that the performance of airlines could be different. Therefore, we propose that the positive moderating effect of ESG (H2) differs between full-service and low-cost airlines. More specifically, the positive moderating effect of ESG exists for full-service airlines while such moderating effect does not exist for low-cost airlines. This may be due to the different expectations from the financial markets for those two airline types. It means that as full-services make more contribution to ESG activities, therefore, they are more likely to benefit from sustainability involvement.

H3: The positive moderating role of ESG exists for full-service airlines, but not for low-cost airlines.

5.3 Research methodology

5.3.1 Data and sample selection

The data were retrieved from two sources. First, we started the inquiry with the Thompson-Reuters Eikon platform. The database collects publicly reported information and publishes a combination of ten relevant data points for its ESG data. These information relays reflect the firm's sustainability activities, in the form of an ESG score. In addition to the sustainability data, the Eikon is also used to collect financial information of sampled airline firms. It is worth mention that we encounter many missing values especially related with pre-Covid variables, where we referred to the consolidated annual reports of respective airline and (if available) manually added the measure to the dataset. OurWorldInData is a source to collate Covid data. It is an online publication that presents data and empirical results showing the change in living conditions around the world. The data from this source are displayed through graphs and interactive maps that show the trends of change by country and region.

5.3.2 Main variables

5.3.2.1 ESG data

ESG pillar score is the proxy variable of the study. It is measured as a score ranging from 0 to 100 based on a firm's performance on the environmental, social and governance dimensions. A firm's participation level in these three sub-factors could be different (Duque-Grisales and Aguilera-Caracuel, 2019). As used in this study, the Thomson Reuters ESG Scores were designed to measure relative ESG performance a company's transparently and objectively across ten themes based on company reported data. Overall, company score based on the self-reported information in the environmental, social, and corporate governance pillars. The detailed list of themes covered by each pillar covers is presented in Table 0.1 Thomson Reuters Eikon's ESG categories

Table 0.1 Thomson Reuters Eikon's ESG categories

Environmental	***Social***	***Governance***
Resource Use	Workforce	Management
Emissions	Human Rights	Shareholders
Innovation	Community	CSR Strategy
	Product Responsibility	

5.3.2.2 Covid-19 data

The Covid-19 pandemic is an infectious disease caused by a recently detected coronavirus SARS-CoV-2 (WHO, 2021). Declared on March 11, 2020 by the World Health Organization (WHO), the pandemic has had an extreme economic and financial impact on every economy across the globe (Singh and Shaik,

2021). Since then, the epidemiological curve of the number of confirmed cases has been on an uptrend trend, and it reached almost 540 million worldwide confirmed cases by August 2022. In this study, we used the data provided by OurWorldInData (OWID). The OWID is an online platform that publishes data on issues such as poverty, disease, hunger, climate change, war, existential risks, and inequality across the globe. The research team managed the website is based at the University of Oxford, in Oxford, England. In our baseline, we used the number of confirmed cases per week as the pandemic data point. Then, following the similar studies at the field pursuing the same question such as Yeon et al., (2021) and Ding et al., (2021) we calculated the growth rate of Covid-19 as follow:

Covid-19 = log (1+ #confirmed cases in week$_t$) - log (1+ #confirmed cases in week$_{t-1}$)

5.3.2.3 Stock returns

The Covid-19 pandemic is observed to have significant negative effect on the stock values. This severe adverse impact is coming from risks it brought to disrupt business operations. The airline industry is one of the first to suffer because of the dramatic drop in passenger demand. Due to the Covid-19 outbreak the market value of airlines shrank significantly (Maneenop and Kotcharin, 2020). Since this study aims to test the influence of sustainability activities on the airline firms' market value resilience to negative shocks of the pandemic. Following the similar studies (Ding et al., (2021); Yeon et al., (2021);), this study uses stock price information as a proxy for resilience. In particular, we retrieve the weekly stock return of selected airlines from Thompson Returns Eikon database for a period of 01/01/2020 to 24/02/2021when the vaccine was introduced. The weekly total return incorporates the price change and any relevant dividends during the respective week.

5.3.3 Control variables

The set of control variables incorporated in our analysis are liquidity, profitability, leverage, dividend, and type-of-airline. Market-to-book ratio is used to find out if a firm's value is affected by ESG. Both market and book values help in the determination of market sentiments for the company. Over the course of time, for firms that are expected to grow and record higher profits, the book value no longer defines the real value as there would be an important gap between book and market value. The well-known Fama-French theory introduced the market-to-book effect as a behavioural anomaly by which firms with low market-to-book (a low stock price relative to book value) tend to be persistently distressed. Conversely, high market-to-book (a high stock price relative to book value) is associated with sustained strong profitability (Fama and French 1995). We in this study, market-to-book ratio (MB) as a measure of liquidity. Return-on-assets (ROA) is a proxy for a firm's operating profitability. It is measured as the company's operating profit (prior to financing costs) divided by total assets. Firm with higher profitability are expected to have more chances to invest in sustainability initiatives (Waddock and Graves, 1997; Kim and Lee, 2020). Leverage is another control variable widely proposed

in literature to control the capital structure of firms (Kraus and Litzenberger, 1973). According to Artiach et al., (2010) the level of debt reflects the importance of financial stakeholders for a firm. Debtors as capital providers are an influential group of stakeholders and managers are likely to prioritize their concerns. Higher leverage can lead to neglecting the concerns of less powerful claimants. So, a negative sign is expected for the leverage coefficient. Consistent with Lee et al. (2013) and Yang and Baasandorj (2017), we use the debt ratio (defined as total liabilities over total assets) for a firm's leverage. Dividends are considered as an illustrative channel for conveying wealth to shareholders, as well as signalling a firm's financial status to investors (Moon et al. 2015). Thus, we expect a positive relationship between performance and dividends. We also introduced this binary variable to determine the airline's business model in the full panel. Summary of the variables included at this study's analysis is presented at Table 0.2 Description of variables

Table 0.2 Description of variables

Variable	Definition	Description
Main Variables		
ESG	ESG Score	Thomson Reuters combined ESG score.
Env	Environmental pillar score	Thomson Reuters score for environmental disclosure.
Soc	Social pillar score	Thomson Reuters score for social disclosure.
Gov	Governance pillar score	Thomson Reuters score for governance disclosure.
Return	Weekly Return	Represents weekly stock returns (percentage) of each firm within a week**.**
Covid	Covid-19	The growth rate calculated based on number of weekly confirmed cases in countries where sample airlines are headquartered.
Control Variables		
MB	Market-to-Book ratio	MB is a firm's price divided by its book value per share.
ROA	Return-on-Assets	ROA measures a company's operating efficiency regardless of its financial structure (in particular, without regard to the degree of leverage a company uses) and is calculated by dividing a company's operating profit to financing costs by total assets.
Div	Dividend pay-out ratio	Defined as the average gross dividends-common stock over 5 fiscal years divided by average of income available to common excluding extraordinary items for the sample period and is expressed as percentage.
Lev	Leverage ratio	Defined as total liabilities over total assets.
Size	Firm Size	Natural logarithm of total assets.
Age	Firm's Age	The number of years since company's foundation (start doing business).
Ctype	Dummy Of carrier type	takes values of 1 if it is full service otherwise 0.
SOE	Dummy of ownership	Take values of 1 if the respective country holds the somehow or entirely owned the airline otherwise 0.

5.4 Model specification and results

Similar studies have mainly used an event study approach to study the influence of unforeseen events or crisis on firm value. However, in this study, we follow the recent trend in the literature (e.g. Yeon et al., (2021), Arora et al., (2021), Ding et al., (2021), Bae et al., (2021), Viet et al., (2022), Zhang et al.,

2022)) by applying panel data regression model. The rationale of utilizing this approach is that spread of the pandemic has evolved over a day around the globe and is not an event at a particular point in time. It means that the Covid-19 is having a continuous impact on the financial performance of airlines. During the Covid-19, airlines have been operating but with huge decrease in number of daily flights. The economic fallout from the pandemic is more like disparate trend since the pandemic hits which can better captured by regression analysis. Therefore, we use panel data approach to investigate the effect of sustainability activities on the stock returns of airline firms during the Covid-19 pandemic.

5.4.1 Proposed models

Model I

$$\begin{aligned}\mathrm{Return}_{it} = \alpha + \beta_1 \mathrm{Covid}_t + \beta_2 \mathrm{ESG}_{it} + \beta_3 \mathrm{MB}_{it} + \beta_4 \mathrm{ROA}_{it} + \beta_5 \mathrm{Div}_{it} + \\ \beta_6 \mathrm{Lev}_{it} + \beta_7 \mathrm{Size}_{it} + \beta_8 \mathrm{Age}_{it} + \beta_9 \mathrm{Ctype}_{it} + \beta_{10} \mathrm{SO}E_{it} + \beta_{11} ESG * \mathrm{Covid}_{it} + \\ + \varepsilon_{it}\end{aligned} \quad (1)$$

Model II

$$\begin{aligned}Return_{it} = \alpha + \beta_1 \mathrm{Covid}_t + \beta_2 \mathrm{Env}_{it} + \beta_3 \mathrm{Soc}_{it} + \beta_4 \mathrm{Gov}_{it} + \beta_5 \mathrm{MB}_{it} + \beta_6 \mathrm{ROA}_{it} + \beta_7 \mathrm{Div}_{it} + \\ \beta_8 \mathrm{Lev}_{it} + \beta_9 \mathrm{Size}_{it} + \beta_{10} \mathrm{Age}_{it} + \beta_{11} Ctype_{it} + \beta_{12} \mathrm{SO}E_{it} + \beta_{13} \mathrm{Env} * \mathrm{Covid}_{it} + \\ \beta_{14} \mathrm{Soc} * \mathrm{Covid}_{it} + \beta_{15} \mathrm{Gov} * \mathrm{Covid}_{it} \\ + \beta_{16} \mathrm{Env} * \mathrm{Covid}_{it} + \varepsilon_{it}\end{aligned} \quad (2)$$

Before the main analysis, two preliminary analyses have been performed. It is mainly to detect potential problems that plague the models such as outliers (biasing the slope of regression) and autocorrelation. To identify potential multicollinearity problem, as shown in Table 0.4 Variance correlation matrix, we calculated the correlation matrix and variance inflation factor (VIF) to the model with ESG. The results suggest that the model is free from multicollinearity problem as all reported VIF values are smaller than 4 (Belsley et al., 2005). In addition, the correlation coefficient (Table 0.3 Correlation matrix) measures the strength and direction of a linear relationship between two variables. It can be seen from the results that the absolute values for all variables are under 0.5, indicating the absence of a significant relationship between some variables.

Table 0.3 Correlation matrix

	Return	Covid	ESG	Env	Soc	Gov	MB	ROA	Div	Lev	Size	Age
Return	1											
Covid-19	-0.13	1										
ESG	-0.0057	-0.018	1									
Env	-0.015	-0.0077	0.71	1								
Soc	-0.011	0.0058	0.7	0.87	1							
Gov	0.00099	0.0097	0.46	0.27	0.27	1						
MB	0.012	0.032	-0.29	-0.3	-0.11	0.25	1					
ROA	-0.0012	0.018	-0.24	-0.32	-0.38	-0.16	0.049	1				
Div	-0.0059	-0.004	0.019	-0.019	0.007	-0.032	0.25	0.074	1			

Lev	0.00095	-0.01	0.23	0.33	0.29	0.23	0.077	-0.16	-0.37	1		
Size	-0.009	-0.024	0.44	0.59	0.51	0.29	-0.26	-0.0056	-0.16	0.44	1	
Age	0.0057	-0.027	0.17	0.32	0.29	0.093	-0.17	-0.18	-0.13	0.16	0.16	1

Table 0.4 Variance correlation matrix

Full Panel									
Covid-19	**ESG**	**MB**	**ROA**	**Div**	**Lev**	**Size**	**Age**	**SOE**	**Ctype**
1.06	1.55	1.72	1.39	1.59	1.85	1.67	1.65	1.40	2.94

5.4.2 Empirical results

In this section, we present and interpret the empirical results obtained for this study, which are shown in Table 0.5 Main effect and interaction models for ESG combined score- Table 0.9 Models with interaction term of environmental, social and governance pillars for low-cost airlines. For conducting the study's analysis, we perform the Random-Effects regression as the main effect model. For sensitivity analysis, fixed effect and pooling OLS models have been estimated to ensure the result's robustness. The analyses were begun with the main effects model from the model with ESG combined score. Table 0.5 Main effect and interaction models for ESG combined score shows the results of testing the model asserting that the pandemic declines the airlines' financial performance (H1). Covid-19 shows a negative and statistically significant coefficient using all three OLS, fixed-effects and random-effects models, supporting H1. There is an additional panel in Table 0.5 Main effect and interaction models for ESG combined scoreto examine the moderating effect of ESG combined score again by employing three methods. It is shown that ESG activities positively and significantly moderate the relationship between airlines' returns and Covid-19. These results indicate that pre-pandemic ESG activities of sampled airlines alleviated stock declines reacting to Covid-19.

report the moderating effect of three separate ESG components (Env, Soc and Gov) on the relationship between Covid-19 and returns. The interaction term between Covid-19 and Env and Soc shows a positive and significant impact on returns across the reported models of OLS, Fixed-effects and Random-effects. However, the Gov dimension is found to be insignificant. This implies that a firm's Gov practices such as launching responsible leadership and independent supervision to guarantee stakeholders' interests as well as an effort to build the CSR strategy do not immediately prevent the negative effects of Covid-19 on returns. Maybe tangible merits underlying governance practices are obtained in a longer term.

Next, to control the significancy of the business model, we separated the full-services airlines from low-cost carriers to separately test how sustainability activities moderate the association between Covid-19 and returns of sampled airlines. To do so, we first test the moderating role of ESG combined score and then ESG components separately. **Error! Reference source not found.**shows the results of models w ith interaction term of ESG combined Score and Covid-19 for full-services and low-cost airlines. The results obtained from the sample of full-service airlines show consistent findings of the full panel; Covid-19 shows coefficient of -8,51E+02 with the p-value of <2.2e-16, indicating that the pandemic has negatively and significantly dropped the returns of full-service airlines. The same goes to the low-cost airlines (with a coefficient of around -0.16 and p-value of 0.00) as this type of airlines also have suffered from the Covid-19. Regarding the moderation role of ESG activities on the relationship between Covid-19 and returns, however, the results shown difference based on the type of airlines. For full-service airlines, our results is that Covid*ESG score shows a positive coefficient of 2,20E+01 and significant at the 1% significance level (p-value= 0,06574) indicating a positive and significant moderating effect of ESG practices. That is, ESG acted as a signal that alleviated stock decline in reaction to Covid-19 for full-service airlines.

For low-cost airlines, although we obtained the same positive moderating effect of ESG practices with the coefficient of 0.0008, however, the coefficients were not significant having the p-value > 0.1. In **Error! Reference source not found.** & **Error! Reference source not found.**, the results for models wi th interaction term of individual Env, Soc and Gov pillars for full-service and low-cost airlines are reported. The sample of full-service airlines we find that coefficients of Covid*Env and Covid*Soc are positive and significant (Coffs: 1,67E+01 and 1,97E+01 with p-values of <0.05). These results show a consistent outcome of a significant and positive moderation role for environmental and social activities on the association between Covid-19 and stock market returns. Gov practices, conversely, found to be negative and insignificant having the coefficient of -3,97E+00 for Covid*Gov with p-value of which is >0.1 (i.e., insignificant). The analysis with the sample of low-cost airlines provided an insignificant moderating effect of Env, Soc and Gov initiatives for all estimated models as interaction term of the Covid with these pillars were >0.1. Another interesting finding for the low-cost sample was that interaction term for three ESG pillars were negative. Finally, across the all models, firm-level characteristics (e.g., MB, Size, Div, Lev, Age and ROA) showed an insignificant effect on returns. It should be noted that our models are suffering from low R-squared values which is understandable because of the nature of data we used at the study. Usually R-squared values are low when the data designed is in the form of "repeated cross sectional data", and they go around 10% (Yoo et al., 2021; Klier and Linn, 2010). Another issue is with the results for binary variables where in some models especially for the sample including low-cost airlines we were not provided with the coefficients.

Table 0.5 Main effect and interaction models for ESG combined score

Variable	Main Effect Model OLS			Main Effect Model Fixed Effects			Main Effect Model Random Effects			Moderating effect of ESG using OLS			Moderating effect of ESG using Fixed Effects			Moderating effect of ESG u Fixed Effects		
	Coeff.	t-value	p-value	Coeff.	t-value	p-value	Coeff.	t-value	p-value	Coeff.	t-value	p-value	Coeff.	t-value	p-value	Coeff.	t-value	p
Intercept	1,75E+0	0.7177	0.4730				1,75E+02	0.7177	0.4729	1,81E+02	0.7449	0.4565				1,81E+02	0.7449	0
Covid-19	-8,66E+0	-10.1511	<2e-16***	-0.087353	-10,1003	<2e-16***	-8,66E+02	-10.1511	<2e-16***	-9,70E+02	-1.11053	<2.2e-16***	-0.09809240	-11.0759	<2.2e-16***	-9,70E+02	-11.1053	<
ESG	-1,44E+0	-0.7377	0.4608	-0.000187	-0.1006	0.9198	-1,44E+00	-0.7377	0.4607	-1,53E+00	-0.7879	0.4309	-0.00023530	-0.1275	0.8985	-1,53E+00	-0.7879	0
MB	9,78E+0	0.3629	0.7167	-0.001192	-0.1323	0.8948	9,78E+00	0.3629	0.7167	8,39E+00	0.3136	0.7539	-0.00261213	-0.2917	0.7705	8,39E+00	0.3136	0
ROA	-1,74E+0	-0.4577	0.6472	0.016985	0.0934	0.9256	-1,74E+02	-0.4577	0.6471	-1,94E+02	-0.5155	0.6063	0.01514234	0.0839	0.9332	-1,94E+02	-0.5155	0
Div	-1,13E+0	-0.7655	0.4441	0.082212	0.3495	0.7267	-1,13E+02	-0.7655	0.4440	-1,14E+02	-0.7777	0.4368	0.11000930	0.4710	0.6377	-1,14E+02	-0.7777	0
Lev	-1,27E+0	-0.4160	0.6775	-0.077198	-0.3272	0.7436	-1,27E+02	-0.4160	0.6774	-1,37E+02	-0.4538	0.6500	-0.04678708	-0.1996	0.8418	-1,37E+02	-0.4538	0
Size	-4,12E+0	-0.2745	0.7837	0.001080	0.0575	0.9541	-4,12E+00	-0.2745	0.7837	-2,10E+00	-0.1410	0.8879	-0.00407575	-0.2183	0.8272	-2,10E+00	-0.1410	0
Age	3,62E-01	0.2470	0.8049	0.010180	0.0992	0.9210	3,62E-01	0.2470	0.8049	3,81E-01	0.2613	0.7939	-0.01920015	-0.1881	0.8508	3,81E-01	0.2613	0
SOE	-1,20E+0	-0.1639	0.8698				-1,20E+01	-0.1639	0.8698	-7,98E+00	-0.1100	0.9124				-7,98E+00	-0.1100	0
Ctype	-3,14E+0	-0.2776	0.7814				-3,14E+01	-0.2776	0.7813	-3,96E+01	-0.3523	0.7246				-3,96E+01	-0.3523	0
Covid-19 *ESG										2,35E+01	4.8835	0,001143***	0.00241314	-11.0759	0,0008128***	2,35E+01	4.8835	0,0
R-Squared	0.05			0.06			0.06			0.07			0.07			0.07		

Signif. Codes: '***' if p-value < 0 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '.' if p-value < 0.1

Table 0.6 Models with interaction term for environmental, social and governance pillars

Variable	Two-way interaction using OLS Model with Env		Two-way interaction using Fixed Effects Model with Env		Two-way interaction using Random Effects Model with Env		Two-way interaction using OLS Model with Soc		Two-way interaction using Fixed Effects Model with Soc		Two-way interaction using Random Effects Model with Soc		Two-way interaction using OLS Model with Gov		Two-way interaction using Fixed Effects Model with Gov		Two-way interacti Random Effects M Gov	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	
Intercept	9,22E+01	0.7216			9,22E+01	0.721	1,42E+02	0.5860			1,42E+02	0.5859	2,18E+02	0.3606			2,18E+02	
Covid-19	-9,77E+02	<2.2e-16***	-9,91E+02	<2.2e-16***	-9,77E+02	<2.2e-16***	-9,77E+02	<2.2e-16***	-0.09908599	<2.2e-16***	-9,77E+02	<2.2e-16***	-8,51E+02	<2e-16***	-0.08627925	<2e-16***	-8,51E+02	
Env	-1,96E+00	0.2155	-5,93E-02	0.998	-1,96E+00	0.215												
Soc							-1,40E+00	0.4477	-0.00083198	0.6775	-1,40E+00	0.4476						
Gov													-5,23E-01	0.7251	-0.00031582	0.7693	-5,23E-01	
MB	1,23E+01	0.6170	1,50E+00	0.986	1,23E+01	0.617	1,98E+01	0.3986	0.00011004	0.9901	1,98E+01	0.3985	2,09E+01	0.3942	-0.00030770	0.9729	2,09E+01	
ROA	-2,07E+02	0.5663	2,39E+02	0.896	-2,07E+02	0.566	-1,50E+02	0.6812	-0.00163288	0.9924	-1,50E+02	0.6812	-8,18E+01	0.8166	0.01375371	0.9354	-8,18E+01	
Div	-1,06E+02	0.4525	1,42E+03	0.541	-1,06E+02	0.452	-1,31E+02	0.3509	0.07635312	0.7399	-1,31E+02	0.3508	-1,48E+02	0.2935	0.07284863	0.7524	-1,48E+02	
Lev	-1,03E+02	0.7157	-8,02E+02	0.729	-1,03E+02	0.715	-1,81E+02	0.5131	-0.11371652	0.6299	-1,81E+02	0.5130	-2,08E+02	0.4369	-0.11425582	0.6301	-2,08E+02	
Size	8,54E-02	0.9955	-7,16E+01	0.689	8,54E-02	0.995	-9,91E-01	0.9485	-0.00433889	0.8110	-9,91E-01	0.9485	-6,33E+00	0.6644	0.00255593	0.8931	-6,33E+00	
Age	5,17E-01	0.7027	-3,54E+02	0.719	5,17E-01	0.702	5,37E-01	0.6918	-0.02096364	0.8332	5,37E-01	0.6918	2,85E-01	0.8340	0.01797670	0.8619	2,85E-01	
SOE	-1,95E+01	0.7783			-1,95E+01	0.778	-1,11E+01	0.8769			-1,11E+01	0.8769	-2,72E+01	0.6938			-2,72E+01	
Covid-19 *Env	1,67E+01	0,04098***	1,74E+01	0,02785***	1,67E+01	0,03907***												
Covid-19 *Soc							2,00E+01	0,002903***	0.00204805	0,002476***	2,00E+01	0,002682***						
Covid-19 *Gov													-5,78E+00	0.1768	-0.00059481	0.1705	-5,78E+00	
R-Squared	0.07		0.07		0.07		0.07		0.07		0.07		0.07		0.07		0.06	

Signif. Codes: '***' if p-value < 0 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '.' if p-value < 0.1

Table 0.7 Models with interaction term of ESG combined score and covid-19 for full-services and low-cost airlines

Variable	Moderating effect of ESG using OLS for Full-Service Airlines			Moderating effect of ESG using Fixed Effects for Full-Service Airlines			Moderating effect of ESG using Random Effects for Full-Service Airlines			Moderating effect of ESG using OLS for Low-Cost Airlines			Moderating effect of ESG using Fixed Effects for Low-Cost Airlines			Moderating effect of ESG using Random Effects for Low-Cost Airlines		
	Coeff.	t-value	p-value	Coeff.	t-value	p-value	Coeff.	t-value	p-value	Coeff.	t-value	p-value	Coeff.	t-value	p-value	Coeff.	t-value	p
Intercept	1,76E+02	0.5883	0.5564				1,76E+02	0.5883	0.5564	0.06095537	0.1779	0.8589				0.06095537	0.1779	0
Covid-19	-8,51E+02	-94.106	<2.2e-16***	-0.08594442	-93.880	<2.2e-16***	-8,51E+02	-94.106	<2.2e-16***	-0.15718864	-56.061	0,00004591***	-1,57E+03	-55.626	0,00005816***	-0.15718864	-56.061	0,0
ESG	-1,38E+00	-0.6416	0.5212	0.00097817	0.3196	0.7493	-1,38E+00	-0.6416	0.5212	0.00030838	0.3294	0.7421	1,76E+02	0.5295	0.5968	0.00030838	0.3294	0
MB	-1,07E+01	-0.2288	0.8191	-0.00187616	-0.2138	0.8308	-1,07E+01	-0.2288	0.8191	0.00761520	0.3901	0.6967	-4,59E+03	-0.6504	0.5159	0.00761520	0.3901	0
ROA	4,80E+02	0.3646	0.7155	0.19030422	0.4275	0.6690	4,80E+02	0.3646	0.7155	0.02257426	0.1619	0.8715	3,74E+03	0.3009	0.7637	0.02257426	0.1619	0
Div	-1,08E+02	-0.6532	0.5137	0.08222978	0.3594	0.7194	-1,08E+02	-0.6532	0.5137	-0.01844937	-0.3320	0.7401	-2,31E+05	-0.5871	0.5576	-0.01844937	-0.3320	0
Lev	-2,59E+01	-0.0748	0.9404	0.09974458	0.2461	0.8056	-2,59E+01	-0.0748	0.9404	-0.17867734	-0.3055	0.7602	8,15E+03	0.6557	0.5125	-0.17867734	-0.3055	0
Size	-1,29E+01	-0.6824	0.4951	-0.00828696	-0.3547	0.7229	-1,29E+01	-0.6824	0.4951	0.00207203	0.2745	0.7839	1,57E+02	0.8397	0.4017	0.00207203	0.2745	0
Age	7,82E-02	0.0543	0.9567	-0.03794484	-0.2995	0.7646	7,82E-02	0.0543	0.9567	0.00068683	0.7080	0.4795	0.00068683	0.7080	0.4795	0.00068683	0.7080	0
SOE	-2,55E+00	-0.0358	0.9714				-2,55E+00	-0.0358	0.9714									
Covid-19 *ESG	2,20E+01	40.039	0,06574***	0.00226996	40.727	0,04926***	2,20E+01	40.039	0,06574**	0.00083646	0.3808	0.7036	8,42E+00	0.3783	0.7055	0.00083646	0.3808	0
R-Squared	0.06			0.06			0.06			0.07			0.10			0.05		

Signif. Codes: '***' if p-value < 0 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '.' if p-value < 0.1

Table 0.8 Models with interaction term of environmental, social and governance pillars for full-services airlines

Variable	Two-way interaction using OLS Model with Env for Full-Services Airlines		Two-way interaction using Fixed Effects Model with Env for Full-Services Airlines		Two-way interaction using Random Effects Model with Env for Full-Services Airlines		Two-way interaction using OLS Model with Soc for Full-Services Airlines		Two-way interaction using Fixed Effects Model with Soc for Full-Services Airlines		Two-way interaction using Random Effects Model with Soc for Full-Services Airlines		Two-way interaction using OLS Model with Gov for Full-Services Airlines		Two-way interaction using Fixed Effects Model with Gov for Full-Services Airlines		Two-way interactio Random Effects Mo Gov for Full-Ser Airlines	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	
Intercept	7,49E+01	0.805121			7,49E+01	0.805 083	8,61E+01	0.7800			8,61E+01	0.7800	1,34E+02	0.6520			1,34E+02	
Covid-19	-8,56E+02	<2.2e-16***	- 0.08680900	<2.2e-16***	-8,56E+02	<2.2e-16***	-8,57E+02	<2.2e-16***	-8,68E+02	<2.2e-16***	-8,57E+02	<2.2e-16***	-7,44E+02	<2e-16***	-7,50E+02	<2e-16***	-7,44E+02	<
Env	-1,65E+00	0.306784	0.00070969	0.797 292	-1,65E+00	0.306 599												
Soc							-1,29E+00	0.4783	-2,94E+00	0.8909	-1,29E+00	0.4782						
Gov													-7,79E-01	0.6193	-2,88E+00	0.7870	-7,79E-01	
MB	-2,07E+00	0.963962	0.00031503	0.971 369	-2,07E+00	0.963 956	2,15E+00	0.9625	-1,21E-01	0.9989	2,15E+00	0.9625	3,18E+00	0.9450	6,43E-01	0.9943	3,18E+00	
ROA	4,35E+02	0.733942	0.14296140	0.743 518	4,35E+02	0.733 889	3,75E+02	0.7722	8,28E+02	0.8472	3,75E+02	0.7722	5,34E+02	0.6811	8,79E+02	0.8321	5,34E+02	
Div	-8,00E+01	0.626703	0.12579753	0.582 080	-8,00E+01	0.626 624	-8,34E+01	0.6139	7,92E+02	0.7250	-8,34E+01	0.6138	-9,37E+01	0.5729	7,05E+02	0.7536	-9,37E+01	
Lev	3,87E+01	0.910965	0.06540714	0.872 583	3,87E+01	0.910 948	-1,65E+00	0.9962	3,31E+02	0.9358	-1,65E+00	0.9962	6,14E+00	0.9858	1,33E+02	0.9739	6,14E+00	
Size	-1,04E+01	0.587107	- 0.00586870	0.776 335	-1,04E+01	0.587 016	-9,54E+00	0.6267	-6,06E+01	0.7749	-9,54E+00	0.6266	-1,49E+01	0.4274	2,18E+01	0.9172	-1,49E+01	
Age	3,24E-01	0.822096	- 0.02527757	0.824 088	3,24E-01	0.822 062	3,95E-01	0.7834	-2,88E+02	0.8018	3,95E-01	0.7834	1,88E-01	0.8965	1,80E+02	0.8744	1,88E-01	
SOE	-1,18E+01	0.864278			-1,18E+01	0.864 252	-4,63E+00	0.9478			-4,63E+00	0.9478	-1,36E+01	0.8456			-1,36E+01	
Covid-19 *Env	1,67E+01	0.001777 **	0.00177532	0.001 199**	1,67E+01	0.001 739**												
Covid-19 *Soc							1,97E+01	0,04721***	2,03E+01	0,03835***	1,97E+01	0,04457***						
Covid-19 *Gov													-3,97E+00	0.3787	-3,96E+00	0.3861	-3,97E+00	
R-Squared	0.06		0.06		0.06		0.06		0.06		0.06		0.07		0.07		0.05	

Signif. Codes: '***' if p-value < 0 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '.' if p-value < 0.1

Table 0.9 Models with interaction term of environmental, social and governance pillars for low-cost airlines

Variable	Two-way interaction using OLS Model with Env for Low-Cost Airlines		Two-way interaction using Fixed Effects Model with Env for Low-Cost Airlines		Two-way interaction using Random Effects Model with Env for Low-Cost Airlines		Two-way interaction using OLS Model with Soc for Low-Cost Airlines		Two-way interaction using Fixed Effects Model with Soc for Low-Cost Airlines		Two-way interaction using Random Effects Model with Soc for Low-Cost Airlines		Two-way interaction using OLS Model with Gov for Low-Cost Airlines		Two-way interaction using Fixed Effects Model with Gov for Low-Cost Airlines		Two-way interactio Random Effects Mo Gov for Low-Cost
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.
Intercept	0.034844	0.9446			0.03484447	0.9446	0.04641634	0.8925	-	-	0.04641634	0.8925	1,29E+03	0.7018	1,29E+03	0.7018	1,29E+03
Covid-19	-0.165943	0,00001525***	-0.165134	0,00003564***	-0.16594372	0,00001525***	-0.16149202	0,00001017***	-0.1636646	0,00001252***	-0.16149202	0,00001017***	-1,62E+03	0,000007742***	-0.1632415	0,000007772***	-1,62E+03
Env	-0.001781	0.8065	-0.016269	0.5973	-0.00178175	0.8065											
Soc							0.00073292	0.8463	0.0126186	0.6827	0.00073292	0.8463					
Gov													4,31E+00	0.7246	-0.0493620	0.10763	4,31E+00
MB	-0.00155027	0.9769	0.052994	0.8500	-0.00155027	0.9769	0.00371514	0.8865	-0.1864449	0.5319	0.00371514	0.8865	1,15E+02	0.5451	-0.5056442	0.10668	1,15E+02
ROA	-0.10246770	0.8646	-0.697448	0.5503	-0.10246770	0.8646	0.04121092	0.8116	-0.2453473	0.6070	0.04121092	0.8116	9,62E+02	0.6542	-5,24E+07	0.10292	9,62E+02
Div	0.00814018	0.9585	6,46E+0	0.6744	0.00814018	0.9585	-0.01759731	0.7436	-3,77E+07	0.6576	-0.01759731	0.7436	-3,11E+02	0.5820	-1,55E+08	0.14848	-3,11E+02
Lev	-0.05108504	0.9623	0.486684	0.7007	-0.05108504	0.9623	-0.12721488	0.8312	1,55E+07	0.6159	-0.12721488	0.8312	-2,92E+03	0.6061	4,26E+07	0.12560	-2,92E+03
Size	0.00349352	0.7846	0.129322	0.4034	0.00349352	0.7846	0.00205111	0.7858	0.1568353	0.5479	0.00205111	0.7858	-4,46E-01	0.9956	0.4450596	0.08118.	-4,46E-01
Age	-0.00056537	0.8961	0.595584	0.4240	-0.00056537	0.8961	0.00033786	0.7323	0.6738819	0.5556	0.00033786	0.7323	7,40E+00	0.4701	1,65E+07	0.08730.	7,40E+00
Covid-19 *Env	-0.002301	0.3697	-0.002562	0.3265	-0.00230159	0.3697											
Covid-19 *Soc							-0.00173328	0.4520	-0.0018717	0.4221	-0.00173328	0.4520					
Covid-19 *Gov													-1,47E+01	0.2226	-0.0016444	0.17754	-1,47E+01
R-Squared	0.10		0.10		0.09		0.10		0.10		0.06		0.10		0.11		0.06

Signif. Codes: '***' if p-value < 0 0.001; '**' if p-value < 0.01; '*' if p-value < 0.05; '.' if p-value < 0.1

5.5 Discussion and conclusion

The main aim of this study is to investigate whether airline firms' contribution to ESG activities can alleviate the negative impact of Covid-19 on their financial performance. In so doing, the study first tested the main impact of Covid-19 on airlines' financial performance measured by stock returns. This study found that the pandemic declines the airlines' financial performance as hypothesized in H1. In addition, the study tested the moderation impact of ESG activities on the association between Covid-19 and stock returns. The study analysed both ESG combined scores and three ESG components separately (i.e., Env, Soc and Gov) to examine the overall moderating effect of these ESG practices and its sub-factors on the relationship. When ESG combined scores were analysed together, the findings provide general support for the "insurance-like" protection constructed by ESG practices (Godfrey, 2005; Yeon et al., 2021) that can enhance the firm's business perspective through promoting its reputation and assisting the firm's sustainable development activities according to stakeholder theory (Herzig and Schaltegger, 2006; Buallay, 2019).

The same results obtained for Env and Soc components. Both sub-factors are found as positive and significant moderators of the relationship between Covid-19 and returns across the reported models. The result is generally in line with Qureshi et al. (2020) and Xie et al. (2019) who also found that both Env and Soc are relevant and have a positive relationship with firm performance. On this basis, based on the stakeholder theory discussion, allocating available resources to eco-friendly and societal projects will be rewarded by as insurance-like protection at the crisis time in the airline industry. Therefore, the use of renewable resources, innovation and reducing emission from Env perspective, as well as an effort to improve human rights or decrease demographic discrimination, training programs and product responsibility in its social aspect, all bring more returns on invested funds. However, the Gov dimension is found to be insignificant. This implies that a firm's Gov practices do not immediately prevent the negative effects of Covid-19 on returns. This finding is consistent with Duque-Grisales and Aguilera-Caracuel (2019) for a negative effect of Gov activities on financial performance.

The current study also tests the potential significance of the business model for sampled airlines. To accomplish this goal, this study separated the dataset into full-service and low-cost airlines. Full-service airlines are considered as established airlines contributing more to sustainability activities. Again, the moderating role of ESG combined score and then ESG components separately on the association between Covid-19 and returns appears to be significant that ESG and its two components (Env and Soc) positively and significantly influence the returns of full-service sampled airlines. That is, ESG acted as a signal that alleviated stock decline in reaction to Covid-19 for full-service airlines. This finding reminds the importance of contribution to sustainability activities for this type of airlines. Therefore, full-service airlines

can construct a clear protection strategy in facing unexpected events such as the Covid-19 pandemic. In addition, as full-service airlines are known for their high quality services, implementing ESG initiatives simultaneously with superiority in services can create a clear competitive advantage and effective differentiation for them (Seo et al., 2015). Low-cost airlines, in contrast, are relatively new carriers known for business and cost efficiency due to their limited resources, and consequently they may not or may not be able to fully commit themselves to ESG initiatives in their business operations. This is due to the fact that when low-cost airlines expand their services beyond their traditional boundaries, they are likely to lose their cost advantage (Seo et al., 2015). Our empirical findings support these arguments for low-cost airlines, presenting an insignificant moderating effect of ESG practices throughout all three models.

5.6 Implications, limitations, and future research

Our results are extremely relevant to both the academic literature and to airline executives. To our knowledge, the current study is one of the first efforts to explore whether prior contribution to ESG/sustainability activities could protect the airlines' stock value at the crisis time (i.e., Covid-19). This way, from the academic perspective, the study contributes to an advance in the broader tourism crisis management literature. As recently discussed by Li et al. (2022), a firm's crisis management strategies involve initiatives in readiness, response and recovery dimensions. Firms operating in this industry (including airlines) were in spotlight during the pandemic in terms of tolerating huge loss (this is due to the nature of their operation which includes face-to-face activities between people which mostly were cut-off by the quarantine), and their response to the crisis. Therefore, we provide the empirical evidence on to the discussion that prior adoption of ESG/sustainability activities could improve their performance in such times. This way, we contribute to the literature on how to craft unexpected events and obtain better record in protecting stakeholders' benefits. Moreover, the current study enriches the broader discussion of whether a firm should consider investment in ESG/sustainability practices for improved performance. Although firms are likely to bear costs related to the implementation of these initiatives, the invested funds will be paid-off by later long-term benefits (McWilliams et al., 1999; Lahouel et al., 2019). Particularly, we supported this view that ESG/sustainability activities, when all firms considered together, implementing sustainability standards positively and significantly moderates the association between the Covid-19 and firm value. This opened another contribution to the argument that ESG/sustainability activities could provide "insurance-like" protection for the firm at the crisis time using the evidence from airline companies' stock market returns during Covid-19. Therefore, we join the discussion by offering additional empirical evidence and confirm the effectiveness of ESG practices. Further, we provide finding to the existing literature on that individual ESG activities must be studied separately to obtain an accurate evidence on how each type of environmental (Env), social (Soc) and governance (Gov) related activities influence with

stock returns (Brammer and Millington, 2005; Yeon et al., 2021). We find that Env and Soc initiatives have a stronger and more immediate influence on the stock returns comparing with those of firm governance pillar. Another unique aspect of this study is to test the significancy of the business model in adopting ESG/sustainability activities. This allows the current study to provide empirical evidence on the type of airline (i.e., full-service, and low-cost) where as initially hypothesized, Env and Soc components appears to be positive and significant for full-service sampled airlines. Finally, this study contributes to the stakeholder theory by adding more empirical findings to the insurance-like protection side of the discussion. Therefore, our findings could be taken into consideration while studying the topic in this context.

This paper focuses on the airline industry which is one of the most challenging industries in regard to ESG/sustainability issues. The research theme covers a key concept with an impact on reaching ESG/sustainability initiatives by providing new findings and perspectives across the industry. On this basis, executives and managers of airlines may also find our results interesting and informative regarding their ESG/sustainability business strategy and preparation to the future unexpected negative events. Specifically, the management needs to prepare their firm to build resilience so that it can protect the benefits of all stakeholders when an unexpected negative event occurs. This preparation includes development of recovery strategies (Li et al., 2022) that will help minimize the damage and design the plan to recover the negative effects of the crisis. Our findings should remind airline executives and managers of the importance of ESG activities, encouraging them to allocate available resources to these initiatives in a strategic manner. We also provide evidence for managers of full-service airlines to particularly consider prioritising environmental and social activities when deciding to contribute to ESG/sustainability initiatives since these two components were found to better protect the firm in crisis time. In this sense, according to McKinsey (2020), the ongoing Covid-19 pandemic has brought up a new era for the aviation industry, giving the industry the best chance to address ESG activities. Although the industry was hit hard by the Covid-19 pandemic and fell dramatically in both provided services rate and passenger number perspectives, one can observe the signals of recovery. According to IATA's report, during the year 2021, overall travel number were 47% of the number of passengers in 2019. This measure is expected to improve to 83% in 2022, 94% in 2023, 103% in 2024 and 111% in 2025 (IATA, 2022). By re-gaining the market and generating revenues after the crisis, airlines can obtain high stakeholder attention and investor evaluation (Charles et al., 2021).

In addition to the necessity to invest in ESG/sustainability initiatives, industry practitioners may also consider differentiation in effects of each ESG/sustainability activity. Initiatives such as reducing emissions and climate impact, human capital management, and politics are likely to help full-service airline companies improve their resilience during a crisis such as Covid-19. Thus, such activities from both Env and Soc components of ESG are more likely to attract the stakeholders' attention. However, those categorized in

the Gov pillar such as board diversity, tax strategy and accounting standards, transparency, etc. may be less sensitive to the investors or stakeholders during a crisis. Airline executives should make an effort to find the optimal solution to proactively engage in ESG/sustainability initiatives with prioritizing initiatives which are attractive for external stakeholders and investors. This provides an insight to these executives on how to integrate ESG initiatives into their strategy and improve future scenarios and sustainability opportunities (and risks). Firms at any society are strong as the communities they are operating in are a part (McKinsey, 2020a). Therefore, they also need to support the societies' common values and avoid operations causing long-term damage to the environment and community.

Future research may study more extensive samples of firms and periods including those airlines listed in other databases such as MSCI ESG KLD STATS, Bloomberg, etc. to compare with the firms in the current study, to provide a broader window and a more comprehensive view on the impact of Covid-19 on the airlines' stock returns. The new database may provide the data for airline firms which are not listed in Eikon and probably have the possibility to classify listed companies by geographical location (i.e., country/region) they are headquartered in to pursue the research questions in different places. This way, it is likely to obtain a universal view on the industry that is how they performed during the pandemic and if their prior-ESG/sustainability activities were helpful in resiliency against negative wave of the pandemic. Employing other methodologies such as an event study or difference-in-differences models will be also encouraged in the future because such different methodologies will help reveal more detailed and specific findings of how effective ESG is during the crisis time, possibly suggesting ways of better promoting ESG/sustainability practices in the airline industry, especially to prepare for a crisis. Lastly, our study did not explore cultural, national, or regional differences in our analysis, thus future scholars may investigate such differences in the effect of ESG during a crisis.

5.7 References

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Chapter 6: Sustainability in supporting firm value during Covid-19 at the air transport industry

Chapter 7.

Conclusion

UNIVERSITAT ROVIRA I VIRGILI
FIRM VALUE AND PERFORMANCE ANALYSIS: IMPACT AND IMPLICATIONS OF IMPLEMENTING SUSTAINABILITY INITIATIVES FOR THE AIRLINE INDUSTRY
Yaghoub Abdi

6. Chapter 7. Conclusion

6.1 Summary of findings

It is well recognized that airline firms play an important role in today's life. Airline firms, nowadays, face the issue of sustainability. This is due to the increasing demand from the society and investors to contribute to more socially responsible investments. However, there is limited empirical data exist to determine the influence of airline firms' contribution to ESG activities. This doctoral thesis, therefore, aims to fill this gap within the existing body of literature to provide first-hand empirical findings on the topic. The results of this doctoral thesis contribute to the literature in both sustainability, firm value and performance perspectives. In this concluding chapter, summary of conducted studies including results obtained, implications for theory and practice, study limitations, as well as possible additional future research avenues are discussed.

As previously mentioned, the main objective of this doctoral thesis was to focus on the important key aspects sustainability initiatives with firm value and performance in the air transportation industry. To reach this main aim, the thesis is built based on a compendium of five articles discussing different aspects of this general theme. **Chapter 2** systematically reviews the literature related to the firm value and value influencers in this industry. This section is the project's starting point and present the direction of the thesis and how it developed. Due to its importance of topic, many studies have focused on several factors affecting the value of airlines. However, when it comes to classification and categorizing these studies, while there are many review studies in air transport context, the academic scholarship lacks the comprehensive and generic review of which contextual factors affect a firm value in this context. The review finds that shifting to sustainability initiatives and its consequence for stakeholders' value is the hottest and most update discussion in this context. The trend, in particular, has gained attention for the last two years due to the pandemic looking for the green and sustainable way to protect the value in crisis time. Based on the findings and gaps addressed at the review in the extant literature, the rest of thesis lie at the nexus of firm value and sustainability activities to conduct the 3rd to 6th chapters.

Chapter 3 examines the extent to which implementation of ESG disclosures influence the firm value and financial performance. The study uses panel data analysis to the set of collected data for the sample of airlines worldwide. Findings support the positive relationship between the environmental pillar score (Env) and governance pillar score (Gov), with market-to-book ratio and Tobin's Q as proxies for firm value and financial performance, respectively. This finding implies that an increase in both pillars leads to higher market value and financial efficiency for investigated airlines. Based on this result which has been published in Sustainability journal, an airline's investment in environmental and governance practices, such

as using re-usable resources, innovation, reducing emissions, having a better management structure, and implementation of a sustainability policy, makes it more attractive for the investors. The outcome particularly is of interest due to the fact that in today's highly competitive situation, employing more prudent environmental and governance policies may provide a considerable advantage for the airline.

When exploring the direct association between the social and financial dimensions, a variety of firm characteristics can potentially moderate this relationship and are crucial for investigating the topic. For this reason, in chapters 3-5 of this thesis, the set of firm's characteristics such as size, age, ownership structure, board characteristics, etc., are tested as influential elements for the relationship between ESG-FP and the other way around (FP-ESG).

Chapter 4 discusses the role of size and age as firm-level attributes which could influence the firm's contribution to sustainability activities and are likely to assist in better understanding the ESG-FP relationship. The topic seems critical for airlines since business prospects for these firms is subject to making progress in the sustainability dimension and in managing the alliance with government, industry, and passengers. I find that firm size significantly moderates the relationship between sustainability disclosure and firm performance and value. However, the moderation direction is different across full-service and low-cost airlines, depending on the type of sustainability undertakings. In particular, it is found that the interaction term between size and both Env and Gov dimensions is significant and negative for full-services panel. This set of airlines is considered as bigger size firms as opposed to low-cost carriers having relatively smaller total assets and therefore being smaller in size. This finding also goes against the general sustainability viewpoint which considers firms with relatively higher total assets, and therefore bigger size, are likely to sloped positively. In contrast, a consistent interaction sign for the Env category in the low-cost panel is detected which supports the sustainability hypothesis that smaller firms may not contribute to sustainability as much as do their bigger counterparts. The practical interpretation of this finding is that managers of low-cost airlines may expect negative market-to-book ratio and financial return if they decide to invest in environmentally related initiatives. In related to the firm age, study finding show that it also somehow moderates the linkage of ESG initiatives and firm's FP and value.

When studying state of sustainability within a firm, in addition to the impact of ESG implementation on firms' financial performance, is that which factors do lead it to implement these initiatives. This research on this line of research which also called a "swimming against the tide" has received insufficient attention (Chih et al., 2010). It is argued that a firm's sustainability disclosure is subject to a range of characteristics influencing the cost and benefits of implementing these standards and its evolution in a broader context. Among these characteristics, a review by Garde-Sanchez et al. (2018) underlined the necessity for advances in sustainability issues in state-owned enterprises (SOEs), given their importance as economic drivers in

the market. To check the issue for airlines, **Chapter 5** investigate the influence of financial performance as the main factor together with firm-related characteristics of size and age on sustainability disclosure. The chapter further explores the moderation effect of SOE on the relationship between financial performance and ESG disclosure. Our empirical results suggest that a firm's financial performance negatively and significantly affects its ESG disclosure. The negative impact of financial performance on ESG implies that, when an airline makes excess returns, it may give low priority to implementing an ESG agenda. In other words, this negative link may indicate that the higher cost of improving its ESG score will be seen to decrease financial performance.

The emergence of Covid-19 which induced uncertainty in the airlines' business activities as most countries adopted complete or partial lockdown approaches to mitigate the spread of the disease. The issue well covered by both industry practitioners and academia. One of the main discussions is how to protect airline firms as they are incurring huge losses across the globe. Therefore, proposing managerial orientations to save firm value would be a great contribution to both theory and practice. ESG has emerged as an agenda to secure the long-term benefit of the business. **Chapter 6**, therefore, pursue the question in this context. It has been shown that promoting ESG activities is positively correlated with firm value. Nonetheless, the degree to which it is also effective in saving airline´s value during industrial crises such as current Covid-19 pandemic is yet to discover.

6.2 Highlighted implications for theory and practice

Given the importance of ESG standards for airline firms and its influence on their financial balance due to the cost of implementing these activities, this study comprehensively investigates the topic in this context. Therefore, several potential contributions that arose from this doctoral thesis can be highlighted.

By conducting literature review on firm value of air transport companies, the study collects the data from reputable journals in the WoS & Scopus databases to identify and classify the important value driver and influencer factors. Therefore, adding an in-depth systemic tendency to the wide divergent literature available in the field could benefit future researchers that are interested in air transportation business valuation and analysis.

The study theoretically documents the concept of firm value and then collect related studies offering insights on factors related to the firm value in each corresponding theme. This approach enables a novel focus on the topic by identifying major value determinants and relationships between them to extend the understanding of the existing state of research.

In addition, the relevance of implementing ESG activates on firm value and performance of in the airline industry has been analyzed in four academic papers. Although the topic has been widely studied in recent

scientific literature, the contributions in an air transport context is limited. This way the findings of this doctoral thesis do add insights to the current body of literature. From an academic perspective, the study contributes to an advance in the association between firm value and performance with ESG initiatives. Moreover, the potential moderation of firm characteristics of size and age on this association is investigated. This way, empirical evidence is provided for both stakeholder theory and resource-based theory, which is based on both approaches, implementing sustainability criteria have implications for firm performance.

Findings on the role of financial performance and value in contributing to sustainable development activities, also echo the existing literature on the relationship. In addition, the study is among the few studies considering state ownership and its moderation effect in a research agenda to linkage. To conclude, the research theme covers a key concept with an impact on reaching SDGs by providing new findings and perspectives across the industry.

Executives and managers of airlines may also find the comprehensive results of the thesis interesting and informative in regard to setting business strategy and decision-making. Specifically, findings of this thesis could help the managers to allocate available resources to ESG activities by adopting more efficient and robust approaches. The study also highlights the potential moderation role of firm characteristics of size and age in building a sustainability agenda for the airline firms. In addition, based on the results managers of full-service airlines to consider prioritizing societal over environmental and governance activities when deciding to contribute to sustainability initiatives. Therefore, the thesis provides policy implication for airline executives potentially allowing them to better allocate and utilize their firm's resources.

Large-scale operations of airlines are accompanied by a high-level of use of resources, and every major decision has an implication for a firm's financial performance, which will be reflected in its share value. This is understandable given that firms' resources are scarce and need to be applied efficiently. In practice, however, there is evidence that the current business strategy of airlines is ineffective. Consequently, airline managers and industry decision makers are acknowledged on the recent preference alteration toward importance of sustainable development strategies to show their commitment to stakeholders' benefits and maximize their wealth. This transformation also provides an opportunity to initiate sustainable development strategy, which may protect the industry against unforeseen events such as health crisis (e.g. current pandemic and SARS), international political and economic instability (e.g. the global financial crisis in 2008, terror attacks such as the September 11 attack, etc). This may also lead to enhancement in market competitiveness by bringing advanced climate change policies and promote transparency to shareholders to increase their trust. The study suggest that managers consider these factors to act proactively under economic turbulence rather than taking a reactive approach. This could also apply to policy makers since they, together with airline stakeholders are facing the issues related to sustainability. In this sense, requiring

firms to invest more in such initiatives could provide a common benefit, not only for the firm, but also for society in the long-term. Finally, sector investors are advised to understand that rewards of green investment do not necessarily come with an immediate impact on their targeted firm but with time and from benefits of meeting SDGs.

6.3 Study limitations

This study had certain limitations. Probably the most limiting factor of empirical part of this study is the sample size. The sample size covered 38 airlines. The reason to select this set of airlines backs to the sustainability data availability. Among the databases providing this data, we only had access to Thompson Reuters Eikon database. While retrieving ESG data from Eikon, we found that information is available for only a limited number of airlines (94 firms world-wide) and, even for these, the ESG score does not exist for all years because they started to implement sustainability standards from different years. Therefore, we basically selected 2009–2019 as longest period possible, leaving us with 38 ESG-rated airlines. Consequently, the results of this study might be limited by the dataset for this time and makes it difficult to generalize the results to the whole industry. Based on this argument, it can be said that the sample includes significant and the most prominent airlines, increasing the representativeness of the sample.

Also, we use the limited set of control variables which could be extended. Specifically, in order to develop a more complete view of impact and implication of sustainability disclosure on financial performance and value of the airline firms, there is a need to consider more firm characteristics variables. Malighetti et al., (2011) discusses a specific set of variables representing the value and performance of airlines such as passenger growth, alliance, route frequency, etc. which could be considered in such a study. Furthermore, firm's board composition and location could be added to such analysis in control for diverse cultural and different institutional settings to investigate their impact on the association between ESG practices and the financial performance. Finally, there are other factors which can influence the relationship between ESG-FP and the other way around (FP-ESG). This study, however, has only tested the size, age, and the SOE.

In addition, for the theoretical part of this study and conducting systematic review, the search is limited to the definite and the most probable keywords to capture the most relevant studies. Therefore, it is almost impossible to cover the state of the field over time in a single study. Furthermore, our review also suffered by the selected database to find relevant articles. This limitation is because we considered only articles published in the WoS and Scopus databases in this study.

6.4 Directions of future research

It is hoped that future research can clarify more aspects of this study, and possibly overcome some of the limitations already discussed. A important need is replication of the model with a larger sample. Therefore,

future research might cover a larger sample of airlines over a longer period. Broadening the scope of the analysis could provide a more comprehensive view on the topic. Also, to develop a more complete view of impact and implication of sustainability disclosure on financial performance and value of the airline firms, the set of explanatory and control variables could be extended. As discussed in limitation section, Malighetti et al., (2011) present a specific set of variables representing the value and performance of airlines such as passenger growth, alliance, route frequency, etc. which together with board composition and location may possible included in future contributions. Additionally, it is suggested that future studies on the current topic may test for the potential moderating effect of leverage, return on assets, or dividends at the association of ESG activities with firm value and performance of airlines. A more detailed and precise analysis of the influence of parameters considered in this study would be enlightening and perhaps suggest ways of better promoting sustainability practices in the airline industry. This way, given that most studies in the literature concentrate on one or a few airlines, more studies could be carried out focusing bigger samples to comply with the variety of firms.

Furthermore, due to the current outbreak of Covid-19 and the questions it raised about valuation, contributions to measure the effectiveness of preserving actions to get through the crisis such as cutting the capacity to reduce costs, relief on taxes and charges by governments, and to propose proactive strategies for policymakers to deal with fluctuating oil prices, seems necessary. In this regard, more dedication is required in investigating the effectiveness of fiscal policies to prevent exposures to oil-related sectors such as air transport industry. Finally, findings of theme analyses may encourage more investigations toward sustainable value drivers as a promising area of research.

Finally, to address the issue related with the literature review, future research may use a literature-exploration algorithm to find an almost overwhelming number of matching documents on a research topic. Future reviews should include articles published in other databases such as journal citation reports (JCR).

. The summary of research limitation and its respective suggestion for future research is presented in Table 6.1 Summary of limitation and future research

Table 6.1 Summary of limitation and future research

Item	Limitation	Future Research
Literature Review	The study is limited to the definite and the most probable keywords to capture the relevant studies. However, the academic contributions are using different keywords which is almost impossible to capture in a single Study.	To use the literature-exploration algorithm to find an overwhelming number of matching documents on a research topic.

Literature Review	Current study literature review search is limited to WoS and Scopus.	Future literature reviews may include papers published in other databases such as journal citation reports (JCR), JStore, DOAJ, etc.
Empirical work	Small proportion of airlines are listed in study samples.	Extend the list of airlines to gain more comprehensive firm sample to obtain generalized results.
Empirical work	Short period of time has been covered.	Collecting data for longer period of time is suggested.
Empirical work	Many factors may influence the relationship between ESG-FP and the other way around (FP-ESG). This study, however, has only tested the size, age, and the SOE.	Future studies on the topic may test for the potential moderating effect of leverage, return on assets, or dividends at the association of ESG activities with firm value and performance for airlines.
Empirical work	Nowadays, sustainability initiatives have become a strategic agenda for all businesses. This study has only focused on the airline industry.	Future studies on the topic may test to unify the consequences of ESG initiatives for other industry or sectors.
Empirical work	The covid-19 pandemic has devastated the businesses. Although the richness and insights arising from qualitative research design and the appropriateness of an inductive approach to find out the protectiveness of ESG activities at the covid-19 time, the results remain limited in terms of their representativeness and potential informant biases.	More dedication is required to produce knowledge for in investigating the effectiveness of ESG activities to protect sectors such as air transport industry at crisis time.

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