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MASTER THESIS

GLOBALIZACIJOS POVEIKIS EUROPOS ORO LINIJŲ RINKAI	IMPACT OF GLOBALIZATION ON EUROPEAN AIRLINE MARKET

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INTRODUCTION

The interest in the influence of globalization on transport has been increasing over the last decades. Globalization is a rapid multidimensional process that has after the 1980s the most tremendous impact on the world's business, increasing functional interactions between countries and geographical scale of business, and, consequently, international transport. Under these circumstances, air transportation has become the most significant, reliable and fastest mean of transport, driven by globalization (Oktal et al., 2006).

The relevance of the topic can be explained by the fact, that airline industry is significantly important for contemporary society being the biggest contributor to globalization connecting markets, facilitating global trade, bolstering the tourism industry, causing social growth (McManners, 2016). Moreover, it plays an inherent role in the creation of European economy (Belobaba et al., 2009). In fact, in 2018 this industry supported to EU's overall employment (9.4 million jobs) and contributed €624 billion, or 4.2% to EU's GDP. Along with this, the air traffic passenger demand has been steadily growing in average by 5% per year during the last 30 years and in 2018 stood at 802 million. Also, it is predicted that airline business prospects to be optimistic: airline passenger traffic is expected to grow by an average annual rate of 4.6 per cent over the next 20 years (Boeing, 2019). The interest in European airline market is constantly growing (Graham, 1998; Jarach, 2004; Vidovic et al, 2006; Kraft & Havlikova, 2016), as it is a successful example of liberalized aviation space (a single European aviation market), causing emergence the best low-cost airlines (Wizz Air, Euro Wings) and oldest and biggest full-service airlines (KLM, Lufthansa).

The relationship between globalization and air transport industry has been the ground for scholars' debate. It cannot be argued that there is a unilateral direction of cause-effect relationships between them. On the one hand, globalization in different manifestations, such as legal liberalization, rapid development in tourism, new infrastructures, and high-speed train competition affects air transport considerably (Albalate et al. 2014; Kalemba, 2017). Indeed, the effects of liberalization of passenger air transport have had a significant impact on the establishment of the basic conditions for its development, and they have caused an emergence of business model called low-cost carrier (LCC), such as first European low-cost airline Ryanair, which enable more and more people to fly by implementing considerably lower and more affordable airfares. Based on this, Martínez-Garcia et al. define LCCs as key drivers of air travel demand (2012). Many scholars (Shaw, 1982; Papatheodorou, 2008; Seetaram, 2010) concluded, that emergence of LCCs has resulted in undoubtedly positive effect on tourism boom. To confirm this, Jones Lang LaSalle Hotels' research demonstrates that LCCs contribute to tourism demand in Europe and potentially occupancy in hotels. Destinations not served by LCCs will most likely face tourism demand decrease (Jones Lang LaSalle Hotels, 2006). According to Upham, the combination of airline strategic alliances, such as Star Alliance, Oneworld, Sky Teams, and network restructuring is the most potent manifestation of globalization processes in the airline industry (Upham et al., 2003).

On another hand, there is inverse relationship: airlines catalyze globalization and spur social and economic development, that is confirmed by some authors (Button & Taylor, 2000; Kasarda & Green, 2005; Ishutkina & Hansman, 2008). From the economic point of view, air transport industry creates jobs opportunity in the aviation sector and is a significant taxpayer, contributes significantly to the economy's growth. As airline industry is characterized by constantly growing demand, many studies devoted to factors influencing passenger air transport demand, particularly within Europe. The approaches of main aircraft manufacturers differ: Boeing consider 3 groups of factors, such as economic drivers, easy of travelling and local market conditions, and forecasts annually, while Airbus identifies only GDP and market maturity (Boeing, 2016; Airbus, 2016). Thus, globalization would unlikely be possible without air transportation. Correspondingly, without globalization, the airline industry would be much less significant. At the time, many theoretical studies analyzed the effects of globalization on companies and industries in general (Knight, 2000; Thoumrungroje, 2004; Wignaraja, 2004; Kraemer et al., 2005; Luo et al., 2005; Thoumrungroje & Tansuhaj, 2007; Mahmutović et al., 2017), there is still an evident shortfall of empirical research on airline industry.

Due to the lack of studies on globalization and airlines industry in Europe there are further issues to be unveiled like impact of globalization on airlines' performance, difference in impact of globalization on low-cost and full-service carriers, positive and negative impacts of globalization, solutions for different negative impacts of globalization. Moreover, it remains unclear how to measure the impact of globalization on performance of airline company and industry in general.

Based on these gaps, **the main aim** of the master thesis is to explore the impact of globalization on operational and financial performance of European airlines.

The following **objectives** are going to be covered in order to reach the aim:

1. To identify factors of globalization, which influence company's performance;
2. To analyze the development of European airline industry in the process of globalization;
3. To measure the impact of globalization on business performance of selected European airlines;

4. To find out, if business model of airline can change the impact of globalization on airlines' performance;

5. To formulate recommendations for LCCs and FSCs to grasp the opportunity and reduce the threat of globalization.

Non-experimental quantitative research design was selected to analyze the relationship between independent globalization variables (level of globalization in Europe, globalization opportunity, globalization threat) and dependent airlines' performance indicators (operational: available seat kilometer (ASK), load factor, number of passengers carried, costs per ASK; financial: revenue per kilometer, yield, net profit margin, return on assets (ROA)). Collecting **secondary data** from annual reports of 19 European airlines and other sources was chosen as a main data collection technique, where European means, that airlines are founded in countries, which are members of European Common Aviation Area (ECAA). As it is longitudinal data (2007-2017), it was applied panel data approach with multiple regression analysis, using STATA.

With regard to the **structure of master thesis** (figure 1), it will start with literature review, where concept of globalization European airline industry in context of global trends are presented and hypotheses and conceptual model are developed. Then, methodology of quantitative research will be described. On third stage collected data will be analyzed, identifying relationships between globalization and airlines' performance. The last phase of this thesis is the discussion and the conclusion, providing recommendations, according to the results of the research.

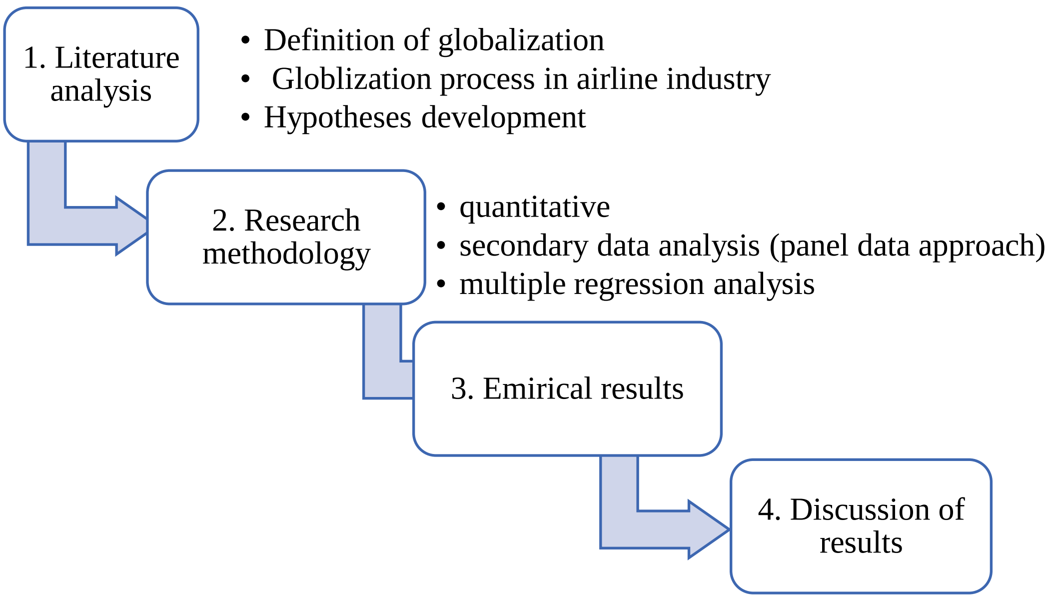

Figure 1. Research sequence

Source: created by the author

1. THEORETICAL FOUNDATION OF GLOBALIZATION AND ITS IMPACT ON EUROPEAN AIRLINE INDUSTRY

The first part of the Master thesis is dedicated to review of literature about concept of globalization and development of European airline industry in the context of globalization. This part begins with identifying approaches to globalization's definition, then the nature, dimensions of globalization and methods of measurement are observed. Along with this, how globalization affects business performance is observed. The important place in the literature review is dedicated to study of globalization's impact on development of airline industry in Europe. At the end, based on the literature review, hypotheses and conceptual model for further research are created.

1.1. Globalization's essence, dimensions and trends

To date, many scholars from various fields of science are considering the essence of globalization as a crucial force influencing the formation of a new world order. All countries are involved to varying degrees in the process of globalization through intensity of the interdependence of countries and economic entities around the world. Now globalization is accompanied by the change in role of institutions, society, business, state, international organizations etc. On this base in recent years, the debate about essence of the concept of globalization and its key characteristics has intensified in economic, sociological, political science literature. However, this discussion has not come to a logical conclusion in the form of a clearly formulated understanding of globalization as such, its manifestations and features which differ globalization from other phenomenon characterizing the current trends of economy and society on global level. Therefore, it is necessary to analyze the existing approaches to definition of globalization for rationalization of further research.

It is commonly believed that firstly the term of globalization was introduced by Levitt (1983), who defined globalization as a phenomenon of merging the markets of products produced by multinational corporations, focusing on globalization's shifts in the economic system.

Analyzing existing definitions of globalization given by different authors, it could be concluded that globalization is a complex concept that consists of many aspects and has different appearances. Based on this, four key approaches to definition, namely process, informational, systematic and complex, were identified (table 1).

Table 1. *Approaches to globalization definition by authors*

Approach	Author	Definition
Process	Boudreaux (2008)	A process of interaction and integration among the people, companies, and governments of different nations, a process driven by international trade and investment and aided by information technology.
	Štefko & Sojka (2015)	A process in which people, democracy, trade, market economy and investment increasingly cross borders between countries and thus borders become less and less restrictive to people.
	Stiglitz (2002)	A process of increasing interconnectedness of the world's countries and nations, which has brought about a huge reduction in transport and communication costs and removal of artificial barriers to the flow of goods, services, capital, knowledge and people across borders.
Informational	Tomlinson (1999)	Opportunity to get information about events around the world, which is an important aspect in the context of innovation and investment activities.
	Castels (Willenius, 1998)	A new capitalist economy characterized by information, knowledge, information technology, which is the main source of growth, productivity and competitiveness.
Systematic	Robertson (1992)	A series of empirically fixed dimensions, heterogeneous but united by the logic of transforming the world into one.
	Thoumrungroje (2004)	A system of interaction among the countries of the world in order to develop the global economy.
Complex	Appadurai (1990)	The set of world cultural flows that operate in the respective spaces (**information, ethno-space, techno-space, financial and ideological spaces**).
	Eden & Lenway (2001), Molle (2002), Orozco (2002)	The process of increasing **social** and **cultural** inter-connectedness, **political** interdependence, and **economic**, f**inancial** and market integrations that are driven by advances in communication and transportation technologies, and trade liberalization
	Štefko & Sojka (2015)	A complex process of **technical, economic, political, social** and **cultural** changes that are reflected in particular in the last two decades of the 20th century
	Štefko & Sojka (2015)	A dynamic process that breaks down barriers, frontiers are blurring, linking different countries and continents, creating a completely new framework not only **economic** and **political** but also international security relations.
	Gunter & van der Hoeven (2004)	The gradual integration of the elements of the world economy and the world community into one whole affected by new technologies, new economic relations, as well as relevant national and international policies developed and implemented by various actors, including national governments, international organizations, business circles and civil society institutions .

Source: created by the author, basing on Appadurai (1990); Robertson (1992); Willenius, 1998; Eden & Lenway (2001), Molle (2002), Orozco (2002); Stiglitz (2002); Gunter & van der Hoeven (2004); Thoumrungroje (2004); Boudreaux (2008), Štefko & Sojka (2015)

Thus, lack of common acceptable definition of globalization, its constant development and widening, distinction of researchers' views, which not always clearly disclose essence of globalization update the need for future studies.

The origin of globalization is also controversial question for researchers, as there is two theoretical ways to identify nature of globalization (Guedes & Faria, 2007; Wood, 2008): globalists, who consider globalization as unique historical and real process, and skeptics, who describe globalization as a common myth. According to skeptics (Burbules & Torres, 2000; Wood, 2008), globalization is not a new process in world development and is ideological basis for Washington Consensus. On contrast, globalists argued about uniqueness of globalization phenomenon, which is occurring due to special forces, such as technology development and integration of economics of countries into single space (Wood, 2008). Held et al. (1999) compared views of two groups of scientists, stressing main discrepancies in general concept of globalization, its causes and results (table 2).

Table 2. *Globalization in globalists' and skeptics' philosophy*

	Globalists	Skeptics
General concept	A new epoch	Nothing new, myth
Reason of emergence	Capitalism and technology development	"Specially" invented ideology of West
Results:		
1) economic	New global economy	Internationalization of economy
2) political	Global government	More power for governments
3) cultural	homogenization	Fragmentation

Source: Held et al. (1999)

To identify essence of concept of globalization researchers point out that, globalization consists of at least three dimensions – economic, political and socio-cultural, which acting as global forces transforming world order (Bottery, 2003). Economic globalization is a paramount form of globalization, which is understood through three factors:

- formation of new types of economies: world market system, characterized by increasing of capital and workforce movement, international trade due to reduction of barriers (Burbules &Torres, 2000; Bottery, 2003; Sallah & Cooper, 2008; Wood, 2008), and knowledge economy, which means growing dependence on information technology development (Wood, 2008);
- appearance and increasing influence of multinational corporations (Sallah & Cooper, 2008; Wood, 2008; Rifai, 2013);
- shift in crucial role states to increasing power of international organizations, such as World Trade Organization, International Monetary Fund and World Bank, which control main capital flows in global free market (Giddens, 2003; Cuterela, 2012; Rifai, 2013).

Political dimension of globalization is related with tendency of appearance of non-state governance – regional (European Union, Commonwealth) and global (World Bank, United Nations) institutions (Sallah & Cooper, 2008; Wood, 2008; Rifai, 2013), which manage political aspects now through multilateral agreements and conventions (Wood, 2008; Rifai, 2013). Along with this, political globalization is characterized by spreading value of democracy in countries' policies, so called democratization (Sallah & Cooper, 2008; Rifai, 2013).

Socio-cultural globalization is explained by free movement of people and spreading of information driven by rapid development of transportation and communication technologies, which led to intensification of social interaction, exchange of cultural and linguistic patterns (English as a global language for communication, global trends in fashion and music (Giddens, 2003; Held & McGrew, 2003; Wood, 2008). Rafai (2013) added, that McDonaldization, Ryanairinaztion, Coca Colanization, hybridization are key trends in socio-cultural gloibalization.

Along with these basic dimensions of globalization some authors highlighted other dimensions, such as

- technological (Sallah & Cooper, 2008), which is a process of formation of innovative technologies: computers, Internet, telecommunications and transport technologies, which fundamentally changed way of doing business;
- environmental (Sallah & Cooper, 2008; Puscaciu et al., 2014), reflecting concerns of business and society in general about environmental problems caused by intensity of global business activity (figure 2).

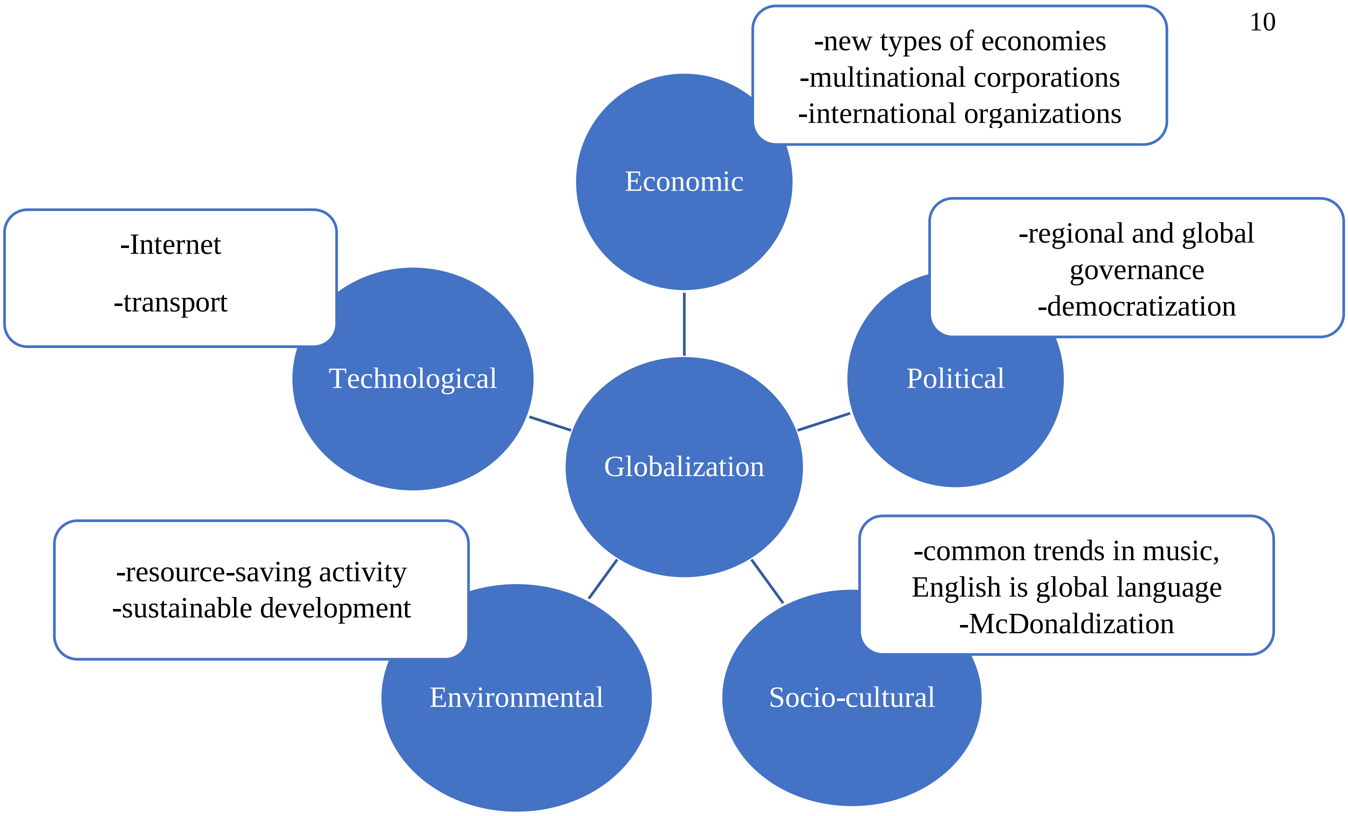

Figure 2. Dimensions of globalization

Source: created by the author

Based on dimensional approach to globalization, different indexes are used for measurement level of globalization, such as Kearney Foreign Policy Globalization Index, KOF Globalization Index, Bertelsmann Stiftung Globalization Index, Ernst & Young Index and DHL Connectedness Index (table 3).

Table 3. *Globalization Indexes*

Factor	**KOF**	**Bertelsmann Globalization Index**	**E&Y**	**Kearney Foreign Policy Globalization Index**	**DHL Connectedness Index**
First year of measurement	2002	1990	2009	1998	2001
Latest measurement	2016	2016	2012	2007	2019
Dimensions of globalization	Economic, political, social	Economic, political, social	Trade, capital, technology, culture, labor	Economic, technology, personal contacts, political	Trade, capital, information, people
Indicators	23	11	-	13	12
Countries	123	42	60	72	169
Scale	1-100	1-100	0-10	0-1	0-100
Leader	Switzerland	Ireland	Hong Kong	Singapore	Netherlands

Source: created by the author basing on Dreher, 2006; Kearney, 2009; Böhmer, 2016; Ernst & Young, 2016; Altman et al., 2018

To sum up, only DHL Connectedness index is recently updated and reflects current globalization trends in 4 dimensions in 169 countries, while Kearney Globalization Index was not updated since 2007. But the most common used index for measurement of globalization among researchers is KOF Globalization index created by ETH Zurich (Potrafke, 2015). It is important to notice, that according the latest update of ranking of KOF Globalization index, European countries are the most globalized.

Main institution in global governance, UN, noticed that it is necessary to be sure that globalization contributes to inclusive economic growth and sustainable development. For this reason, it identified three main trends of globalization that are shaping future now:

1) changes in production on workforce due to outsourcing and mechanization;
2) breakthrough in economical innovations, especially artificial intelligence;
3) climate change (Department of Economic and Social Affairs of UN, 2017).

To conclude, globalization is a phenomenon which characterizes modern trends, due to which world is smaller and closer. Despite the growing interest among researchers to this process, there is not clearly formulated explanation of globalization and commonly agreement in structure of globalization, that indicates need in further studies. Based on existing literature, globalization can be defined as a process, an information flow, a system and as a complex concept, involving mix of globalization dimensions. Regarding nature of globalization, there is divergence of opinions between authors: globalists argued that globalization is new and unique process, while skeptics supported idea about that it is not a new and not real. Essence of globalization is defined by five dimensions of globalization: economic, political, socio-cultural, technological and environmental, which are measured by globalization indexes.

1.2. Impact of globalization on business performance

In the past two decades, the world has gone through globalization process, that causes increasing economic, financial, market, cultural, social and political interdependence among countries. Business also is significantly affected by this process, going out from the country's of basement of boundaries and becoming international to survive in new market conditions. For this reason, companies changed their strategies which they followed. Scholars identified three possible strategies which companies apply in globalization context: multidomestic, multinational and global. In the case of multidomestic strategy, according to Diaconu (2012), company consists of independent branches, which of them focuses on special market; this strategy is applied only when markets are completely different or when it is necessary to reduce cost on managing of subsidiaries.

The second way for company is to follow multinational strategy. Multinational company has become one of the most discussed concepts in globalization literature, and even is called “central vehicle” in globalization process worldwide (Fiss & Hirsch, 2005; Scholte, 2005), as they are the most active in international business. To contrast, Rugman (2003, 2005, 2009) said that multinational companies follow strategies of regionalization, not globalization. Cavusgil et al. (2008) describe multinational company as which owns own resources, is based in one country but performs different business activities through the network of subsidiaries located in several countries. With reference to Ansoff (1984), companies implement this type of strategy due to operational (providing equipment, materials, technologies) and strategic needs (sustained growth, better profitability). Porter (2008) in his work compared these both strategies, which have become a basis for global strategy (table 4).

Table 4. *Comparison of characteristics of multidomestic and multinational companies*

Features	Companies	
	Multidomestic	Multinational
Market	Global	Several countries
Company strategy	Centralized strategy, decentralization depends on situation	Different strategies for different markets
Competition	Between the global system of production and marketing resources of different multinational companies	Between companies on specific national markets
Branches	Specialize on production of only a certain element of the products, exchanging with other subdivisions	Independent subdivisions with own strategies
Headquarters	It is a driving force of the organization, performs not only traditional functions (representation, management and coordination)	Coordinate financial management tools and marketing policy, can centralize R&D, design, and manufacturing of some components

Source: Porter (2008)

Summarizing Diaconu (2012) and Kovtun & Ignatuk (2014), following global strategy, company produces and sells standardized products around the world, enjoys advantages in scale effect in marketing and production in the most productive branches, cost reduction and activity coordination (centralized in headquarter). Despite the similarities in definition of global and multinational strategy, there are some examples of studies, which prove that they are totally different (Levitt, 1983; Collinson & Rugman, 2008; Porter, 2008).

Important role of globalization in business companies and its complex impact were noticed by many authors (Wignaraja, 2004; Thoumrungroje & Tansuhaj, 2007; Porter, 2008; Ristovska & Ristovska, 2014). However, despite existing studies of impact of globalization on business performance, authors (Eden & Lenway, 2001; Clark & Knowles, 2003; Thoumrungroje, 2004; Mahmutović et al., 2017) emphasized on lack of studies in this area, it can be seen a need for further studies related globalization-company's performance relationship.

Ball et al. (2001) identified six specific globalization factors impacting business development:

- political changes – emergence of preferential trade agreements and international grouping (EU, USMCA), resulting single market and reducing trade barriers;
- international business climate;
- market development – development of new technologies, international tourism, cultural exchange contributed to appearance of new customers;
- expenses – due to the need to launch new products and invest in R&D, companies have to cut expenses to be competitive; for this reason, companies locate production in countries with cost of production;
- competition – because of easy access to new geographical markets, competition is constantly growing;
- development of technology – new communication technologies enabled to intense exchange of ideas across borders; due to Internet it is possible for smaller companies to compete globally, regardless of geographical location of client; development of transport technologies makes world closer, connecting countries around the world. Indeed, many authors confirmed that advances in transportation are the essential consequence of globalization, which radically changed way of doing business (Knight, 2000; Thoumrungroje, 2004; Čiarnienė & Kumpikaitė, 2008) and contributed to globalization intensity (Trommelen, 2013).

Analyzing existing literature and results of previous empirical researches, it can be concluded, that there are two primary impacts of globalization on companies: global opportunities and global threats.

Positive manifestations of globalization, as Porter (2008) said, are related with that companies are able to acquire resources (raw materials, knowledge, capital) from anywhere, distributing different business activities abroad and using more cheaper workforce to obtain competitive advantage. Supporting this, Wignaraja (2004) and Ristovska & Ristovska (2014) noticed globalization results easier access to new sources, new knowledge and technologies and markets. Indeed, due to trade barriers fall, trade in goods and services between countries is increasing constantly and companies grow number of geographical areas where they are presented to increase profitability (Cullen & Parboteeah, 2010). Also, as money flows across boundaries has become freer, investors from around the world seek for attractive companies with favorable ROI (Ristovska & Ristovska, 2014). Finally, globalization allows companies to reduce costs finding suppliers from different countries to get competitive advantage based on national differences in price and quality to compete more efficiently (Hill, 2008). Taking all of this into account, companies must use these globalization opportunities fully to be successful on the global market.

Along with this, globalization creates risks and threats for companies, such as intensive competition, as they need fight for survival and strengthen position on the market innovating and expanding geographical presence (Hafsi, 2002; Ristovska & Ristovska, 2014). Especially this challenge is felt by companies from developing countries, as products produced have to meet global excepted criterias. Moreover, companies are subjected to other negative impacts of globalization, such as global crisis: instability in employment, production, banking system in one region could be spread quickly in another one, which is locates in thousands of kilometers away (McGrew, 2010). Lopatina (2012) called globalization in general as a risk for companies, constituting financial, operational, strategic and hazard risks. World economic forum (2016) in Global Risk Report distinguished five groups of globalization risks for business, namely economic, geopolitical, environmental, societal and technological and according to this, the most effecting risks on business activities are economic (unemployment or underemployment, energy price shock and fiscal crises). In addition, Štefko & Sojka (2015) said that increasing of labor force diversity might be challenging for companies to effectively manage this diversity.

To summarize this part, it is commonly agreed that globalization affects way how companies do business, changing strategies, which companies must follow to be successful on high-competitive global market. Moreover, results of studies demonstrate that globalization provide opportunities for companies, such as effortless access to new markets, new sources, new customers, chance to be invested and decrease cost as well as cause threats, like intensive competition and global crisis.

1.3. Globalization processes in the European airline industry

Airline industry is an extremely unique industry, because being a direct result of globalization, it contributes to creation of the world which we know today: without airline industry tourism and leisure sector would not develop so fast and it would be harder to run international business (Tiernan et al., 2008). According to IATA 2018 Report European air passenger market is the second largest in the world (26.2 %), following Asian (37.1 %) and overtaking American (22.6 %). Also, it is forecasted that airline business prospects to be optimistic: airline passenger traffic is expected to grow by an average annual rate of 4.6 per cent over the next 20 years (Boeing, 2019). Indeed, Asian market demonstrates brilliant results on global market: Asian airlines are awarded by Skytrax as the best in the world (Qatar Airways, Singapore Airlines and ANA All Nippon Airways) (Skytrax, 2019). However, some of the European airlines are also included in the top-airlines list: Lufthansa (9th place), Swiss International Airlines (13th place), Austrian Airlines (15th place) and KLM Royal Dutch Airlines (18th place). The main driver of development in European airline sector is newly adopted European Union aviation strategy in 2015, which has to provide to airlines access to all world destinations. As a result, it is expected the annual 5% growth in the European airline industry by 2030 (Moores, 2015).

European airline industry arouses interest of researches, so there a significant literature background concerning different aspects of industry development. There are a lot of studies about response of European airline industry on global crisis (Dobruszkes &Van Hamme, 2011; Pearce, 2012); partnerships of airlines in Europe were studied by Adler & Smilowitz (2007), and it was concluded that all these mergers did not succeeded, but in contrast Schosser & Wittmer (2015) argued, that comparatively with American experience, mergers in European airline industry were more cost-effective.

Different researches argue that globalization caused crucial changes in airline industry. The consequences of globalization with its displays influenced not just the demand on international air transport, as the scope, nature and geography of demand was shifted significantly but also the supply, when harmonizing of policies by governments and private sector affected the environment in which air transportation services are provided (OECD, 2010). Cidell (2006) pointed out three key processes of globalization that had the biggest impact on air transportation: increase of trade, technological improvements and liberalization.

A lot of investigators noticed the essential role of technology development in passenger airline industry. Airline industry is one of the most technologically dependent businesses globally (Drummond, n. d.). Along with this, Rodrigue (1999) emphasized, that investments in development of transport technologies, which supported globalization, caused reduction of “the transactional space and enabled extended exploitation of the comparative advantages of space in terms of resources, capital and labor”. First, invention of jet engine is often called as one of the technological improvements that contributed to globalization the most (Rodrigue, 1999). Another key direction of technology development in the industry is efficient fuel consumption, that now is also corelated with global trends of reduction of negative impact airline industry on the environment. The global oil crises forced to consider about highly fuel-efficient systems and investments in energy-saving technological innovations, as high price on fuel influence airfares directly. Airlines in cooperation with the aircraft manufacturers was working on the improvement of efficiency of fuel consumption through the development modern jet engines, high-lift wing designs, and lighter airframe materials (Lee et al., 2001). Now due to global concerning on climate change and rising oil prices, airlines are keen to create energy-efficient innovation and implement them in business operations. According to website Alternativeairlines (2019), top-3 positions in the ranking of the most-ecofriendly airlines are occupied by American airlines (Alaska Airlines, Delta and American airlines). European airlines are also presented in the ranking: KLM with its Climate Plan and strategy to promote the sustainable fuel for operations; EasyJet; Ryanair, which positions itself as a “Europe's greenest, cleanest airline” and was the pioneer to plan being plastic free by 2023; Flybe and British Airways, which in partnership with Royal Dutch Shell and Velocys is going to build the first in Europe waste to jet fuel plant (Reid, 2019). The last, but not least, applying Internet technologies in business operations of airlines affected their performance significantly. Amit & Zott (2001) identified 4 components in airlines activities, which affected by Internet (table 5). Drummond (n. d.) argued that “Internet of things”, cloud computing and mobile devices allow airlines not only to manage successfully operational activities (safety and maintenance of flights, control aircraft’s indicators), but also to be closer to consumers and communicate with them effectively.

Table 5. *Impact of Internet technologies on airline companies*

Source of value	Results in airline company
Efficiency (search costs, speed, simplicity)	1. Real-time decision-making 2. Updated information for customers. 3. Cut in customers’ search and transaction costs.
Complementarities (between activities, products and services, on-line and off-line assets)	1. Bunching products and services throughout vertical and horizontal collaboration/alliances to create more valuable travel package. 2. Providing additional services, which not directly related to travel the offering (financial services). 3. Decrease communication and promotion costs.
Lock-in	1. Proposing lower prices or discounts. 2. Individual approach to meet all customer needs. 3. Loyalty program and bonuses. 4. Basement for consumer trust.
Novelty	1. New transaction structures case lowering transaction costs for airlines and customers 2. New retail partners.

Source: Amit & Zott, 2001

Woodburn et al. (2008) argued that globalization has affected the transportation sector in two different aspects: development of international trade and business and removal of barriers between European countries. Dinçer et al. (2017) supports previous study, but at the same time there are no empirical results of this.

There are other views on globalization processes in airline industry. In ATAG report (2005) globalization, including deregulation and reducing airfares, along with rising GDP and living standards is called as main driver of airline industry development. Upham et al. (2003) said that there the most important manifestation of globalization in the airline industry is the combination of airline strategic alliances and network restructuring. Williams (2002) in his turn, said that strategic alliances between airlines is a response of industry on globalization process. There are three global airlines alliances: Star alliance, One World and Sky Team (table 6).

Table 6. *Airlines global alliances*

	Star Alliance	Sky Team	One World
Members	26 +40 affiliates	19	13+30 affiliates
Founded	1997	2000	1999
Passengers, mln.	762.3	630	528
Destination airports	1294	1150	1012
Destination countries	195	175	158

Source: Williams (2002)

Albalate et al. (2015) describes globalization through deregulation, open sky policy, changes in the tourism, new revenue management policies, strategic alliances establishment of new business models of air carriers (LCCs), and high-speed train competition. Socha et al. (n.d.) supported previous results, highlighting information technologies including “green issues” as strategic global alliances as the significant globalization manifestations in airline industry, added some specific, such as terrorism and requirement for security and quality.

To sum up, airline industry is specific industry, which is a direct result of globalization. For this reason, there are a lot of studies about the development of airline industry in context of globalization, especially European one, however, there is remarkable lack in empirical studies about impact of globalization components on airlines. Considering analysis of exciting literature, scholars identified three main globalization processes influencing the development European airline business: intensity of trade, technological breakthrough and liberalization, which will be discussed further.

1.3.1. Liberalization in European airline market

Liberalization and deregulation as globalization’s manifestations were the main forces which shaped global airline industry. For years, the airline industry was strongly state-controlled comparatively with other industries: airlines were national property, airfares were fixed, landing rights in each country had been approved by governments. The commonly used tool to regulate international air transport relationships was bilateral air service agreement (BASA), aiming to protect national interests and to support national carriers (Doganis, 2002; Vasigh et al., 2008). Along with this, Williams (1993) provides evidences about inefficiency of BASA system and argues about high fares, low profit, low load factors and poor service quality. Starting in 1978 in the USA with the adoption of Airline Deregulation Act, the foundation was laid down for further liberalization in the USA as well as in Europe.

Firstly, deregulation was done on the domestic US market and later, when it met the success, – internationally, in particular, it was adopted by European countries in 1980th under the term “liberalization”. Mootien (2012) argued, that the term of deregulation was changed in Europe’s case, as the Europeans wanted to determ own processes originally and in systematic way. Moreover, liberalized market is characterized by less and simpler regulations to increase efficiency and protect consumers‘ rights. Despite these differences, the terms are used interchangeably.

It is important to notice, that liberalization in Europe was started under the specific conditions, when EU only started to create rules for common market in the 1957 Rome Treaty implementing free competition, free circulation of goods services, capital and people. On this base Common Transport Policy was created, but it was applied to other transports, air transport excluded. And only in 1987 the first liberalization package was introduced, which reflected that deregulation would take place in stages. Dudek & Hawlena (2013) argued that European liberalization process had been implemented over the long period by stages (three liberalization packages in 1987, 1990 and 1992) unlike in the USA. Some of authors (Button, 2001; Stevens, 2004; Dudek & Hawlena, 2013; Norwegian Ministry of Transport and Communications, 2016) emphasized on importance of third liberalization package, as is was an act finishing the regulatory process of European airlines market, which abolished all obstacles for opened up competition. Thus, implementation of these liberalization packages caused the creation of single liberal airline market in 1992 – European Economic Space, that opened new opportunities for the European air carriers to operate on any route within the EU and to use own established tariffs, , causing at the same time an increase in the intensity of competition (Dudek & Hawlena, 2013).

The previous studies distinguished some consequences of liberalization for European airlines market:

1) Liberalization caused intensified competition (Alamdari & Morell, 1997) due to emergence and development of low-cost carriers (Cobb, 2005; Morrell, 2005; O’Connell and Williams, 2005; Forgas et al. 2010; Dudek & Hawlena, 2013;).

2) Essential development of airlines’ network and decline of airfares (Vowles & Tierney, 2007; Button, 2009; Goetz &Vowles, 2009; Koo et al., 2010; Alderighi et al., 2012; Dobruszkes, 2013). However, this positive effect of liberalization in developing countries is not the same as in developed countries (Papatheodorou, 2002; Goetz & Vowles, 2009).

3) Shift from bilateral agreements to “open sky” agreements meaning the emergence of business alliances between airlines in conditions of removement of any restrictions in governing rates and airfares (Cidell, 2006; Mootien, 2012). Thus, airlines, especially full-service carriers, started to associate in alliances to make maximum use of positive results of liberalization and to survive in highly competitive environment with the purpose to reduce the costs in maintenance of sales offices and facilities, personnel costs.

To sum up, liberalization process in Europe is an adaptation of American deregulation, which took more time. The main steps – three liberalization packages remove all obstacles for the growth of European airlines market, causing rising of the competition due to emergence of new business model of airline companies – low-cost carriers, that in its term let to decline of airfares.

1.3.2. Factors influencing European passenger demand for air transport

As air passenger traffic has been growing continuously during last years in average by 5 %, this causes researchers’ interest, especially in Europe’s case, to identify and study factors of influence passenger air transport demand, because knowing these factors airline companies can better understand travel conduct and expected passenger traffic that is crucial for planning of pricing strategies, fleet utilization and airline’s corporate success in general (BCG, 2006; Grosche et al., 2007).

Main manufacturers of aircraft Boeing and Airbus in 2016 conducted researches regarding drivers of air travel demand: results demonstrated that GDP of country and level of income is the key factor (Boeing, 2016; Airbus 2016). Along with this Airbus (2016) noticed market maturity as a second determinant, but there is no describing methodology of this statement. In its turn, Boeing (2016) considers other drivers of demand, such as easy of travelling (including visa restrictions, emerging of new business models of airline companies and market regulations) and local market conditions in addition. International organizations, such as CAPA and IATA (IATA, 2008; CAPA, 2014) emphasize on that higher level of income (GDP per capita), higher demand on air travel and vica versa – if incomes decline, people tend to consider air travel as luxury. The same idea it can be seen in work of Hollaway (2008) and Doganis (2010).

Another example of studying air transport demand is research of Cheze et al. (2011), results of which identify along with GDP, jet-fuel price (affecting airfare) and external shocks are main drivers of air travel demand applying dynamic panel-data models for eight regions including Europe. Supporting him, Wadud (2014) successfully proved that air travel demand could show reversible because of fuel prices as people react differently to price increases and decreases. Besides Cheze, the groups of authors (Inglada & Rey, 2004; Lai & Lu, 2005; Kopsch, 2012) determine external shocks, especially terrorist attacks, as a power of fall in air passenger traffic in Europe and USA.

Kluge & Paul (2017) added completely different factors of impact on air travel, such as population size, age of passengers and education. They found out that more than 50 % of European travelers belong to the age groups between 25 and 44 years as well as 45 and 64 years. These two groups also demonstrate most of the working age population. Regarding education, they observed that 71% of clients of European airline companies has a high education.

There are examples of studies of factor of passenger air transport demand in European countries: Kopsch (2012) explored these factors on Swedish airline market; Department of Transport in UK (2013), applying econometric models, explored impact of income and airfare on air transport demand in the UK. The same area of research as in previous study was examined by Dargay & Hanly (2001), who confirmed that demand was driven by airfare, income, trade (only for business air travel) and exchange rates (supported by Doganis, 2010).

Basing on existing study results, it can be argued, that key factors affecting air passenger demand in Europe are level of income and price that was proved by majority of authors (table 7).

Table 7. *Factors affecting European passenger demand for air travel*

Factor	Authors
Income (GDP)	Airbus (2016), Boeing (2016), CAPA (2014), Cheze et al. (2011), Department of Transport in UK (2013), Doganis (2010), Hollaway (2008), IATA (2008), Kluge & Paul (2017), Kopsch (2012)
Airfare	Cheze et al. (2011), Department of Transport in UK (2013), Doganis (2010), Hollaway (2008)
Fuel price	Cheze et al. (2011), Wadud (2014)
External shocks	Cheze et al. (2011), Inglada & Rey (2004), Lai & Lu (2005), Kopsch (2012)
Macroeconomic factors	Airbus (2016), Boeing (2016), Dargay & Hanly (2001)
exchange rate	Dargay & Hanly (2001), Doganis (2010)
Others	Boeing (2016), Kluge & Paul (2017)

Source: created by the author

However, strong influence on quantity of passengers using air transport have other drivers, such as fuel price, external shocks, macroeconomic factors (exchange rate) and others.

1.4. Globalization and new business models of airlines

The main result of the liberalization on airline market is intensified competition because of decrease of airfares and, consequently, emergence of new type of airlines – low-cost carriers, which enjoy their competitive advantage in lower level of price on tickets comparatively with evolving national carriers in full-service carriers, which focus on quality of service. In a result of this competition, airlines begin to adopt characteristics from another business model to survive, creating hybrid airlines.

1.4.1. Emergence of low-cost carriers (LCCs)

One of the most essential consequences of globalization as a result of liberalization in airline industry is an establishment of new business model based on higher levels of operational efficiency with low fares, namely – low cost carriers (LCCs). Firstly, this concept was introduced in 1960th with appearance of Southwest Airlines on the US airline market, and today we can find examples of LCCs in many areas worldwide (Francis et al., 2006; Zhang et al., 2008; Albers et al., 2010; Macário and Reis, 2011). Originally, the main idea was to provide fewer services for the cheaper price and this is achieved through a variety of operational processes that provide cost advantages to a LCC as opposed to full service carriers (Schlumberger & Weisskopf, 2014) that became the basis for modern low-cost airlines.

In Europe this model adopted only in 1995 by Irish private airline Ryanair (Creaton, 2005) and later by easyJet (Jones, 2007). Today the LCCs occupy a substantial part of passenger airline industry both in the USA and on the Europe, being the strong competitors of full-service carriers (Dobruzskes, 2006). In 2018, there were an estimated 49 LCCs worldwide having market share of 30 % (Mazareanu, 2020). But Boeing (2019) reports that in terms of regional aspect, LCCs have possibly had the biggest impact precisely on European airline market, where they demonstrate significant increase from 2% in 1998 and currently account for over 33% of all passenger flights, while the growth of the FSCs has been stagnant. This proves that the development of the market is due to LCCs (Eurocontrol 2013).

There is a common agreement about that LCCs are key drivers of European airline industry development (European Union Committee of the Regions, 2004; Williams, 2004; O’Connel and Williams, 2005; Price and Hermans, 2008; Boeing, 2019), as they transform airline market, making flying cheaper than driving and cause a considerable growth of passenger traffic and benefit regional economics and development new touristic areas.

Consequently, the LCCs airline model has become the subject of intense interest and study among scholars and organizations. There is still no commonly agreed definition of a low-cost carrier and its characteristics. The first attempt to develop low-cost airline business model was done by Franke (2004) who suggested that when LCCs access to the market offering lower fares, air service supply grows and consequently modifies the demand curve as demonstrated on the figure. Hence, providing low-price possibilities to individuals to travel by air is one of the most significant consequences of low-cost airlines to the people mobility, which contributes to connectivity between areas and globalization.

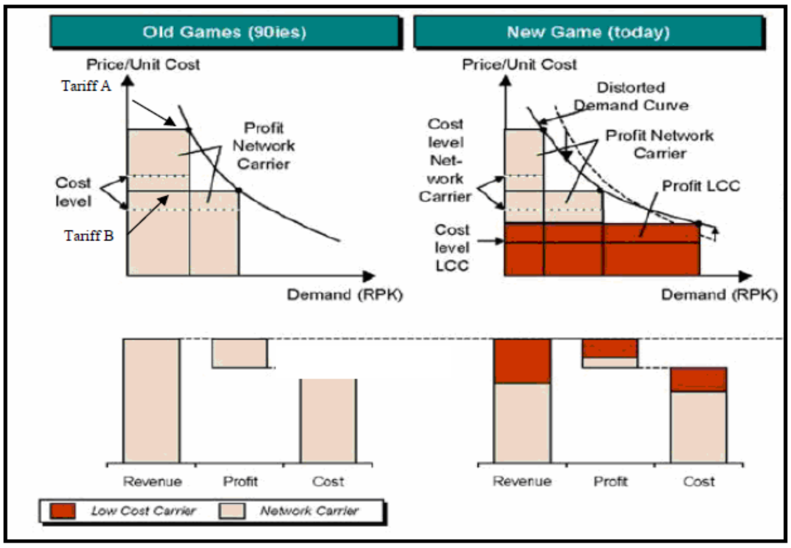

Figure 3. Low-cost carrier model

Source: Franke, 2004

In more precise way LCCs was defined by Cento (2009) as an airline developed to have a competitive edge regarding costs over an FSC. Button and Ison (2008) defined LCCs through its attributes: low-cost airline can be differed from other airlines by following cost minimization strategies including reducing maintenance and training costs, ease scheduling, using mostly a single type of aircraft (usually Boeing 737 or Airbus A320). Analyzing exciting literature, it can be concluded, that LCCs are described by some basic characteristics, such as limited customer services (free baggage, catering), operating to secondary airports due to lower price, using short-haul and point-to-point routes instead of the hub-and-spoke model, direct ticket sales through Internet avoiding payments to travel agencies etc. (figure 4). Thus, despite the fact that there is no agreement in definition of LCC, there is a common understanding of what these airlines are, owing to their characteristics. Concerning passengers, they can be divided by two groups: student (national and international), young globe-trotters (Shaw & Thomas, 2006) and business passengers (Mason, 2000; Huse and Evangelho, 2007; Graham & Shaw, 2008).

According to studies results (Hunter, 2006; Martin & Roman, 2010; Kotze, 2017) the key factor of LCC business model operating is using the cost reduction strategy implementing price leadership. On the table 8 strategic measures used by LCCs to within cost reduction strategy. Based on this, five basic cost reduction sub-strategies are identified: fuel cost reduction, employee productivity improvement, flight operations, aircraft maintenance cost reduction, operating procedure simplification (Rao, 1999; Pegrum & Kennell, 2002; Haacker, 2006; Morrell & Swan, 2006; Candell et al., 2009; Tekiner et al., 2009; Martin & Roman, 2010).

- No frills
- Point-to-point routes with secondary airports
- Young homogeneious fuel-efficient fleet
- Direct on-line tickets selling
- High labor utilization with lower salary, workers plays different roles
- Single class configuration
- Modest fare scheme, usually higher price when the plane is nearly full of passengers

Figure 4. Attributes of LCCs

Source: Mark S. & Brian P., 2006; Reichmuth et al., 2008; Campisi et al., 2010; Olischer & Dörrenbächer, 2013; Schlumberger & Weisskopf, 2014

Table 8. *Cost-reduction policies implemented by LCCs*

Cost	Fleet		In-flight Service			Network		Marketing+PR		HR
Unit cost category (cost per passenger kilometer)	Homogenous fleet	Young fleet	High-density seating, fewer galleys and toilets	No free meals and drinks, lounges, loyalty system	No seat reservation	Use of small airports	No interlining, no flight connections	Focus on direct sales	“low prices sell themselves”, aggressive PR	Variable remunerations, low hierarchies, low labor costs
Maintenance	X	X	X							
Fuel		X	X			X				
Staff		X	X				X			X
Airport costs			X		X	X	X			
In-flight service				X						
Capital and leasing	X		X		X	X	X			
Marketing and sales			X			X		X	X	
Overheads	X		X	X	X		X			X

Source: Reichmuth et al. (2008)

Over the time there is a deviation from basic characteristics because of the market’s maturity and changes in business strategies. For instance, it has been recently noticed, that more and more LCCs have started establishing themselves in large European airports (Dobruszkes et al., 2017). Along with this, new characteristics may be added: Budd et al. (2014) suggest that one of the most distinguished features of LCCs is a into commercial partnerships with third-party company, such as accommodation provider or car-rent firm. Additionally, used strategy has been changed: along with cost leadership, new LCCs tends to implement differentiation strategy, which means that airline seeks to be unique among competitors promoting services highly valued by buyers (Alamdari & Fagan, 2005).

Based on these, researches are interested in studies of LCCs airline model and its specifies: groups of authors (Lawton, 2002; Calder, 2002; Alamdari & Fagan, 2005) studied examined the nature of the low cost model and the operating practices (Blyton et al., 2003; Gillen and Lall, 2004; Marty, 2004). Many studies were devoted to competition between LCCs and FSCs (Franke, 2004; Tretheway, 2004; Doganis, 2010; Castillo-Manzano et al., 2012), pricing strategies and sales revenue management (Gillen and Morrison, 2003; Alves et al., 2009) and passenger experience of using low-cost airlines for travelling (Mason, 2000). Plenty of studies shown significant economic of LCC on trends of business, migration and tourism. As an example, study of Dobruszkes (2009) of West–East European routes demonstrated that this low-cost market is still periphery but exactly thanks to LCCs rapid growth is possible. Focusing on Italy, Campisi et al. (2010) found out that many regional airports have experienced high increase in passenger traffic owing to low-cost airlines.

Despite this significant background, there are a lot of gaps mainly due to lack of common agreed definition of low-cost airlines serving European countries. Doganis (2006) proved empirically that LCAs always offer fares of around 0.10 € per seat-km and/ or half the price offered by the FSCs, but this was not supported by others. Dobruszkes (2017) emphasize on lack of a systematic geographical analysis of the LCCs networks developed. Moreover, there are no systematized empirical studies about impact of globalization on European low-cost airlines and previous studies are outdated.

1.4.2. Full-service carriers (FSCs) and hybrid airlines in the era of globalization

Deregulation of airline industry gave rise not only to establishment of LCCs but also to the development full-service airline business model which provides a broad spectrum of pre-flight and onboard service options, proposing different classes of serving and connecting flights (Reichmuth et al., 2008). This is a basis for FSCs operating – hub and spoke system, which, according to Cook & Goodwin (2008), allows "all passengers expect those whose origin or destination is the hub, transfer at the hub for an additional flight to their final destination". Thus, this business model involves long-haul, regional and domestic flights, that explains the utilization of several aircraft models (Vidovic et al., 2013). Regarding customers, the main business sectors for full-service carriers are passengers, cargo and maintenance, e.g. German carrier Lufthansa Group consists of Lufthansa airlines (including subsidiaries), Lufthansa Cargo, Lufthansa Technik.

Due to the poor literature background about FSCs, there are not a lot of examples of successful definitions of this business model of airlines. Summarizing circumstances in which FSCs had been formulated, Cento (2009) defines the FSC as an airline created on base of the former state-owned flag carrier owing to deregulation process of airline market. Indeed, it can be observed a trend, especially in case of European market, that majority of FSCs are former flag carriers, e.g. Lufthansa – Germany, KLM – Netherlands, Air France – France etc.; equally, full-service airlines tend to be national airlines, like in case of Eastern Europe – LOT (Poland), UIA (Ukraine), Czech Airlines (Czechia). Based on these, Vidovic et al. (2013) note that image of FSCs affects country's associations they represent.

Gillen & Morrison (2003) highlighted additional characteristics of FSCs, such as broad range of destinations with wide network of services; strong focus on service quality: continuous improvement of flight scheduling, baggage tracking and increase capacity. Special attention is given to customer relationship management which includes loyalty programs, making value for travelers due to the network of destinations and frequency of service. Cento (2009) notes that CRM tools increase the customers buying and travel experience. One more essential characteristic of FSC is using numerous sales channels, such as indirect off-line in travel agencies, indirect online on web pages of agents, direct online on airlines website, direct off-line through the airlines call center and in airline representative offices or airline airport offices (Cento, 2009).

FSCs follow the differentiation strategy which means operating on a broad scope and offering unique for industry service highly valued by customers (Sørenson, 2005). Proussaloglou and Koppelman (1999) described how airlines increase service differentiation to be more competitive over other airlines; they implement differentiation of pricing by market segment, loyalty programs, alliances with other airlines for common marketing and code sharing, improvements in terminals and on-board amenities, and monitoring and improving on-time performance.

Obviously, emergence of LCCs caused significant increase of competition on airline market, that generate interest for researches to compare both airline models. Cooperation and competition between LCCs and FSCs as a result of continuing revolution in air travel industry were studied by Gilen and Morrison (2003). Although, this study notes only partial competition despite completely different attributes of business models. Another study (Baker, 2013) explores the service quality in both models of airlines, comparing them. The results demonstrated that competition between models makes LCCs to improve their service quality: it was noticed in 2007-2011 period quality of low-cost airlines services was higher than in some tradition FSCs. Stoenescu and Gheorghe (2017) compare main factors influencing passenger's decision to use one or another airline business model: while the crucial factors in choosing a LCC are the price level and the direct flights, FSCs are mainly used due to the airport location, the progressed ticketing advantages, interline agreements, and the services offered.

To sum up, table 9 presents specifies and differences of FSC and LCCs.

Table 9. *Differences between full-service and low-cost airlines*

Feature	FSC	LCC
Strategy	Differentiation	Cost minimization, cost leadership
Scale	Typically large	Generally small, but with some big players (Ryanair, Wizz Air)
Network coverage	Alliances, interline agreements	No
Operational model	Hub and spoke/Multiple hub and spoke linking with feeder routes Mix of short/medium and long-haul routes Prolonged stops at airports	Point to point, no interlining, short sector length (400 - 600 miles) Mainly short haul Short stops at airports
Airport	Major/conventional	Regional/Secondary
Fleet	Mixed	Homogeneous medium sized fleet
Distribution	Online, intermediaries	Online
Process design	Full-service Different classes of services	No frills Only economy class
Fare	Large price range, different fares by customer/channel	Fare differentiation by time of booking, generally low

Source: created by the author basing on Gillen&Morrison (2003), Hunter (2006), Sabre airline solutions (2011)

From this comparison it is clear, that FSC and LCC airline models are completely different with own features. Based on the fact, that appearance of LCCs on airline market caused significant changes for FSCs: it was necessary to adopt to new realities reconsidering price policy and exposing lower fares, that consequently removed boundaries between concepts of FCSs and LCCs creating airline companies "somewhere in the middle" (Eliott, 2013). In this way hybrid airlines were created, which combine characteristics of both models of airlines. Dabkowski (2016) argues that this form of airlines will displace clear LCCs and FSCs as they adapt quickly to the market constantly following changing passengers needs and implement new technologies. Figure 5 demonstrates the features of the hybrid model taken from LCC and FSC business models.

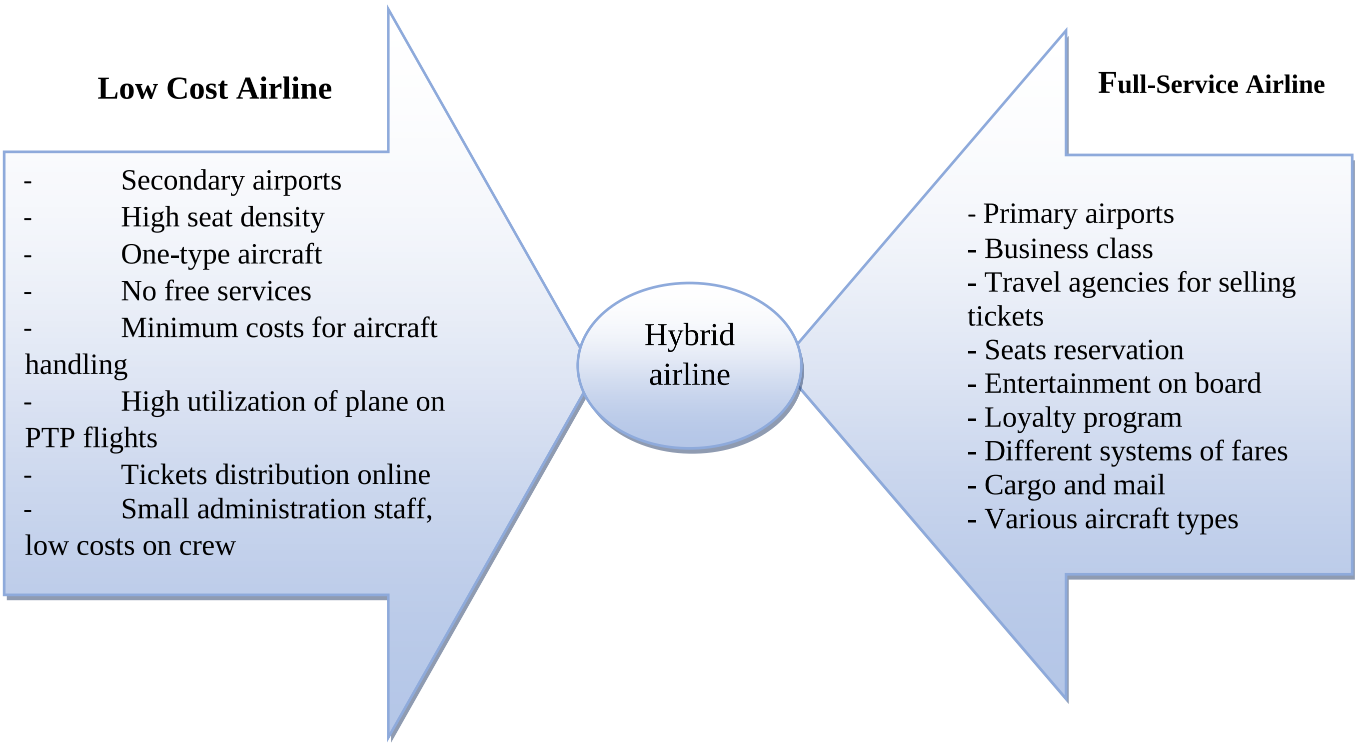

Figure 5. The characteristics of the hybrid airline model

Source: created by the author basing on Kurth (2008)

Thus, hybrid airline provides more services for passenger in comparison to LLC, e.g leg space, two passenger classes, entertainment on board as well as Wi-Fi and loyalty program (Kurth, 2008). The last, but not least, some hybrid airlines have the partnership with big airlines, for expanding their flight network.

Taking everything into account, there are not a lot of studies done about FSCs, however, it is obvious, that it was developed due to liberalization and deregulation as well as LCCs; this model provides to customers more services that in its turn effects the ticket price. They differ by strategy and operating model used, scale of activity, fleet, distribution and fare. Due to significant competition, both models tend to emulate features from each other to survive on the market, therefore, hybrid airline model appears.

2. DEVELOPMENT OF CONCEPTUAL FRAMEWORK

Summarizing literature review, it was observed that globalization process plays crucial role for European airline companies, particularly on its performance. Considering gaps in previous studies regarding measurement of globalization impact on airlines performance, the main aim of this research is not only to measure this effect, but also find differences in the results for two business models of airlines – LCCs and FSCs. Thus, level of globalization in Europe measured by KOF globalization index is an independent variable, which influences organizational performance of airline company. In addition, taking into account previous researches (Knight, 2000; Thoumrungroje, 2004; Kraemer et al., 2005; Luo et al., 2005; Thoumrungroje & Tansuhaj, 2007; Mahmutović et al., 2017) and the idea, that effect of globalization on companies is expressed through globalization opportunity and globalization threat, they are also considered as independent variables. Globalization opportunity is expressed in number of destinations served by airlines; globalization threat is measured as intensity of competition and expressed as the most commonly used indicator – Herfindahl-Hirschman Index (Kwieciński, 2017). Organizational performance of airlines is divided by operational and financial indicators, which are dependents variables. It is important to mention, that airlines have specific indicators for performance evaluation (ICAO, 2009). Operational performance will be measured using four variables:

- Available seat kilometer (ASK) measures an airline's carrying capacity to generate revenue, it is a result from multiplying the number available seats on aircraft by the number of kilometers flown ;
- Load factor (LF) is passenger kilometers RPK represented as a percentage of ASK; this indicator is considered to be the key indicator of airline operations and for the management of certain airlines;
- Cost per ASK (CASK) – a measurement for comparison of the efficiency of various airlines, obtained by dividing the operating costs of an airline by ASK;
- Passengers carried (PAX) – the number of passengers carried by airline during certain period.

Financial performance will be represented through another system of indicators:

- Revenue per passenger kilometer (RPK) is demonstrated by sum of the products obtained by multiplying the number of revenue passengers carried on each flight stage by the corresponding stage distance;

- Yield (Y) is the average revenue per passenger kilometer, calculated by dividing the total passenger revenue on a flight by the passenger kilometers generated by the flight; it is a measure of the weighted average fare paid;
- Net profit margin (NPM) is a percentage of revenue remaining after all operating expenses, interest and taxes; demonstrates how effective the business is at generating profit on each dollar of revenue;
- Return on Assets (ROA) measures profitability and indicates the per dollar profits a company earns on its assets; this indicator is important, as airlines assets (planes) generate revenue.

Business model of airline (low-cost carrier or full-service carrier) is a moderator variable, which could change the impact of independent variables of globalization on dependent variables of airline's performance.

However, the relationship between variables mentioned above is unexplored at all. Due to this, the research aims to eliminate and empirically prove or defuse these links. The table 10 represents all variables which will be used in this empirical study.

Table 10. *Research variables*

Variable	Type	Supporting literature	Source
Level of globalization	Independent	Kılıçarslan & Dumrul, 2018	KOF Globalization index
Globalization opportunity	Independent	Thoumrungroje, 2004; Thoumrungroje & Tansuhaj, 2007; Mahmutović et al., 2017	Market reports, annual reports, CAPA data
Globalization threat	Independent	Thoumrungroje, 2004; Thoumrungroje & Tansuhaj, 2007; Mahmutović et al., 2017	Own calculations based on data from annual reports
Available seat kilometer (ASK)	Dependent	Doganis, 2002; Demydyuk, 2011; Arhall & Cox, 2013; Dizkirici et al. 2016	Annual report of airline
Load factor	Dependent	Arhall & Cox, 2013; Dizkirici et al. 2016	Annual report of airline
Passenger carried (PAX)	Dependent	Doganis, 2002; Demydyuk, 2011; Arhall & Cox, 2013; Dizkirici et al. 2016	Annual report of airline
Revenue per passenger kilometer (RPK)	Dependent	Doganis, 2002; Demydyuk, 2011; Arhall & Cox, 2013; Dizkirici et al. 2016	Annual report of airline
Cost per Available seat kilometer (CASK)	Dependent	Doganis, 2002; Demydyuk, 2011; Arhall & Cox, 2013; Dizkirici et al. 2016	Annual report of airline

Yield	Dependent	Doganis, 2002; Demydyuk, 2011; Arhall & Cox, 2013; Dizkirici et al. 2016	Annual report of airline
Return on Assets (ROA)	Dependent	Demydyuk, 2011; Dizkirici et al. 2016 Maverick, 2019	Annual report of airline
Net profit margin	Dependent	Demydyuk, 2011; Arora and Sharma, 2016; Dizkirici et al. 2016	Annual report of airline
Business model of airline	Moderator	-	-

Source: created by the author

Based on this, conceptual framework was designed to illustrate hypothesis and initial relationships between independent variables of globalization on dependent variables of airlines' performance (figure 6).

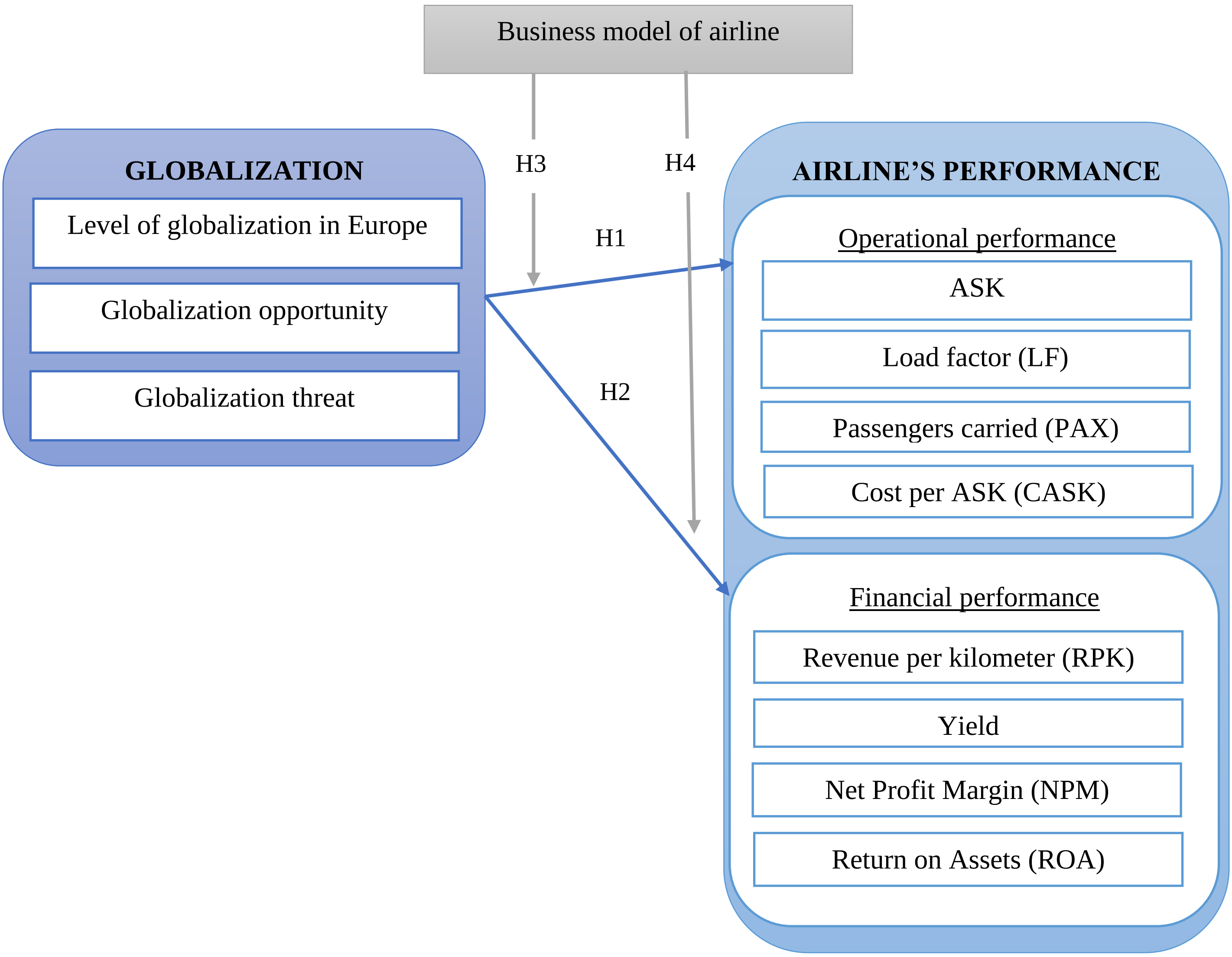

Figure 6. Conceptual research model

Source: created by the author

The resented model will be used in order to explore what impact globalization has on performance of both business models of European airlines – LCCs and FSCs. Based on the literature review and the conceptual model as its result, hypotheses were formulated for further research. Each hypothesis was aimed at measuring the relationship between globalization indicators and airline's performance (operational and financial) in Europe. Four groups of hypotheses were formulated (table 11).

Table 11. *List of hypotheses*

Hypothesis	Sub-hypothesis
H_1. Globalization impacts operational performance of European airlines	$H_{1.1}$. There is a positive relationship between globalization and ASK. $H_{1.2}$. There is a positive relationship between globalization and load factor. $H_{1.3}$. There is a positive relationship between globalization and the number of passengers carried. $H_{1.4}$. There is a positive relationship between globalization and CASK
H_2. Globalization impacts financial performance of European airlines	$H_{2.1}$. There is a positive relationship between globalization and revenue per kilometer. $H_{2.2}$. There is a positive relationship between globalization and yield. $H_{2.3}$. There is a positive relationship between globalization and net profit margin. $H_{2.4}$. There is a positive relationship between globalization and return on assets.
$H_{3.}$ Type of airline business model can change impact of globalization on operational performance of airline companies.	
H_4. Type of airline business model can change impact of globalization on financial performance of airline companies.	

Source: created by the author

To sum up, to measure impact of globalization on airlines performance and to find differences in the results for LCCs and FSCs, the research model was created, where globalization is represented with a set of independent variables, namely the level of globalization, globalization opportunity and globalization threat. Dependent performance variables were divided into two groups: operational (ASK, LF, PAX, CASK) and financial performance indicators (RPK, yield, NPM, ROA). Business model of airline is considered as a moderator variable, to identify if globalization affects different airlines differently. Based on the research model, 4 groups of hypotheses were formulated.

3. RESEARCH METHODOLOGY

The previous chapter of literature review contributed to describe the concept of globalization and to identify manifestations of globalization in European airline industry. Then conceptual model of relationships between globalization and airline companies' performance indicators was suggested and based on this, four groups of hypotheses were formulated. In the following chapter chosen methodology is described: quantitative design selected for the research with panel data approach. Moreover, multiple regression analysis was chosen as a main instrument of analysis, using secondary data from annual reports of European airlines. Along with this, sample of population, followed by a description of the data collection and data analysis techniques are discussed. This empirical research aims to **solve research problem**, precisely – measure the impact of globalization on performance of airlines in Europe on the basis of proposed conceptual model. As the main problem of this research is to identify the influencing factors (Bryman & Bell, 2007), positivism as appropriate philosophy is used.

3.1. Research design

To conduct this empirical research **quantitative research design** was chosen, since, according to Malhorta (2007), this design fits better for evaluation of causal links between social phenomena. Along with this, quantitative method allows to maximize objectivity, accuracy and reliability of research findings (Westat, 2002). Moreover, previous researchers (Knight, 2000; Thoumrungroje, 2004; Kraemer et al., 2005; Luo et al., 2005; Thoumrungroje & Tansuhaj, 2007; Mahmutović et al., 2017) used quantitative methods of study effect of globalization on companies from different industries except for airline industry. Malhorta (2007) identifies four types of quantitative research design: experimental, which defines cause-effect relationships, and non-experimental, which enables to test significance of link between variables. Despite the fact, that it would be better to choose experimental design to evaluate cause-effect links between globalization and airlines' performance variables, this type of design is difficult to conduct due to the impossibility to control variables and necessity of a lot of time taken for experiment. Thus, for this research **non-experimental quantitative research design** is appropriate.

The quantitative study includes yearly observations of European airlines collected for 2007-2017 period. The timeframe of the research is from 2007 till 2017 is due to the earliest availability of the data for airlines included in the sample (2007) and the latest version of KOF globalization index (2017). As data has longitudinal nature, a **panel data design** is the most suitable. Panel data analysis is the technique, which combines both time series and cross-sectional, and evaluate variables for different subjects (e.g. companies) over time periods (Brooks, 2014). In the case of this study, the panel data consists of:

– the cross-sectional data: measurement of independent and dependent variables for European airlines;

– the time series: changes of variables within studied companies over the eleven-year period from 2007 till 2017.

Panel data can be balanced and unbalanced: in balanced panel data the number of periods of time is identical for all cross-sectional unit, otherwise – it is unbalanced. Studied dataset is considered to be balanced.

Baltagi (2005) and Hsiao (2006) highlighted advantages of panel data approach applying, such as more degrees of freedom, less risk of multicollinearity, the opportunity to control for individual heterogeneity, study dynamics. Moreover, using panel data analysis it makes easier to test more advanced hypotheses.

3.2. Data sample selection and sample size

Starting point is to define which airlines are considered to be European for this research, which airlines belong to low-cost and which to full-service carriers. By saying *European airline* in this research, it means airlines created in one of 28 EU-countries along with Norway, Iceland, Montenegro, Serbia, North Macedonia, Albania, Bosnia and Herzegovina, which are the members of European Common Aviation Area (ECAA). The object of study is passenger airlines in the ECAA, so carrier airlines as well as results of carrier-branches of airline groups are out of the scope of this research. Taking this into account, preliminarily 49 European airlines were selected. List of airlines divided into LCCs and FSCs is demonstrated in Annex 1.

The next important thing is to identify which airlines are LCCs and FSCs. *The full-service carrier* is understood as the national or former national carrier (Reichmuth et al., 2008). *Low-cost carrier* in the research means basing on the most used definition of ICAO (2009) “an air carrier that has a relatively low-cost structure in comparison with other comparable carriers and offers low fares and rates. Such an airline may be independent, the division or subsidiary of a major network airline or, in some instances, the ex-charter arm of an airline group”. Taking into account the definitions, 21 LCCs and 28 FSCs should be studied. But limited data is available for FSCs, which are still national carriers, and LCCs. Eventually, there are 19 European airlines (10 FSCs and 9 LCCs) with all information needed over the 11-year period (table 12).

Table 12. *European airlines included in study*

FULL-SERVICE CARRIERS	LOW-COST CARRIERS
Aegean Airlines	Easy Jet
Air Lingus	Eurowings
Austrian airlines	Flybe
British Airways	Jet2.com
Finnair	Norwegian
Iberia	Ryanair
KLM	Transavia
Lufthansa Passenger Airlines	Vueling
Scandinavian Airlines (SAS)	Wizz Air
Tap Air Portugal	

Source: created by the author

Consequently, there is a balanced panel data set with 209 organizational-year combinations.

3.3. Data collection tools

The issue of choosing of appropriate data collecting technique for assessing of the impact of globalization on airline companies had become one of the biggest challenges in conducting the research. The fact is that a survey as a main data collection method was used to measure impact of globalization on companies in previous studies (Knight, 2000; Thoumrungroje, 2004; Kraemer et al., 2005; Luo et al., 2005; Thoumrungroje & Tansuhaj, 2007; Mahmutović et al., 2017). Considering the high possibility of no-response from managers of European airlines, instead of survey, gathering quantitative data from annual reports available on airline company websites is more real in this context. This information is classified as a **secondary data**, which has already been gathered by another researcher for other purposes. The main advantages of using secondary data for the research are:

– cost and time effectiveness – data is already collected by another researcher, moreover secondary data collection is not expensive, to contrast to primary research, which requires to spend a lot of money;

– high quality, reliability, greater validity (Johnston, 2014)– as a rule, secondary data is gathered by most of the data collected by experts (companies, international organizations), that conditions quality of data; thus, it is not necessary to check validity of data;

– easily accessible – data has already been summarized, furthermore, annual reports of airlines are available on their website (Saunders et al., 2003);

– large scope of research (Johnston, 2014) – it allows to cover more target population, than primary data.

However, at the same time, using secondary data has drawbacks, as it could be inappropriate for the specific research aims, because data was collected for another purpose and cannot be able to answer research questions correctly. Moreover, researcher does not participate in the data collection and does not know exactly how it was conducted, so there is a possibility of not so high quality of information than expected.

The data was collected from multiple secondary data sources. To measure the level of globalization in Europe the KOF globalization index 2007-2017 was used, calculating average value among ECAA countries during 2007-2017 (Annex 2). HHI indexes were calculated for 2007-2017 period basing on market shares of every airline included in the study:

$$HHI = s_1^2 + s_2^2 + s_3^2 + \cdots + s_n^2, \quad (1)$$

where s_n is a market share of the airline, calculated as a number of passengers carried by airline (PAX)-total air transport passenger traffic in ECAA countries ratio. But as market shares of other airlines, which not included in the study, are not available, quasi-HHI were used. According to Alkhamisi et al. (2004), quasi-HHI applying instead of actual HHI is justified under conditions, when market share information of not all companies is available. Other variables, such as a number of served destinations, operational and financial statistics were obtained from annual reports available on companies' websites from 2007 to 2017 and from CAPA database. Financial ratios (net profit margin and return on assets) were calculated based on sales revenue, net profit and total assets, which are available in annual reports of airlines.

3.4. Methods of analysis

As panel data approach is used in order to achieve main research aim of the master thesis, it is important to identify the class of panel data analysis approach (regression model) that can be employed: fixed effect and random effect model.

Fixed effect model allows controlling for time-invariant unobserved individual attributes over the time that can be correlated with the researched explanatory variables – fixed effect removes the impact of those time-invariant characteristics from the dependent variables. The fixed effects model can be generalized to contain more than just one determinant of dependent variable that is correlated with independent variable and changes over time.

$$y_{it} = \beta_1 x_{it1} + \beta_2 x_{it2} + \cdots + \beta_k x_{itk} + a_i + u_{it}, \quad t = 1, 2, \ldots, T \quad (2)$$

Where:

y_{it} – the dependent variable, i – entity, t – time;

β – the coefficient for the independent variable;

x_{it} – the independent variable;

a_i – the individual specific effect;

u_{it} – time-varying error, which represents unobserved factor that change over time and affect dependent variable.

This model (2) is called a fixed effect model or unobserved effect model, where the error u_{it} is a time-varying error, because it illustrates unobserved factor that changes over time and affect dependent variable y_{it} (Wooldridge, 2009). To estimate the parameters interested β of given panel data framework, one possibility is pooling all cross-sectional and time series data without distinguishing them and use OLS for estimation (Wooldridge, 2009). The model should meet the condition that unobserved effect on dependent variable is uncorrelated with every x_{it}. If this requirement is not met, it is recommended to use a random effect model (Kohler and Kreuter, 2005).

According to Kohler and Kreuter (2005), in random effect model the variation across all entities is assumed to be random and uncorrelated with the dependent or independent variables. Random effect model assumes that there are two residual elements of effect: group specific random element which is a combination of cross section and time series and an individual residual which is a random characteristic of the i-th unit observation in each period studied. The regression equation of panel data of random effect model is:

$$y_{it} = \beta_1 x_{it1} + \beta_2 x_{it2} + \cdots + \beta_k x_{itk} + \varepsilon_i + u_{it} + a, \qquad (3)$$

Where:

u_{it} – the group residual which is a combination of cross section and time series;

E_i – the individual residual which is the random characteristic of i-th entity and always remains (Zulfikar, 2018).

Using the random effect model causes heteroscedasticity elimination. To estimate the model Generalized Least Square (GLS) technique is applied. This technique estimates the unknown parameters in a linear regression model. The GLS is applied when the variances of the observations are unequal (heteroscedasticity), or when there is a certain degree of correlation between the observations. A GLS regression is more suitable in that it corrects for the omitted variable bias in the presence of autocorrelation and heteroskedasticity in pooled time series data (Marashdeh, 2014).

Before to run a regression model it is needed to decide if to apply a fixed effect model or a random effect model, taking into account the consideration whether entity effects correlated with. To identify this, the specification Hausman test is used by researchers. The main idea of the test is to compare the estimators of 2 hypothesis (Greene, 2007):

H_0: there is no correlation between the independent variables and the unit effects, estimators β of fixed and random effect model should be similar;

H_1: there is correlation the independent variables and the unit effects.

If the difference, according to Hausman test results, is significant ($p < 0.05$), it means that models are different it is needed to reject the null hypothesis and follow the fixed effect model; if the difference is not significant ($p > 0.05$) – the random effect model is preferred. To check the correctness of this, the Lagrande Multiplier (LM) test is be used, which aims to identify the presence of the unobserved random effect in the data.

According to Hausman test and LM test results (chapter 4), **random effect multiple regression model (GLS)** (as in the research model 3 independent variables are included) will be run for every dependent variable. Before running the multiple regression to test hypothesis, assumptions must be tested:

- linearity of relationship between dependent and independent variables by running correlation test;
- normality of residuals' distribution, using Shapiro-Wilk test;
- homoscedasticity of residuals, using Breusch-Pagan test for heteroskedasticity;
- no multicollinearity between independent variables, using VIF values.

Mentioned above methods of analysis will be processed and analyzed by statistical software – **STATA program**.

To summarize, the quantitative research design is implemented to explore what impact globalization has on operational and financial performance of European airlines. The studied period is the 11-year period from 2007 till 2017. As data has longitudinal nature, a panel data design is applied. The sample includes 19 European airlines (10 FSCs and 9 LCCs). To collect data about all variables multiple secondary data sources were used: KOF Globalization index report, airlines' annual reports from 2007 to 2017, data from CAPA database. Regarding HHI index, it was calculated for 2007-2017, basing on basing on market shares of every airline included in the study. As market shares of other airlines, which not included in the study, are not available, quasi-HHI were used. Hausman test and Lagrande Multiplier (LM) test will be used to decide what class of panel data approach (fixed or random effects model) should be applied. As three independent globalization variables are included in the research model, multiple regression will be run, but before the data will be tested for linearity, normality, homoscedasticity, and multicollinearity.

4. EMPIRICAL RESEARCH RESULTS

In the previous chapter, a chosen methodology of research was described to test the effect of globalization on the operational and financial performance of European airlines. This part of the thesis discusses the results of empirical tests for European airlines in general and for LCCs and FSCs separately to compare the effect of globalization, conducting multiple regression analysis. Multiple regressions analysis will run 8 times (as there are 8 dependent variables in the research model) in order to identify which of the independent variables has an influence on each of dependent ones. Empirical results include:

- descriptive statistics to overview all variables;
- testing of multiple regression analysis assumptions: linearity, normality, homoscedasticity, multicollinearity;
- running Hausman and LM tests to choose between fixed and random effects models;
- testing the impact of globalization variables on the operational performance of European airlines;
- testing the impact of globalization on the financial performance of European airlines.

4.1. Descriptive Statistics

Before testing the hypotheses and conducting multiple regression analysis to identify if globalization effects financial and operational performance of airlines in Europe the descriptive analysis was done to examine the preliminary features of the collected data.

As sample of study includes 19 airlines from 2007 to 2017 and research model consists of 12 variables – 209 observations were made. The table 13 demonstrates the data summary for 209 observations over 11-year period (2007-2017) including mean, standard deviation, maximum, minimum for all independent, dependent and mediator variables studied.

Table 13. *Descriptive statistics*

Variable	Obs	Mean	Std Dev	Minimum	Maximum
Independent variables					
KOF	209	81.37	0.71	80.50	82.50
HHI	209	382.56	64.57	272.30	465.29
DS	209	105.23	47.37	21.00	258.00
Dependent variables					
ASK	209	48.60	49.16	5.00	202.30
LF	209	79.92	6.25	62.00	94.00
PAX	209	23.13	22.24	3.10	120.00

RPK	209	40.70	41.60	3.40	162.20
NPM	209	2.49	6.34	-17.00	24.00
ROA	209	2.21	5.84	-20.00	18.00
CASK	209	6.50	2.31	2.00	13.67
Yield	209	7.47	2.73	1.31	14.00
Moderator variable					
Model	209	0.47	0.50	0	1

Source: created by the author

Speaking in terms of maximum and minimum values of variables, the lowest value of KOF was in 2007, and the highest in 2017: it was observed a growth of Europe globalization over the 11-year period. The average level of competition in the European airline industry is 382.56, that reflects strong competition in the industry, as HHI less 1500, that is in line with Yasar & Kiraci (2017): according to them European airline market is highly competitive, especially market of Western Europe, values of calculated of quasi-HHI are similar to values of HHI in this research. The lowest numbers of destinations served had Vueling in 2007, the richest geography of destinations had Lufthansa in 2015.

In terms of dependent variables, namely ASK, the values differ a lot from 5 (Flybe in 2014) to 202.3 (Lufthansa in 2015). RPK and PAX reflect the same trend – the lowest value of RPK (3.40) had Flybe in 2012 and 2013, while the highest indicator had Lufthansa in 2015 (162.20). The lowest number of passengers (3.1 mln) was carried by Jet2.com in 2009, whereas 120 mln passengers were carried by Ryanair in 2017. Mean value for NPM of European airlines is 2.49% that demonstrates that the level of profitability is slightly below average than the commonly appropriate level at 4%. At the same time, a few companies have a negative value of profit margin, which indicates their unprofitability – the worst result was shown by Austrian Airlines in 2008 (-17%), while the profitability of Ryanair in 2016 was 24%. Regarding ROA, it ranges from a minimum of -20.00% to a maximum of 18.00% with an average of 2.21% for the overall sample: the mean value for European airlines is low, that it could be explained with the substantial assets of airlines. The average cost to fly a single-seat one kilometer in the European airline industry is 6.50 EUR cent, while Ryanair had the lowest cost per unit (2.00 EUR cent in 2017), Austrian Airlines – the highest (13.67 EUR cent in 2015). Similarly, the lowest yield had Flybe in 2016 (1.31), which is a low-cost airline, and the highest – Aegean (14.00 in 2008).

The mean of the moderator, type of airline, is 0.47 and the standard deviation is 0.50. The airline could get a score of 0 if it is FSC and a 1 if it is LCC.

To distinguish differences between LCCs and FSCs, in the table results of the descriptive analysis are shown. For each subsample mean, standard deviation, maximum, minimum for all variables were reported (table 14).

Table 14. *Descriptive statistics for LCCs and FSCs separately*

Variable	Cases	Mean	Std Dev	Minimum	Maximum
Subsample 1 – LCCs					
Independent variables					
KOF	99	81.37	0.71	80.50	82.50
HHI	99	382.56	64.75	272.30	465.29
DS	99	92.82	44.36	21.00	207
Dependent variables					
ASK	99	29.35	25.64	5.00	97.91
LF	99	81.84	7.43	62.00	94.00
PAX	99	23.99	26.00	3.10	120.00
RPK	99	26.23	26.53	3.40	102.60
NPM	99	3.82	6.36	-8.00	24.00
ROA	99	3.55	5.52	-15.00	18.00
CASK	99	5.71	2.34	2.00	11.25
Yield	99	5.72	2.24	1.31	11.50
Subsample 2 – FSCs					
Independent variables					
KOF	110	81.37	0.71	80.50	82.50
HHI	110	382.56	64.71	272.30	465.29
DS	110	116.4	47.40	35.00	258.00
Dependent variables					
ASK	110	65.92	58.15	5.10	202.30
LF	110	78.19	4.33	66.00	88.00
PAX	110	22.36	18.29	5.20	85.10
RPK	110	53.73	48.53	3.60	162.20
NPM	110	1.31	6.29	-17.00	22.00
ROA	110	1.01	5.89	-20.00	15.00
CASK	110	7.22	2.06	4.12	13.67
Yield	110	9.04	2.03	6.30	14.00

Source: created by the author

Having studied the collected data separately for LCCs and FSCs, it was concluded:

- FSCs serve wide broader geography of destinations than LCCs, that was already mentioned in the literature (Gillen & Morrison, 2003; Sørenson, 2005);
- despite that fact it is characterized for LCCs to expand their capacity adding more seats, average ASK of FSCs is higher than LCCs';
- similar with Demydyuk (2011), there is no big difference in average load factors, nor in the extremes;
- on average, the number of passengers carried by LCCs is slightly higher than by FSCs;
- in terms of profitability, LCCs are much more economically efficient than FSCs, moreover, the highest level of profitability was shown by Ryanair;

- costs per unit and average fare per passenger-kilometre of LCCs are obviously lower than FSCs;
- it was proved, that LCCs are profitable despite lower yield, they compensate this by high load factor (Doganis, 2002; Demydyuk, 2011).

4.2. Appropriateness of collected data to multiple regression analysis

To ensure that the data is accurate for running multiple regression test, four assumptions were tested: linearity, normality of data distribution, homoscedasticity, and no multicollinearity among predictor variables. Results of each test are described as more detailed.

Linearity. According to Osborn and Waters (2002), the linear relationship between the dependent and independent variables is an obligatory condition for multiple regression. To conduct the linearity test between predictors and outcomes the Pearson correlation test was used (command *pwcorr* in STATA) (table 15).

Table 15. *Linearity test*

	DS	KOF	HHI
ASK	0.784*	0.149	0.124
LF	0.210	0.393	0.350
PAX	0.795*	0.197	0.172
CASK	0.015	-0.031	-0.002
NPM	0.244	0.227	0.121
RPK	0.781*	0.181	0.153
YIELD	0.216	-0.049	-0.043
ROA	0.151	0.223	0.138

Source: created by the author

Considering that Pearson correlation index (r) is 0.1 to 0.3 for small strength of the correlation, 0.3 to 0.5 for moderate and 0.5 to 1.00 for a strong linear relationship, linearity test demonstrated a strong linear relationship between ASK and number of served destinations, PAX and number of served destinations, RPK and ds, moderate correlation between LF and KOF, LF and level of competition. It can be seen an insignificant negative correlation between yield and KOF, CASK and KOF indicating an inverse relationship between yield, CASK and KOF globalization index. Additionally, it can be seen a lack of correlation between CASK and HHI. For the rest of the variable’s pairs, there is a weak positive correlation.

Normality. It is necessary for multiple regression analysis, that residuals of dependent variables are normally distributed, in case if not – they should be transformed. In order to test whether collected data is distributed normally Shapiro-Wilk test was conducted, using the command *swilk* in STATA for calculated residuals (command *predict, resid*) (Annex 3). The condition of the Shapiro-Wilk test regarding sample size is met ($7 \leq N \leq 2000$) (Rizzo, 2019).

Shapiro-Wilk test has shown that whereas residuals of NPM and yield followed a normal distribution (p-value > 0.05), LF, PAX and CASK did not. Distribution of ASK, RPK and ROA is are close to normal (p-value is 0.02, 0.03 and 0.02 respectively). Resuming Shapiro-Wilk test results, there is a violation of the assumption of residuals normality distribution (LF, PAX, CASK), that can cause inaccuracy of models' results. Applying STATA command *ladder* on residuals, it was concluded not to transform variables, as current values of variables are more normally distributed than proposed options of transformations.

Homoscedasticity. This assumption claims that the variances of error terms are similar across the range of the independent variables. To check data for homoscedasticity – dependent variables (ASK, LF, PAX, RPK, NPM, ROA, CASK, yield) demonstrate equal variance across independent variables (number of destinations, KOF index, HHI) – Breusch-Pagan test for heteroskedasticity was used (command *hettest* in STATA). This test assumed that if the p-value is below the appropriate level ($p < 0.05$) then H_0 of homoskedasticity can be rejected.

After testing data on heteroscedasticity, the null hypothesis was rejected ($p>0.05$) for ASK, PAX and RPK and heteroskedasticity was observed (Annex 3). However, testing LF, NPM, CASK, ROA, yield it was found out, that p-value is higher than 0.05 (data is homogeneous), that could be explained by the sensitivity of the Breusch-Pagan test to the normality of residual distribution.

The most common solution to the observed problem of heteroscedasticity is to run Weighted Least Squares (WLS) or GLS (Verbeek, 2008). According to results of Hausman and LM test (paragraph 4.3), in all models random effects were observed and GLS will be applied, that decreases impact of heteroscedasticity and autocorrelation on regression results (Verbeek, 2008).

Multicollinearity. Finally, independent variables were tested for multicollinearity. According to Pallant (2013), there is multicollinearity, when independent variables are strongly correlated (r=0.9 and more). As shown in table 16, correlations are lower than 0.9, that means there is no-multicollinearity.

Table 16. *Multicollinearity test*

	DS	**KOF**	**HHI**
DS	1.000		
KOF	0.329	1.000	
HHI	0.270	0.768	1.000

Source: created by the author

Additionally, the Variance Inflation Factors (VIF) method is used to check if there is multicollinearity (vif command in STATA) – when VIF scores are above 10 (Pallant, 2013). As all the VIF score were less than 3, it reflected no risk of multicollinearity (Annex 3).

Thus, testing the collected data for appropriateness for multiple regression analysis (panel data analysis), it was concluded, that there is a linear relationship between predictor and outcome variables. However, LF, PAX, CASK are not normally distributed, heteroscedasticity was indicated in, that will be fixed with applying of GLS. Regression models do not suffer from multicollinearity problems Therefore, these violations of multiple regression assumptions can affect the accuracy of results of testing hypothesis.

4.2.1. LCCs

As one of the objectives of the master thesis is to find out, if the business model of the airline can change the impact of globalization on airlines' performance (H_3, H_4), multiple regression models will be run for 2 subsamples (LCCs and FSCs) separately (Annex 3).

It was observed a strong linear relationship between the number of served destinations and ASK, the number of served destinations and number of passengers carried, RPK and number of served destinations. A moderate linear correlation was found between NPM and ds, ROA and ds, ASK and KOF, LF and KOF, RPK and KOF, ASK and HHI, LF and HHI, RPK and HHI. Along with this, it was observed a weak negative correlation between CASK and ds, that reflects the existence of the reverse linear relationship between variables. There are insignificant correlations between yield and ds, CASK and KOF, yield and KOF, CASK and HHI, yield and HHI. Rest of variables pairs demonstrated a weak positive correlation.

According to Shapiro-Wilk test results, only a half of dependent variables residuals (ASK, PAX, NPM and ROA) are normally distributed (p-value > 0.05), while LF, CASK, RPK and yield are not. After checking if transforming variables can increase significance, it was decided not to transform variables, as current values of variables shown more significant results. Thus, violation of normality assumption can negatively affect the accuracy of models' results.

Breusch-Pagan test for heteroskedasticity demonstrated data homoskedasticity of LF, ROA, yield (p-value >0.05), the p-value of CASK is slightly lower (0.04), while in case of ASK, PAX, RPK, NPM null hypotheses of homoscedasticity was rejected and heteroscedasticity of data was observed. To fix the negative effect of heteroscedasticity on the accuracy of models results, GLS will be used.

There is no multicollinearity effect among independent variables, as they are not strongly correlated and VIF scores are lower than 10.

Taking all results into account, there is a violation of normality and homoscedasticity assumptions of multiple regression, that can negatively affect the accuracy of results of the regression. To neutralize this, GLS regression will be run to test the hypothesis.

4.2.2. FSCs

In case of FSCs, similarly to LCCs, there is a strong correlation between the number of served destinations and ASK, the number of served destinations and number of passengers carried, RPK and number of served destinations. There is a moderate correlation between LF and ds, LF and KOF, NPM and KOF, ROA and KOF, LF and HHI. A weak correlation was observed between NPM and ds, ROA and ds, RPK and KOF, ROA and KOF, NPM and HHI, ROA and HHI. Rest pairs of variables demonstrated insignificant linear relationship. In the case of FSCs, it can be seen the change in direction of a linear relationship between variables: there is small inverse correlation between CASK and KOF, yield and KOF, yield and HHI.

Residuals of dependent variables are not normally distributed (p-value < 0.05), only LF and NPM demonstrated normal distribution. Hence, the assumption of normality is violated, that can negatively influence the accuracy of models' results. Moreover, it can be said, that FSCs is a contributor to non-normality data of the general model of the impact of globalization on the European airline industry.

According to results of the Breusch-Pagan test for heteroskedasticity, LF, ROA, NPM, CASK and yield are homogenous, while in case of ASK, PAX and RPK heteroscedasticity was observed (p-value <0.05). To eliminate the negative impact of data heteroscedasticity on models results, GLS regression will be run. Comparatively with LCCs, data of FSCs are more homogeneous.

It was not observed any risk of multicollinearity of independent variables, VIF scores are not higher than 10.

Thus, as well as in the case of LCCs, there is a violation of normality and homoscedasticity assumptions of multiple regression, that can negatively affect the accuracy of results of the regression. To neutralize this, GLS regression will be run to test the hypothesis. Additionally, LCCs are contributors of data normality, whereas data of FSCs is more homogenous.

4.3. Tests for panel data analysis

To identify which model should be applied for each of research hypothesis, Hausman test was performed to test statements, using *hausman* command in STATA:

- H0: Random effects model is appropriate;
- H1: Fixed effects model is appropriate.

Running Hausman test for all regression models (Annex 4), it was found that p-value more than 0.05 which indicates rejection of H1. Thus, a high value of Hausman test identified that the unobserved heterogeneity is significant, that supports random effects model. However, the model with PAX as dependent variable demonstrated p-value equal to 0, that means the significant result of a fixed effect, but it will be run random effects model to fix observed heteroscedasticity. To check the results of the Hausman test Lagrange Multiplier (LM) test by Breusch – Pagan was conducted to identify the presence of random effect in the data (*xttest0* command in STATA). The results of the LM test (Annex 4) demonstrate null hypotheses (all individual specific variances are zero) can be rejected, as the p-value for all models is 0. Taking everything into account, the **random effects model** is appropriate and will be applied to identify if globalization affects the operational and financial performance of European Airlines.

Studying cases of LCCs and FSCs separately, it can be seen, that random effects model is appropriate for all models in case of LCCs as well as FSCs, except for LF as independent variable in case of FSCs: Hausman test identified significant fixed effect.

4.4 Impact of globalization on operational performance of European airlines

To test hypotheses multiple regressions with random effects models were used for each dependent variable – 8 models are created to perform regressions. In this paragraph will be assessed impact of globalization independent variables on the operational performance of airlines. Based on this, it was created Model 1 (ASK), Model 2 (LF), Model 3 (PAX), Model 4 (CASK). Table 17 demonstrates regression results: coefficients, p-values (in parentheses), R-squared and F-statistics.

Table 17. *Results from multiple regression for impact of globalization on airlines' operational performance*

Independent variables	*Model 1 – ASK*	*Model 2 – LF*	*Model 3 – PAX*	*Model 4 – CASK*
KOF	5.516 (0.000)	2.111 (0.000)	1.767 (0.091)	-0.226 (0.191)
HHI	0.010 (0.459)	0.010 (0.008)	0.011 (0.285)	0.002 (0.261)
ds	0.190 (0.000)	0.029 (0.001)	0.168 (0.000)	-0.001 (0.895)
Observations	209	209	209	209
R-squared	0.471	0.156	0.589	0.002
F-value	0.000	0.000	0.000	0.510

Source: created by the author

For Model 1, Model 2 and Model 3 it was shown significant F-values (p-value <0.05), that means that the regression models fit the data, whereas Model 4 (CASK) demonstrated high p-value, indicating that chosen model does not fit the data. However, based on the Hausman test and LM test results, random effect model is appropriate for CASK.

From **Model 1** it can be seen the significant positive impact of the level of globalization in Europe and number of destinations served by airlines ($p<0.05$) on airlines' capacity (ASK). This indicates that the increase in the level of globalization in Europe by 1point leads to the growth of airlines' capacity by 5.52 bln. seat-km while the expansion of the geography of flights by 1 destination leads to the increase of ASK by 0.19 bln. seat-km. On the same time high p-value of the level of competition (0.459) implies that HHI has no significant effect on ASK meaning that competition in the airline industry does not affect airlines' capacity. R-square of the model is 0.471 which mean that 47% of the variance in ASK is explained by globalization. These results *support* $H_{1.1}$, that globalization has a positive impact on European airlines capacity (ASK).

In **Model 2** for load factor all independent globalization variables are significant, as p-value<0.05, and have positive effect, that proves $H_{1.2}$ – there is a positive relationship between globalization and load factor. The growth of KOF globalization index, level of competition and extension of flights network lead to increase of load factor. However, globalization explains only 15.6% of the total variance in load factor, that means that other variables affect the load factor of airlines more. Due to this $H_{1.2}$ *is partially accepted*.

In Model 3 direct positive and significant impact of globalization (number of destinations served, KOF globalization index) on the number of passengers carried by European airlines (PAX) is observed, while level of competitions is insignificant for PAX (p-value>0.05). These results indicate that the growth of the level of globalization by 1 point causes increase of passenger traffic by 1.77 mln. passengers while increase of number of destinations served by European airlines by 1 destination leads to the increase of PAX by 0.17 mln. passengers. Globalization explains 59% of the total variance in the number of carried passengers that allows *accepting* $H_{1.3}$: there is a positive relationship between globalization and the number of passengers carried by European airlines.

In **Model 4** there is the negative effect of globalization on unit costs: the growth of globalization level in Europe according to KOF globalization index by 1 point and increase of number of served destinations by 1 destination result in decrease of CASK by 0.226 euro cents and 0.001 euro cents respectively. At the same time there is a weak positive relationship between level of competition and CASK, which proves the higher competition is, the higher unit cost is. But all these effects are insignificant. Due to that low R-squared tends to zero (0.002) and insignificance of all globalization variables for CASK (p-value >0.05) $H_{1.4}$ *cannot be supported*.

Taking everything into account, globalization significantly affects ASK and PAX, while effect on load factor is relatively lower. There is no positive relationship between globalization and CASK.

LCCs. From the analysis of multiple regression results for LCCs it could be seen that they do not differ much from the whole sample (table 18).

Table 18. *Results from multiple regression for impact of globalization on LCCs' operational performance*

Independent variables	*Model 1 – ASK*	*Model 2 – LF*	*Model 3 – PAX*	*Model 4 – CASK*
KOF	7.500 (0.000)	3.294 (0.000)	4.520 (0.011)	-0.040 (0.851)
HHI	0.006 (0.766)	0.005 (0.399)	0.002 (0.925)	0.004 (0.039)
ds	0.222 (0.000)	0.115 (0.452)	0.201 (0.000)	-0.005 (0.350)
Observations	99	99	99	99
R-squared	0.589	0.160	0.597	0.040
F-value	0.000	0.000	0.000	0.123

Source: created by the author

Model 1 demonstrates the significant positive impact of the level of globalization in Europe and number of served destinations ($p<0.05$) on low-costs' ASK, while the level of competition in the industry is insignificant. This means that the growth of European level of globalization by 1point leads to the growth of LCCs' capacity by 7.5 bln. seat-km; the expansion of the geography of flights by 1 destination leads to the increase of ASK by 0.22 bln. seat-km. R-square of the model is high and equals 0.471 that means that 47% of the variance in ASK of low-costs carriers is explained by globalization. Comparatively with the whole sample, R-squared of Model 1 for LCCs is higher: 58.9% against 47.1%. Thus, $H_{1.1}$ *is supported* for low-costs: globalization has a positive impact on capacity (ASK) of European LCCs.

Unlike in a whole model, for load factor (**Model 2**) of LCCs only level of globalization is significant – the increase of level of globalization causes the increase of low-cost' load factor. But R-squared of regression is still low, in other words, only 16% of the variability in LCCs' load factor can be determined by globalization and 84% can be determined by other factors. Due to low R-squared $H_{1.2}$.*is partially accepted*.

In Model 3 there is positive and significant impact (p-value<0.05) of the level of globalization and number of served destinations on the number of passengers carried by low-cost airlines, while level of competition is insignificant for PAX (p-value>0.05). In other words, the increase of the level of globalization by 1 point contributes to increase of passenger traffic by 4.52 mln. passengers. Moreover, increase of number of destinations served by low-cost carriers by 1 destination leads to the increase of PAX by 0.2 mln. passengers. Globalization explains 59.7% of the total variance in the number of carried passengers that is higher than the whole-sample's results. This *supports* $H_{1.3}$: there is a positive relationship between globalization and the number of passengers carried by European low-cost airlines.

In **Model 4** the negative effect of globalization on unit costs (CASK) is observed, that means the higher level of globalization in Europe is, the wider geography of served destinations is, the lower CASK is, but there is weak positive relationship between HHI and CASK. All these results are insignificant (p-value >0.05). Like in case of whole sample, R-squared (0.04) of the regression is extremely low. According to these results $H_{1.4}$ *cannot be supported* – there is no positive relationship between globalization and CASK for European low-cost airlines.

FSCs. According to regression results of FSCs' sample (table 19), in **Model 1** positive significant effect of globalization variables (level of globalization in ECAA countries and number of served destinations) on ASK of full-service airlines is observed; level of competition is insignificant. This means that the growth of the level of globalization in Europe by 1 point and extension of the flights geography by 1 destination cause the increase of full-service airlines' ASK by 4.38 bln. seat-km and 0.02 bln. seat-km respectively. R-squared of the model equals 0.406 (which is lower than R-squared for the whole sample) – globalization explains 40.6% of the variance in ASK. The regression results allow *to accept* $H_{1.1}$, that globalization has a positive impact on European full-service airlines' ASK.

In **Model 2** there is positive significant effect of all globalization variables on load factor of FSCs: increase of level of globalization in Europe according to KOF globalization index by 1 point leads to growth of load factor of FSCs by 1.13%; increase of level of competition by 1 point in HHI – by 0.02%; increase of number of served destinations by 1 destination – by 0.46%. R-squared equals 30.2%, which is higher than R-squared of the whole sample (15.6%). These results *prove* $H_{1.2}$ – there is a positive relationship between globalization and load factor of European full-service airlines.

Model 3 demonstrates significant impact of globalization on PAX of FSCs, but only numbers of served destination is significant for the model, level of globalization and level of competition are insignificant. From the regression results it can be concluded that the growth of the number of served destination by 1 destination leads to increase of the number of carried passengers by FSCs by 0.15 mln. passengers. Globalization explains 73% of the total variance in the number of carried passengers (against 59% in case of the study of the whole sample) that allows to *accept* $H_{1.3}$: there is a positive relationship between globalization and the number of passengers carried by European full-service carriers.

In **Model 4** there are similar results with the whole sample: the negative effect of globalization on unit costs of FSCs is observed. However, all independent variables are insignificant for the model. Moreover, R-squared is extremely low and tends to zero (0.002) – these results *do not support* $H_{1.4}$.

Table 19. *Results from multiple regression for impact of globalization on FSCs' operational performance*

Independent variables	*Model 1 – ASK*	*Model 2 – LF (fixed effects)*	*Model 3 – PAX*	*Model 4 – CASK*
KOF	4.384 (0.014)	1.131 (0.011)	-0.566 (0.608)	-0.279 (0.283)
HHI	0.011 (0.522)	0.016 (0.000)	0.017 (0.127)	0.000 (0.956)
ds	0.107 (0.019)	0.460 (0.000)	0.115 (0.000)	-0.003 (0.675)
Observations	110	110	110	110
R-squared	0.406	0.302	0.731	0.006
F-value	0.000	0.000	0.000	0.242

Source: created by the author

Comparative analysis of operational performance of European LCCs and FSCs demonstrate the existence of some differences:

- R-squared of **Model 1** for FSCs is lower than for LCCs (40.6 % against 58.9%), that demonstrates stronger effect of globalization on the capacity of LCSs. To illustrate, the increase in globalization level in ECAA countries provokes the growth of LCCs' capacity by 7.5 bln. seat-km whereas FSCs' capacity increases only by 4.34 bln. seat-km.
- For **Model 2** fixed effects model is applicable for FSCs' sample (for the whole sample and LCCs case random effect model is significant). The impact of globalization on FSCs' load factor is stronger than on LCCs' (30.3% against 16%) Higher R-squared of the model allows to support H1.2 for full-service carriers.
- In **Model 3**, R-squared for FSCs is higher than for LCCs (73.1% against 59.7%) and this means a stronger globalization's effect on PAX of FSCs.

Hence, basing on these insights, H_3 *is accepted*: the business model of airline can change impact of globalization on the operational performance of airlines.

4.5. Impact of globalization on financial performance of European airlines

Concerning the study of globalization impact on the financial performance of European airlines, table 20 displays the results. As previously mentioned, to meet this aim, the outcome variables are used: RPK, NPM, ROA, yield. Model 5, Model 6, Model 7 and Model 8 were created.

According to F-statistics, Model 5, Model 6 and Model 7 are statistically significant, that means chosen model fits the data, while high p-value of Model 8 (p-value>0.05) allows to reject the null hypothesis – globalization in Europe affects yield of airlines.

Table 20. *Results from multiple regression for impact of globalization on airlines' financial performance*

Independent variables	*Model 5 – RPK*	*Model 6 – NPM*	*Model 7 – ROA*	*Model 8 – yield*
KOF	5.708 (0.000)	2.623 (0.002)	2.127 (0.009)	-0.198 (0.253)
HHI	0.016 (0.231)	-0.014 (0.125)	-0.008 (0.367)	-0.001 (0.698)
ds	0.173 (0.000)	0.172 (0.244)	0.011 (0.393)	0.003 (0.528)
Observations	209	209	209	209
R-squared	0.454	0.089	0.060	0.038
F-value	0.000	0.000	0.002	0.246

Source: created by the author

In Model 5 the regressions results demonstrate that KOF globalization index and the number of destinations served by airlines are significant (p<0.05) for RPK and affects it positively, while the level of competition in the industry does not (p>0.05). Thus, the increase of KOF globalization index by 1 point and the number of served destinations by 1 destination cause the growth of RPK by 5.71 bln. EUR-km and 0.17 bln. EUR-km respectively. The high R-squared (45.4%) is *in line with H2.1* – there is a positive relationship between globalization and RPK.

In **Model 6** there is a positive significant effect of KOF globalization index on the profitability of airlines (p<0.05) – the increase of level of globalization in Europe by 1 point cause the growth of NPM on 2.62%. On the same time number of served destinations and level of competition are insignificant for airlines profitability (p>0.05). R-squared of the model is low – only 8.9% of variance in NPM is explained by globalization, 91.1% of variance is explained by other variables. Due to low R-squared but statistical significance it was decided to *partially support* $H_{2.2}$.

From **Model 7** it can be concluded that the level of globalization significantly influences ROA of European airlines (p<0.05). Only level of globalization in Europe is significant for ROA – the increase of KOF globalization index in Europe results in increase the ROA of airlines by 2.13%. 6% of ROA variance is explained by globalization, meaning that there are other factors that affect the load factor of airlines more. Hence, $H_{2.3}$ *is partially accepted,* as relationship between globalization and ROA is statistically significant.

Model 8 is statistically insignificant ($p>0.05$), that may be explained by the insignificance of all independent globalization variables. Furthermore, R-squared of the model is low (0.04), that means that 96% of the variance in yield is explained by other variables. Thus, *$H_{2.4}$ must be rejected*.

To sum up, of all the financial performance indicators only RPK is explained by globalization (level of competition in the industry is insignificant). Also, it was observed statistically significant but weak relationships between globalization and NPM and ROA. Findings described above draw a conclusion that globalization does not affect the financial performance of European airlines considerably.

LCCs. Analyzing the impact of globalization on the financial performance of European low-cost airlines (table 21), in **Model 5** it was found out positive significant effect of the level of globalization in Europe and number of served destinations ($p<0.05$) on RPK, level of competition is insignificant ($p<0.05$). The increase of KOF globalization index by 1 point and the increase of number of served destinations by 1 destination lead to increase of RPK of LCCs by 8.38 bln. EUR-km and 0.18 bln. EUR-km respectively. R-squared of the model equals 0.494, which is slightly higher than in whole sample (0.454) – 49.5 % of variance in RPK of low-costs is explained by globalization variables. *$H_{2.1}$ is supported* for low-costs: globalization has a positive impact on RPK of European LCCs.

In **Model 6** positive significant effect of number of served destination on the profitability of low-costs ($p<0.05$), level of globalization and level of competition are insignificant for NPM of LCCs ($p>0.05$). In other words, the increase of the number of served destinations by 1 causes the increase of profitability by 0.05%. Unlike in case of whole sample, R-squared of the model for LCCs is higher and equals 0.247 – 24.7% of variance in net profit margin is described by globalization. Basing on these results, *$H_{2.2}$ is accepted* for low-cost airlines sample: there is a positive impact of globalization on profitability of LCCs.

Model 7 demonstrates positive significant of number of served destinations on ROA for low-cost airlines, while level of competition and level of globalization affect ROA negatively (the stronger competition in the airline industry is and the higher level of globalization is, the lower ROA of low-costs is), but this effect is insignificant ($p>0.05$). The increase of the number of served destinations by 1 causes the growth of ROA by 0.05%. But due to still low R-squared (like in case of whole sample) – 0.101 –*$H_{2.3}$ is partially accepted* for low-cost airlines.

In **Model 8**, it could be seen similar results with the whole sample, the impact of globalization on LCCs' yield is not statistically significant, that is a reason *to reject $H_{2.4}$*. Another reason is extremely low R-squared of the regression model – less than 1% in yield variance is explained by globalization. All these results prove that there is no positive relationship between globalization and yield of European low-cost airlines.

Table 21. *Results from multiple regression for impact of globalization on LCCs' financial performance*

Independent variables	*Model 5 – RPK*	*Model 6 – NPM*	*Model 7 – ROA*	*Model 8 – yield*
KOF	8.378 (0.000)	-0.004 (0.998)	-0.496 (0.664)	0.225 (0.316)
HHI	0.006 (0.749)	-0.011 (0.353)	-0.001 (0.957)	0.001 (0.523)
ds	0.184 (0.000)	0.648 (0.003)	0.050 (0.012)	-0.010 (0.048)
Observations	99	99	99	99
R-squared	0.494	0.247	0.101	0.007
F-value	0.000	0.009	0.044	0.255

Source: created by the author

FSCs. For full-service airlines' sample (table 22) in **Model 5** it was found out the significant positive effect of globalization on RPK: level of globalization and number of served destination are significant for the model ($p<0.05$), while level of competition is not ($p>0.05$). The growth of KOF globalization by 1 point and the growth of the number of served destination by 1 destination lead to increase of RPK by 8.38 bln. EUR-km and 0.18 bln. EUR-km respectively. R-squared of the regression model for FSCs' sample is lower than for the whole sample (0.40 against 0.45) – 40% of variance in RPK is explained by globalization. Proved significance of the regression results and appropriate value of R-squared allows *to accept* $H_{2.1}$ for FSCs – there is a positive relationship between globalization and RPK of European full-service airlines.

Model 6 demonstrates that only level of globalization in Europe has positive significant effect on profitability of FSCs ($p<0.05$), while number of served destinations and level of competition are insignificant for NPM ($p>0.05$). The higher level of globalization by 1 point causes the increase of net profit margin by 4.21%. But only 13.3% of variance in NPM is explained by globalization, 86.7% - is explained by other variables. Thus, $H_{2.2}$ *is partially supported* for FSCs' sample.

In **Model 7** it could be seen the similar situation as in Model 6: KOF globalization index has significant positive effect on ROA, whereas level of competition and number of served destinations are insignificant. The growth in KOF globalization index of Europe by 1 point causes increase in ROA by 3.83%. R-squared of the model equals 0.123, which is higher than in case of the whole sample (0.06), and proves that 87.7% of variance in RPK explained by other variables not globalization –$H_{2.3}$ *is partially accepted*.

In **Model 8** all globalization variables are insignificant for yield of full-service airlines (p-value>0.05), despite that F-statistics demonstrates significance of the relationship between globalization and yield of FSCs. Moreover, R-squared of the regression model is low – only 3.5% of variance in yield is described by globalization, while 96.5% – by other variables. Thus, *$H_{2.4}$ should be partially accepted for FSCs,* as the regression model is statistically significant.

Table 22. *Results from multiple regression for impact of globalization on FSCs' financial performance*

Independent variables	*Model 5 – RPK*	*Model 6 – NPM*	*Model 7 – ROA*	*Model 8 – yield*
KOF	4.123 (0.014)	4.211 (0.000)	3.828 (0.001)	-0.400 (0.108)
HHI	0.238 (0.161)	-0.019 (0.130)	-0.170 (0.162)	-0.002 (0.534)
ds	0.108 (0.012)	0.005 (0.758)	0.003 (0.856)	0.007 (0.207)
Observations	110	110	110	110
R-squared	0.400	0.133	0.123	0.035
F-value	0.000	0.000	0.000	0.028

Source: created by the author

In the analysis of financial, as well as operational, performance, it can be seen the differences between low-costs and full-service carriers:

- R-squared of **Model 5** for full-service airlines is lower than of LCCs (0.400 against 0.494), which means that stronger effect of globalization on RPK for low-costs.
- In **Model 6**, it was observed that effect of globalization on airlines' profitability is stronger for low-costs; the value of R-squared allows to accept *$H_{2.2}$* for FSCs.
- In **Model 8,** unlike in LCCs sample, it could be seen that globalization is statistically significant for FSCs' yield (p>0.05).

Consequently, globalization affects the financial performance of European airlines of different business models unequally: unlike for sample of full-service airlines, globalization strongly influences low-cost airlines' profitability. These results *support H_4*: the business model of airlines changes the impact of globalization on financial performance.

Table 23. *Summary of hypothesis' results*

Hypotheses		**Supported**	**Effect Size**
$H_{1.1}$	Whole sample	Yes	Moderate
	LCCs	Yes	Moderate
	FSCs	Yes	Moderate
$H_{1.2}$	Whole sample	Partially	Weak
	LCCs	Partially	Weak
	FSCs	Yes	Moderate
$H_{1.3}$	Whole sample	Yes	Moderate
	LCCs	Yes	Moderate

	FSCs	Yes	Strong
$H_{1.4}$	Whole sample	No	Very weak
	LCCs	No	Very weak
	FSCs	No	Very weak
$H_{2.1}$	Whole sample	Yes	Moderate
	LCCs	Yes	Moderate
	FSCs	Yes	Moderate
$H_{2.2}$	Whole sample	Partially	Very weak
	LCCs	Yes	Moderate
	FSCs	Partially	Weak
$H_{2.3}$	Whole sample	Partially	Very weak
	LCCs	Partially	Weak
	FSCs	Partially	Weak
$H_{2.4}$	Whole sample	No	Very weak
	LCCs	No	Very weak
	FSCs	Partially	Very weak
H_3		Yes	-
H_4		Yes	-

Source: created by the author

Taking everything into account, testing the collected data for appropriateness for multiple regression analysis, it was found out the existence of a linear relationship between predictor and outcome variables. LF, PAX, CASK are not normally distributed, heteroscedasticity was indicated, that will be fixed with applying of GLS; it was not observed risk of multicollinearity of the data. Violations of normality and homoskedasticity assumptions of multiple regression may negatively affect the accuracy of results of testing hypothesis. Studying LCCs and FSCs subsamples separately, similar patterns were indicated, however, LCCs are contributors to the whole sample data normality, whereas data of FSCs is more homogenous.

After running Hausman test and LM test, it was identified, that the random effects model is appropriate for all models of the whole, LCCs and FSCs samples. It is important to notice, Hausman test identified significant fixed effect for LF-model in case of FSCs.

Speaking about multiple regression results, for the whole sample it was proved, that globalization affects operational performance of European airlines, namely indicators ASK, PAX and LF (partially). Speaking about financial performance, there is an influence of globalization on RPK, while hypotheses of about positive relationship between globalization and NPM and ROA were proved partially. It was observed, that globalization effect for LCCs and FSCs is unequal, that allowed to support H_3 and H_4 , that business model of airlines can change the impact of globalization on operational and financial performance.

CONCLUSIONS

This Master thesis aimed at examination of how the globalization phenomenon affects operational and financial performance of European airlines. The Master thesis focuses on airlines from member-countries of European Common Aviation Area, which are considered in this research as European, and its performance during 2007-2017. Despite great researchers' interest in the study of links between globalization and the airline industry, it is obvious that knowledge about the impact of globalization on airlines' performance is still limited as well as how to measure this impact and this thesis is a first attempt to assess empirically if globalization affects operational and financial performance of European airlines. After exploring theoretical background, four groups of hypotheses were formulated focusing to fulfill these gaps. In order to achieve the main aim of the research, five objectives were set out which were covered and delivered the results are listed below.

The first objective was to determine globalization factors, which influence business performance. According to the theoretical analysis, there are two primary impacts of globalization on companies: globalization opportunities and globalization threats. Globalization opportunities include easier access to new sources, new knowledge and technologies and markets. All these are possible due to the decrease in trade barriers that causes the constant growth of the companies in new geographical areas. To be successful on the global market companies must use these globalization opportunities fully. On other side, globalization creates risks and threats for companies as an intensive competition. Moreover, companies can be affected by other negative impacts such as global crisis – instability in employment, production. For this reason, companies must fight for survival and strengthen position on the market innovating and expanding geographical presence to neutralize the negative impact of globalization.

The second objective was to analyze the development of European airline industry in the context of the globalization. Airline industry is an extremely unique industry because being a direct consequence of globalization, it contributes to creation of the modern global world. According to the literature review, globalization caused crucial changes in airline industry: it influenced not just the demand for international air transport (its scope, nature and geography) but also the supply and the environment in which air transportation services are provided. Three key processes of globalization that had the biggest impact on air transportation were indicated: increase in trade, technological improvements and liberalization. Process of liberalization was recognized as the main force of globalization shaping global airline industry, which included three liberalization packages in 1987, 1990 and 1992 that caused the growth of the competition due to emergence of new business model of airline companies based on higher levels of operational efficiency with low fares – low-cost carriers.

The third objective was to measure empirically what impact globalization has on operational and financial performance in selected European airlines. To achieve this, a conceptual research model was created, where globalization opportunity (number of served destinations by the airline), globalization threat (level of competition in the industry – HHI) and level of globalization in Europe (KOF globalization index) were independent variables. Operational performance was measured using ASK, LF, CASK, PAX indicators, while financial performance was assessed applying RPK, yield, NPM and ROA indicators. Business model of airline served as a moderator variable (low-cost airline or full-service airline). Basing on the proposed model, the non-experimental quantitative study was conducted applying a panel data design, which includes yearly observations of European airlines collected for 2007-2017 period. The sample includes 19 European airlines (10 FSCs and 9 LCCs).

As panel data design was applied in the research, it was necessary to identify either fixed effects model or random effects model should be run. A high value of Hausman test (p-value > 0.05) suggested that random effect (GLS) is the most adequate for dependent variables which was proved by Lagrande Multiplier test. As the research model consists of 3 independent variables, multiple regressions were run for each performance dependent variable. For multiple regression models linearity, normality, homoscedasticity and multicollinearity assumptions were tested, using STATA.

Multiple regression results demonstrated the significant positive effect of the level of globalization in Europe and globalization opportunity for the European airlines’ capacity (ASK). In other words, the increase of the level of globalization in Europe and the expansion of the geography of flights lead to the growth of airlines’ capacity. The same trend was observed for the number of passengers carried by European airlines (PAX): the growth of the level of globalization and the number of served destinations cause increase in passenger traffic. However, the impact of globalization on load factor is small, while CASK is not explained by globalization. From the analysis of financial performance indicators, it was observed that the level of globalization and globalization opportunity positively and significantly affect RPK of European airlines. This means, the higher KOF globalization index and the number of served destinations are, the higher RPK of European airlines is. Also, it was observed statistically significant but weak impact of globalization on airlines profitability and return of assets (R-squared is low). But according to multiple regression results, globalization does not impact airlines’ yield. Therefore, globalization does not affect the financial performance of European airlines considerably.

The fourth objective was to discover, if business model of airline can change the impact of globalization on airlines' performance. To achieve this aim, multiple regression models were run for LCCs and FSCs subsamples separately and it was noticed that some differences between FSCs and LCCs exist. Firstly, it was observed a higher R-squared of LCCs' ASK model in comparison to FSCs', that demonstrates stronger effect of globalization on the capacity of LCCs. Secondly, unlike for LCCs, globalization has stronger positive significant effect on load factor full-service airlines: the growth of globalization level in Europe, intensified competition and extension of geography of flight cause the increase of load factor of FSCs. Thirdly, it was identified stronger globalization's effect on FSCs' number of served destinations, than for LCCs. Regarding financial performance indicators, unlike in a FSCs' sample, it was identified a moderate significant impact of globalization on LCCs' profitability. These observations prove that type of airline business model can change the impact of globalization on operational performance of airlines and financial performance as well.

The last (fifth) objective was to formulate the recommendations for LCCs and FSCs in order to use the opportunity and reduce the threat of globalization. With respect to regression results, globalization opportunity, namely the adding the destinations to the geography of flights, contributes to improve operational and financial performance airlines, especially low-costs. Taking this into account, low-cost airlines should be focused on expansion of the geography of flights to maximize positive effect of globalization. One of the ways to achieve this is cooperation with full-service airlines in order to expand coverage network – code-sharing. Enjoying this partnership, low-cost airlines can get access to broader flight network of FSCs, increase number of carried passengers. Moreover, this partnership allows full-service airlines to reduce costs, which is claimed in literature as the most common measure to survive the competition with LCCs. It could be useful especially for FSCs' routes where the demand for business class is less required. There are already existing partnerships between LCCs and FSCs – KLM/Air France – Transavia, Iberia – Vueling. Also, to be competitive on the airline market it is recommended for FSCs and LCCs to implement hybrid business model, which assumes adoption of some features from each other. For low-cost carriers it could be the improvement of customer service, the providing more frills and expanding geography of flights in order to create customer loyalty and attract new passengers. From the prospective of full-service airlines it means to find a balance between decreasing cost and keeping high quality of service.

Limitations of the research. Despite the Master thesis aimed to contribute to fulfil existing gaps in the literature about impact of globalization on airlines' performance, some limitations occur and should be taken into account.

First of all, to measure globalization it was decided to follow the literature, that globalization has two impacts on companies' performance: globalization opportunity and globalization threat. The way how to express these variables was proposed by the author according to definitions of globalization threat and opportunity and was not tested on context of airline industry before. Thus, this approach requires further studies. Moreover, in the research model not all performance indicators are used to assess performance of airlines. While for operational performance measurement there is commonly used set of indicators (ASK, load factor, PAX, CASK), for financial performance measurement along with universal KPIs for companies from all industries, such as, net profit margin, ROA, ROE, EBIT, EBITDA exist indicators which are specific for airline industry – RPK, yield, RASK, TRASK, PRASK etc. In the research model two specific (RPK, yield) and two universal variables (net profit margin and ROA) were integrated.

Secondly, time frame of the research is limited by 2007, as the earliest year when information was available for all selected airlines, and 2017. But in December 2020 KOF globalization index 2018 has become available, hence, there is a need to include this new information in the further research. Due to the convenience sampling technique only airlines were included who's annual report was available on their websites. Thus, from 49 European airlines, only 19 were included in the research sample. The small sample size of the research might affect the validity of the results.

Thirdly, after checking the variables for normality it was found out, that data is not normally distributed: only NPM and yield are normally distributed; LF, PAX and CASK are not, other variables' distribution is close to normal. The violation of normality assumption might affect the accuracy of results of testing hypothesis.

Looking at regression results, it was observed statistically significant relationship between globalization and load factor, which is proved by F-statistics. However, low value of R-squared illustrates low effect of globalization. The same trend could be discovered for NPM and ROA. Thus, based on p-value ($p\text{-value}<0.05$) the hypotheses $H_{1.2}$, $H_{2.2}$, $H_{2.3}$ should be accepted, as this proves existence of relationship between globalization and load factor, NPM and ROA even if these relationships are weak.

Finally, despite that in the literature globalization threat is mostly explained by competition, regression result demonstrated that HHI, which is one of the indicators to measure level of competition in the industry, is insignificant for the performance indicators.

Directions of future research. Considering future possible researches about the impact of globalization on airline industry, there are some possible choices.

From the literature analysis it was concluded that despite the big attention among scholars to the globalization phenomenon there is a lack of clear formulated definition of globalization and its components. Moreover, there are debates about what airlines are considered to be low-costs: previous studies (Doganis, 2006) proved that airlines which fares is around 0.10 € per seat-km and/or equals half of price of FSCs are low-cost airlines, but this approach was not supported by others. Also, researchers claimed about the need to conduct geographical analysis of the LCCs networks developed. With regards to full-service airlines, the number of researches is limited despite that these airlines are constantly evolving to survive in competition with low-cost carriers.

Referring to the proposed research model, it can be extended with other business performance variables. Moreover, approach for globalization measurement should be improved, since HHI, which describe globalization threat in research model, is statistically insignificant for majority of business performance indicators. The research model can be applied for other geographical markets to measure globalization's impact (American, Asia Pacific & Middle East).

Addressing to limitations of the empirical research, to evaluate more accurately the effects of globalization on European airline market and to get more comprehensive picture it is necessary to expand the research sample, including all 49 European airlines. Also, as this research covers 2007-2017 period, it is suggested to broaden the timeframe of the research adding the modern observations (2018, 2019, 2020), that is especially important in the time of fast global changes, which occur right now.

Finally, it is definitely needed to conduct empirical research about the impact of global COVID-19 crisis on European airlines industry: countries imposed total lock-down and travel restrictions, which clearly not only reduced number of flights in the EU region but also caused mass layoffs, losses, bankruptcies (as it was in case of Flybe).

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GLOBALIZACIJOS POVEIKIS EUROPOS ORO LINIJŲ RINKAI

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SANTRAUKA

71 puslapių, 23 diagramos, 7 paveikslai, 187 nuorda.

Pagrindinis šio magistro darbo tikslas yra ištirti globalizacijos poveikį Europos oro linijų veiklos ir finansiniams rezultatams ir išsiaiškinti, ar aviakompanijos verslo modelis (visų paslaugų, pigių oro linijų) gali pakeisti globalizacijos poveikį aviakompanijų veiklai.

Magistro darbą sudaro keturios pagrindinės dalys: literatūros apžvalga, tyrimo metodika ir jos rezultatai, išvados ir rekomendacijos.

Literatūros analizė atskleidžia globalizacijos esmę ir jos dimensijas, apima globalizacijos procesą Europos oro transporto šakoje, susijusį su aktyviu interneto technologijų naudojimu, oro linijų bendrovių integravimu į aljansus ir liberalizavimu, dėl ko padidėjo konkurencija dėl pigių vežėjų atsiradimo. Buvo pristatyti du aviakompanijų verslo modeliai – LCC ir FSC – įskaitant jų ypatumus ir skirtumus. Taip pat literatūros apžvalgoje buvo paaiškinta, kaip globalizacija veikia verslo rezultatus.

Remdamasis siūlomu tyrimo modeliu, autorius atliko neeksperimentinius kiekybinius tyrimus, siekdamas išanalizuoti ryšį tarp nepriklausomų globalizacijos kintamųjų (globalizacijos lygis Europoje, globalizacijos galimybė, globalizacijos grėsmė) ir priklausomų oro linijų veiklos rodiklių: operatyvinės veiklos (turimų vietų kilometrų (ASK), apkrovimo koeficientas, skrendančių keleivių skaičius (PAX), išlaidos, tenkančios ASK (CASK)) ir finansinės veiklos (pajamos už kilometrą (RPK), pajamingumas, grynojo pelno marža, turto grąža (ROA)). Antrinių duomenų rinkimas iš 19 Europos oro linijų metinių ataskaitų ir kitų šaltinių buvo pasirinktas kaip pagrindinė duomenų rinkimo priemonė, kai Europos reiškia, kad oro linijos yra įsteigtos šalyse, esančiose Europos bendrosios aviacijos erdvės (ECAA) narėmis. Kadangi tai yra ilgo laikotarpio duomenys (2007–2017 m.), buvo pritaikytas panelinių duomenų metodas su daugkartine regresijos analize, naudojant STATA.

Atliktas tyrimas atskleidė, kad globalizacija daro įtaką veiklos rezultatams, būtent ASK, PAX ir apkrovimo koeficientui. Remiantis finansinės veiklos rodikliu, globalizacija teigiamai veikia tik RPK; grynojo pelno maržai ir ROA globalizacija taip pat turi įtakos, tačiau šis poveikis yra silpnas. Be to, buvo įrodyta, kad globalizacija nevienodai veikia pigių avialinijų ir visų paslaugų oro linijų veiklą: FSC pavyzdyje pastebimas reikšmingas teigiamas vidutinis globalizacijos poveikis apkrovimo koeficientui, o LCC pavyzdyje - pelningumui.

Atsižvelgiant į viską buvo suformuluotos išvados ir rekomendacijos, skirtos apibendrinti pagrindines literatūros analizės įžvalgas bei atliktų tyrimų rezultatus.

IMPACT OF GLOBALIZATION ON EUROPEAN AIRLINE INDUSTRY

Anastasiia Kuz

Master Thesis

Global Business and Economics Master Programme

Faculty of Economics and Business Administration, Vilnius University

Supervisor prof. Dr. A. Miškinis

SUMMARY

71 pages, 23 charts, 7 figures, 187 references.

The main purpose of this Master Thesis is to explore the impact of globalization on operational and financial performance of European airlines and to find out, if business model (full-service airline, low-cost airline) of airline can change the impact of globalization on airlines' performance.

The Master Thesis consists of four main parts: the literature review, the research methodology and its results, the conclusions and recommendations.

Literature analysis discovers the essence of globalization and its dimensions, covers the globalization process in European airline industry, which lies in active usage of Internet technologies, integration of airlines into alliances and liberalization, that, consequently, let to increasing of the competition due to emergence of low-cost carriers. It was presented two business models of airlines – LCCs and FSCs – including their peculiarities and differences. Also, in the literature review it was explained how globalization affects business performance.

Basing on proposed research model, the author conducted non-experimental quantitative research in order to analyze the relationship between independent globalization variables (level of globalization in Europe, globalization opportunity, globalization threat) and dependent airlines' performance indicators: operational (available seat kilometer (ASK), load factor, number of passengers carried (PAX), costs per ASK (CASK)) and financial (revenue per kilometer (RPK), yield, net profit margin, return on assets (ROA)). Collecting secondary data from annual reports of 19 European airlines and other sources was chosen as a main data collection technique, where European means, that airlines are founded in countries, which are members of European Common Aviation Area (ECAA). As it is longitudinal data (2007-2017), it was applied panel data approach with multiple regression analysis, using STATA.

The performed research revealed that globalization influences operational performance, namely ASK, PAX and load factor. From financial performance indicator only RPK is positively influenced by globalization; net profit margin and ROA are affected by globalization as well, but this impact is weak. Additionally, it was proved that globalization affects low-cost airlines and full-service airlines performance unequally: in FSCs' sample significant positive moderate effect of globalization on the load factor is observed, in LCCs' sample – on the profitability.

Taking everything into account, the conclusions and recommendations were formulated to summarize the main insights of literature analysis as well as the results of the performed research.

ANNEXES

Annex 1. List of European Airlines

Country	Full-service carriers	Low-cost carriers
Albania	Air Albania	Albawings
Austria	Austrian Airlines	Lauda
Belgium	Brussels Airlines	-
Bulgaria	Bulgaria Air	-
Croatia	Croatia Airlines	-
Czechia	Czech Airlines	-
Denmark	Scandinavian Airlines (SAS)	-
Estonia	Nordica	-
Finland	Finnair	-
France	Air France	French Bee
Germany	Lufthansa	Eurowings Condor Airlines
Greece	Aegean Airlines	-
Hungary	-	Wizz Air
Iceland	Icelandair	PLAY
Ireland	Aer Lingus	Ryanair
Italy	Alitalia	Ernest Airlines
Latvia	Air Baltic	-
Luxembourg	Luxair	-
Malta	Air Malta	Malta Air
Montenegro	Montenegro Airlines	-
Netherlands	KLM	Transavia
Norway	Scandinavian Airlines (SAS)	Norwegian Air Norway Norwegian Air Shuttle Norwegian Long Haul
Poland	LOT	-
Portugal	TAP Air Portugal	-
Romania	Tarom	Blue Air
Serbia	Air Serbia	-
Spain	Iberia	Level Volotea Vueling
Sweden	Scandinavian Airlines (SAS)	-
United Kingdom	British Airways	EasyJet Flybe Jet2.com

Annex 2. KOF Globalization index of Europe

Countries	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Austria	88,8	89	88,5	88,2	88,4	88,6	88,3	89,4	89	89	89,1
Albania	63,8	65,6	68,8	70,1	67	63,8	66,5	68,7	69,5	66,9	67,5
Belgium	90	89,9	89,9	90,0	90,1	90,1	90,1	91,1	90,5	90,5	90,7
Bulgaria	78,4	78,9	77,5	77,1	77,4	78,7	79,6	80,3	80,3	80,4	80,7
Bosnia and Herzegovina	66,4	67,7	67,6	68,7	70	69,7	69,1	69,6	69,6	68,2	69,3
Cyprus	81,2	81,7	80,8	81,4	81,4	81,4	81	83,1	78	78,7	79,1
Czech Republic	83,1	83	82,4	82,8	82,8	83,6	83,5	84,9	85	85,3	85,7
Germany	87,9	87,5	87,1	87,0	87,2	87,3	87,4	87,7	87,6	88,3	88,7
Denmark	89	88,8	87,7	88,3	88,5	87,9	88,2	88,8	89	89,2	89,3
Spain	83,2	82,9	82,7	83,2	83,7	83,8	84	85	85,2	85,5	85,8
Estonia	79,7	80,4	80,1	80,7	82,1	82,6	82,7	83	83,7	83,6	83,9
Finland	86,7	86,5	85,8	85,9	86	86,7	86,5	87,5	87,2	87,2	87,7
France	86,2	85,9	85,6	86,4	86,5	86,9	86,8	87,7	87,5	87,3	87,4
UK	88,4	88,3	88,5	88,8	89,2	89,2	89,2	89	89,2	89,5	90
Greece	80,2	80,8	79,9	79,7	80,1	80,2	80,8	81,9	81,5	81,6	82,4
Croatia	78,1	78,4	77,6	77,3	77,3	78	78,1	80,1	80,3	81,2	81,3
Hungary	85,1	85,3	85,8	85,6	85	84,9	84,9	86,2	85	85	85,1
Ireland	83,7	83	84,2	84,7	84,6	84,8	84,7	85,1	85,2	84,6	84,6
Iceland	74,8	76,2	75,6	75,7	72,3	72,6	72,4	72,6	72,4	72,8	72,2
Italy	81,4	80,7	80,5	81,0	81,3	81,2	81,3	82,2	82,5	82,7	83,4
Lithuania	76,7	76,8	75,5	76,8	77,5	77,7	78,9	79,5	80,3	80,8	81,3
Luxembourg	87,8	87,5	87,4	87,4	87,5	87,3	87,3	87,4	83,8	83,6	83,6
Latvia	73,4	73,2	72,4	73,5	74,3	75,2	75,8	76,1	76,5	80,2	80,3
Macedonia	68,3	68,4	68,1	68,4	70,2	71,1	70,5	70,2	71,1	71,1	71,1
Malta	77,1	77,4	77,4	77,9	78,2	78,5	78,3	79	78,3	78,3	77,9
Montenegro	64,4	67,4	67,8	69,5	70,6	71,2	70,9	72,2	71,1	71,5	72,1
Netherlands	89,1	88,7	88,5	89,0	89,3	89,6	89,9	90,8	91,3	90,9	91,2
Norway	85,6	85,6	86	85,6	85,2	85,7	85,6	85,1	86,6	86,5	86,3
Poland	78,6	78,7	78,8	78,5	78,7	79,6	80	80,8	81,5	81,4	81,5
Portugal	82,2	81,9	82	82,3	82,8	82,2	81,6	83	83,4	83,8	84,9
Romania	76,7	77	76,4	76,7	76,8	77,4	77,9	79,1	79,6	79,6	79,8
Serbia	69,1	69,7	70,3	72,0	73	74,2	74,7	75,7	76,6	77,5	78,8
Slovakia	82,2	81,9	82	82,0	82,2	81,9	81,9	83,2	82,9	83	83,7
Slovenia	79	79,6	78,9	79,3	79,7	79,4	79,7	80,9	80,9	81,2	81,1
Sweden	89,5	89,4	89,3	89,3	89	88,8	88,8	90,4	90,4	89,9	90,1
EU GLOBALIZATION	**80,5**	**80,7**	**80,5**	**80,9**	**81,0**	**81,2**	**81,3**	**82,2**	**82,1**	**82,2**	**82,5**

Annex 3. Testing assumptions for multiple regression

Whole sample

```
. swilk res_ASK res_LF res_PAX res_CASK res_RPK res_NPM res_ROA res_yield
```

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
res_ASK	209	0.98425	2.441	2.058	0.01980
res_LF	209	0.96703	5.111	3.762	0.00008
res_PAX	209	0.90624	14.534	6.172	0.00000
res_CASK	209	0.94120	9.116	5.096	0.00000
res_RPK	209	0.98530	2.279	1.899	0.02877
res_NPM	209	0.99211	1.223	0.464	0.32150
res_ROA	209	0.98451	2.401	2.020	0.02168
res_yield	209	0.99420	0.899	-0.245	0.59671

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ASK

         chi2(1)      =    62.79
         Prob > chi2  =   0.0000
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of LF

         chi2(1)      =     1.40
         Prob > chi2  =   0.2371
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of PAX

         chi2(1)      =    75.32
         Prob > chi2  =   0.0000
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of CASK

         chi2(1)      =     0.01
         Prob > chi2  =   0.9039
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of RPK

         chi2(1)      =    55.26
         Prob > chi2  =   0.0000
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of NPM

         chi2(1)      =     3.34
         Prob > chi2  =   0.0676
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ROA

         chi2(1)      =     0.55
         Prob > chi2  =   0.4569
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of yield

         chi2(1)      =     1.21
         Prob > chi2  =   0.2707
```

```
. vif

    Variable |       VIF       1/VIF
-------------+----------------------
         KOF |      2.53    0.395321
         HHI |      2.44    0.409437
          ds |      1.12    0.894006
-------------+----------------------
    Mean VIF |      2.03
```

LCCs

Linearity test

	DS	KOF	HHI
ASK	0.817*	0.394	0.327
LF	0.286	0.384	0.318
PAX	0.833*	0.283	0.236
CASK	-0.161	0.039	0.074
NPM	0.479	0.118	0.066
RPK	0.762*	0.392	0.323
YIELD	0.080	0.011	0.015
ROA	0.317	0.110	0.104

```
. swilk ASK_res LF_res PAX_res CASK_res RPK_res NPM_res ROA_res yield_res

                   Shapiro-Wilk W test for normal data

    Variable |        Obs       W           V         z       Prob>z
-------------+------------------------------------------------------
     ASK_res |         99    0.97909      1.712     1.192    0.11661
      LF_res |         99    0.91736      6.766     4.239    0.00001
     PAX_res |         99    0.98385      1.322     0.619    0.26803
    CASK_res |         99    0.86319     11.201     5.357    0.00000
     RPK_res |         99    0.91687      6.807     4.252    0.00001
     NPM_res |         99    0.98721      1.047     0.102    0.45957
     ROA_res |         99    0.99389      0.500    -1.535    0.93766
   yield_res |         99    0.96427      2.925     2.380    0.00866
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ASK

         chi2(1)      =    13.95
         Prob > chi2  =   0.0002
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of LF

         chi2(1)      =     1.14
         Prob > chi2  =   0.2860
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of PAX

         chi2(1)      =    35.17
         Prob > chi2  =   0.0000
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of CASK

         chi2(1)      =     4.15
         Prob > chi2  =   0.0416
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of RPK

         chi2(1)      =    21.75
         Prob > chi2  =   0.0000
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ROA

         chi2(1)      =     0.77
         Prob > chi2  =   0.3790
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of NPM

         chi2(1)      =     8.45
         Prob > chi2  =   0.0037
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of yield

         chi2(1)      =     3.66
         Prob > chi2  =   0.0557
```

Multicollinearity test

	DS	KOF	HHI
DS	1.000		
KOF	0.454	1.000	
HHI	0.397	0.768	1.000

```
. vif

    Variable |       VIF       1/VIF
-------------+----------------------
         KOF |      2.61    0.383768
         HHI |      2.46    0.406945
          ds |      1.27    0.788435
-------------+----------------------
    Mean VIF |      2.11
```

FSCs

Linearity test

	DS	KOF	HHI
ASK	0.811*	0.084	0.070
LF	0.367	0.488	0.472
PAX	0.869*	0.095	0.098
CASK	0.012	-0.107	-0.080
NPM	0.163	0.334	0.174
RPK	0.805*	0.109	0.097
YIELD	0.090	-0.138	-0.127
ROA	0.139	0.325	0.173

```
. swilk ASK_res LF_res PAX_res CASK_res RPK_res NPM_res ROA_res yield_res

                   Shapiro-Wilk W test for normal data

    Variable |        Obs       W           V         z       Prob>z
-------------+------------------------------------------------------
     ASK_res |        110    0.95273      4.227     3.214    0.00065
      LF_res |        110    0.97769      1.995     1.540    0.06181
     PAX_res |        110    0.96933      2.742     2.250    0.01224
    CASK_res |        110    0.89332      9.539     5.029    0.00000
     RPK_res |        110    0.96811      2.851     2.337    0.00973
     NPM_res |        110    0.98404      1.428     0.794    0.21365
     ROA_res |        110    0.96465      3.161     2.567    0.00514
   yield_res |        110    0.95222      4.272     3.238    0.00060
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ASK

         chi2(1)      =    10.42
         Prob > chi2  =   0.0012
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of LF

         chi2(1)      =     3.81
         Prob > chi2  =   0.0508
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of PAX

         chi2(1)      =    24.64
         Prob > chi2  =   0.0000
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of RPK

         chi2(1)      =    11.73
         Prob > chi2  =   0.0006
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ROA

         chi2(1)      =     1.00
         Prob > chi2  =   0.3178
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of NPM

         chi2(1)      =     0.45
         Prob > chi2  =   0.5009
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of yield

         chi2(1)      =     2.55
         Prob > chi2  =   0.1100
```

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of CASK

         chi2(1)      =     0.00
         Prob > chi2  =   0.9667
```

Multicollinearity test

	DS	KOF	HHI
DS	1.000		
KOF	0.234	1.000	
HHI	0.180	0.768	1.000

Source: created by author

```
. vif

    Variable |       VIF       1/VIF
-------------+----------------------
         KOF |      2.50    0.400309
         HHI |      2.44    0.409942
          ds |      1.06    0.945049
-------------+----------------------
    Mean VIF |      2.00
```

Annex 4. Choosing between Fixed effects and Random effects models

Hausman test – Whole Sample

ASK

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |    6.103544     5.515774        .5877705               .
         HHI |    .0111583     .0099752        .0011832               .
          ds |    .1590748     .1901619       -.0310871               .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =   -12.36    chi2<0 ==> model fitted on these
                                        data fails to meet the asymptotic
                                        assumptions of the Hausman test;
                                        see suest for a generalized test
```

LF

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |    2.075865     5.515774       -3.439909               .
         HHI |    .0102649     .0099752        .0002898               .
          ds |    .0307493     .1901619       -.1594126               .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =  -112.08    chi2<0 ==> model fitted on these
                                        data fails to meet the asymptotic
                                        assumptions of the Hausman test;
                                        see suest for a generalized test
```

PAX

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
          ds |    .1324862     .1677172        -.035231         .005369
         KOF |    2.433544     1.767424        .6661194               .
         HHI |     .012517     .0111762        .0013409               .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       43.06
                Prob>chi2 =      0.0000
```

RPK

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      fe           re          Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |    6.349959     5.708379         .64158               .
         HHI |     .017241     .0159495        .0012915              .
          ds |    .1397611     .1736942       -.0339331              .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =   -21.72    chi2<0 ==> model fitted on these
                                        data fails to meet the asymptotic
                                        assumptions of the Hausman test;
                                        see suest for a generalized test
```

NPM

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      fe           re          Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |    2.887583     2.623625        .2639579        .2935932
         HHI |   -.0130766     -.013608        .0005313        .0006463
          ds |     .003317     .0172777       -.0139607        .0154754
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.81
                Prob>chi2 =      0.8462
```

ROA

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      fe           re          Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |    2.121506     2.127362        -.005856        .3082353
         HHI |    -.007744    -.0077322       -.0000118        .0008554
          ds |    .0115892     .0112794        .0003097        .0160471
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.00
                Prob>chi2 =      1.0000
```

CASK

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      fe           re          Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |   -.2209384    -.2257127        .0047743        .0279276
         HHI |    .0019458     .0019362        9.61e-06        .0001288
          ds |   -.0007702    -.0005177       -.0002525        .0013644
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.03
                Prob>chi2 =      0.9983
```

Yield

. **hausman fe re**

	Coefficients (b) fe	Coefficients (B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
KOF	-.1742299	-.1976213	.0233914	.0212496
HHI	-.0006213	-.0006684	.0000471	.
ds	.0012831	.0025203	-.0012372	.0011463

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```
            chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                    =        1.16
          Prob>chi2 =      0.7615
          (V_b-V_B is not positive definite)
```

<u>Hausman test – LCCs Sample</u>

ASK

. **hausman fe re**

	Coefficients (b) fe	Coefficients (B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
KOF	-.1742299	7.49665	-7.67088	.
HHI	-.0006213	.0056058	-.0062271	.
ds	.0012831	.2221632	-.2208802	.

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```
            chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                    =  -207.94    chi2<0 ==> model fitted on these
                                  data fails to meet the asymptotic
                                  assumptions of the Hausman test;
                                  see suest for a generalized test
```

LF

. **hausman fe re**

	Coefficients (b) fe	Coefficients (B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
KOF	3.312114	3.294012	.0181017	.1062846
HHI	.0055512	.0054857	.0000655	.0007178
ds	.0107095	.0115133	-.0008038	.0039485

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```
            chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                    =        0.04
          Prob>chi2 =      0.9978
```

PAX

. **hausman fe re**

	Coefficients (b) fe	Coefficients (B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
KOF	5.627233	4.520195	1.107038	.
HHI	.0056295	.001621	.0040084	.
ds	.1522605	.2014198	-.0491594	.

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```
            chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                    =   -91.40    chi2<0 ==> model fitted on these
                                  data fails to meet the asymptotic
                                  assumptions of the Hausman test;
                                  see suest for a generalized test
```

CASK

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      fe           re          Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |   -.0504772    -.0399527       -.0105245        .0313173
         HHI |    .0042117     .0042498       -.0000381        .0002101
          ds |   -.0040712    -.0045385        .0004674         .001168
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.16
                Prob>chi2 =      0.9838
```

RPK

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      fe           re          Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |    9.065135     8.377752        .6873829               .
         HHI |     .008789     .0063001        .0024889               .
          ds |    .1536473     .1841714       -.0305241        .0112191
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        7.40
                Prob>chi2 =      0.0601
                (V_b-V_B is not positive definite)
```

NPM

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      fe           re          Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |    .3491066    -.0036248        .3527314        .4435741
         HHI |   -.0097881    -.0110653        .0012772         .001743
          ds |    .0490934     .0647568       -.0156635        .0194844
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.65
                Prob>chi2 =      0.8858
```

ROA

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      fe           re          Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |   -.8086979    -.4958938       -.3128041        .4635202
         HHI |   -.0017626      -.00063       -.0011326        .0018657
          ds |    .0641614      .050271        .0138904        .0202874
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.47
                Prob>chi2 =      0.9257
```

Yield

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |    .2469937     .2250373        .0219564         .029297
         HHI |    .0014603     .0013808        .0000795        .0001558
          ds |   -.0110576    -.0100826        -.000975        .0012064
------------------------------------------------------------------------------
                          b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.65
                Prob>chi2 =      0.8842
```

Hausman test – FSCs Sample

ASK

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |    4.934328     4.383854        .5504744               .
         HHI |    .0114325     .0114702       -.0000377               .
          ds |    .0720032     .1071632       -.0351599               .
------------------------------------------------------------------------------
                          b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       -4.50    chi2<0 ==> model fitted on these
                                           data fails to meet the asymptotic
                                           assumptions of the Hausman test;
                                           see suest for a generalized test
```

LF

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |     1.13143     1.792401       -.6609708               .
         HHI |    .0159942     .0156168        .0003774               .
------------------------------------------------------------------------------
                          b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       36.75
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)
```

PAX

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          S.E.
-------------+----------------------------------------------------------------
       yield |    .6235917     .6174826        .0061091        .0538303
         KOF |    1.409251     1.407521        .0017297        .0856203
         HHI |    .0181145     .0181048        9.72e-06        .0009323
------------------------------------------------------------------------------
                          b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.01
                Prob>chi2 =      0.9996
```

CASK

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      fe           re          Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |   -.2602826    -.2790361        .0187535        .0526177
         HHI |    .0001455     .0001468       -1.28e-06        .0002379
          ds |    -.003783    -.0025851       -.0011978        .0030649
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.15
                Prob>chi2 =      0.9848
```

RPK

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      fe           re          Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |    4.665433     4.123235        .5421981               .
         HHI |    .0237575     .0237947       -.0000371               .
          ds |    .0732978     .1079291       -.0346313               .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =    -6.14    chi2<0 ==> model fitted on these
                                        data fails to meet the asymptotic
                                        assumptions of the Hausman test;
                                        see suest for a generalized test
```

NPM

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      fe           re          Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |    4.647249     4.211265        .4359843        .4374422
         HHI |   -.0194232    -.0193933       -.0000299        .0001025
          ds |   -.0224111     .0054361       -.0278472        .0279346
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.99
                Prob>chi2 =      0.8028
```

ROA

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      fe           re          Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |    4.221594     3.828103        .3934909        .4211694
         HHI |   -.0170214    -.0169944       -.0000269        .0004102
          ds |   -.0221614     .0029716       -.0251331        .0267962
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.88
                Prob>chi2 =      0.8303
```

Yield

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      fe           re          Difference          S.E.
-------------+----------------------------------------------------------------
         KOF |   -.4085079    -.4004933       -.0080146         .0501724
         HHI |   -.0015819    -.0015825        5.49e-07         .0002441
          ds |    .0080082     .0074963        .0005119         .0028754
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.03
                Prob>chi2 =      0.9985
```

Breusch-Pagan LM test – Whole Sample

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ASK[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     ASK |   2416.818       49.16115
                       e |    56.7179       7.531129
                       u |   758.1834       27.53513

        Test:   Var(u) = 0
                             chibar2(01) =   613.98
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        LF[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                      LF |   39.14239       6.256388
                       e |    5.30056       2.302295
                       u |   30.33633       5.507843

        Test:   Var(u) = 0
                             chibar2(01) =   729.80
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        PAX[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     PAX |   494.5879       22.23933
                       e |   35.69779       5.974762
                       u |   137.0418       11.70649

        Test:   Var(u) = 0
                             chibar2(01) =   499.21
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        CASK[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                    CASK |   5.365379       2.316329
                       e |   1.050701       1.025037
                       u |   4.803282       2.191639

        Test:   Var(u) = 0
                             chibar2(01) =   678.07
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        NPM[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     NPM |   41.34631        6.43011
                       e |   27.83578       5.275962
                       u |   11.20745       3.347752

        Test:   Var(u) = 0
                             chibar2(01) =    72.02
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ROA[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     ROA |   34.14965        5.84377
                       e |   26.15068       5.113773
                       u |    7.18936       2.681298

        Test:   Var(u) = 0
                             chibar2(01) =    39.58
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        RPK[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     RPK |   1730.445       41.59862
                       e |   56.18653       7.495767
                       u |   555.3318       23.56548

        Test:   Var(u) = 0
                             chibar2(01) =   604.09
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        yield[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                   yield |   7.501827       2.738946
                       e |   1.043385       1.021462
                       u |   6.609569       2.570908

        Test:   Var(u) = 0
                             chibar2(01) =   745.47
                          Prob > chibar2 =   0.0000
```

Breusch-Pagan LM test – LCCs Sample

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ASK[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     ASK |   657.4938       25.64164
                       e |   54.46456       7.380011
                       u |   175.4673       13.24641

        Test:   Var(u) = 0
                             chibar2(01) =   204.10
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        LF[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                      LF |   55.13688       7.425421
                       e |   6.922965       2.631153
                       u |   50.13518        7.08062

        Test:   Var(u) = 0
                             chibar2(01) =   359.54
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        PAX[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     PAX |   676.1866       26.00359
                       e |   42.74013       6.537594
                       u |   139.5092        11.8114

        Test:   Var(u) = 0
                             chibar2(01) =   163.12
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        CASK[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                    CASK |   5.464236       2.337571
                       e |   .6912074       .8313889
                       u |   5.738468        2.39551

        Test:   Var(u) = 0
                             chibar2(01) =   371.25
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        RPK[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     RPK |   651.5623       25.52572
                       e |   60.56075       7.782079
                       u |    238.577       15.44594

        Test:   Var(u) = 0
                             chibar2(01) =   240.78
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        NPM[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     NPM |   40.45618       6.360517
                       e |   23.43581       4.841055
                       u |   9.769971       3.125695

        Test:   Var(u) = 0
                             chibar2(01) =    28.45
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ROA[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     ROA |   30.43087       5.516418
                       e |   22.52864       4.746434
                       u |   7.069143       2.658786

        Test:   Var(u) = 0
                             chibar2(01) =    17.78
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        yield[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                   yield |   5.469747       2.338749
                       e |   .7614096       .8725879
                       u |   5.869267       2.422657

        Test:   Var(u) = 0
                             chibar2(01) =   356.30
                          Prob > chibar2 =   0.0000
```

.

Breusch-Pagan LM test – Whole Sample

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ASK[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     ASK |   3381.338       58.14927
                       e |   50.53563       7.108842
                       u |   990.4639       31.47164

        Test:   Var(u) = 0
                             chibar2(01) =   288.13
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        LF[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                      LF |   18.76138       4.331441
                       e |   4.191217       2.047246
                       u |   5.827874       2.414099

        Test:   Var(u) = 0
                             chibar2(01) =   130.22
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        PAX[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     PAX |   334.5716        18.2913
                       e |   17.51003       4.184499
                       u |   388.6449       19.71408

        Test:   Var(u) = 0
                             chibar2(01) =   493.85
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        CASK[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                    CASK |    4.23581       2.058108
                       e |   1.332635       1.154398
                       u |   3.577697        1.89148

        Test:   Var(u) = 0
                             chibar2(01) =   258.79
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        RPK[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     RPK |   2354.806       48.52634
                       e |   46.29771       6.804242
                       u |   736.7466       27.14308

        Test:   Var(u) = 0
                             chibar2(01) =   299.04
                          Prob > chibar2 =   0.0000
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        NPM[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     NPM |   39.50309       6.285148
                       e |   30.67849       5.538817
                       u |   5.272912       2.296282

        Test:   Var(u) = 0
                             chibar2(01) =     6.77
                          Prob > chibar2 =   0.0046
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ROA[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     ROA |   34.74442        5.89444
                       e |   27.70491       5.263546
                       u |   4.298267       2.073226

        Test:   Var(u) = 0
                             chibar2(01) =     5.52
                          Prob > chibar2 =   0.0094
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        yield[airline,t] = Xb + u[airline] + e[airline,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                   yield |   4.140637       2.034856
                       e |   1.221672       1.105293
                       u |   3.484835       1.866771

        Test:   Var(u) = 0
                             chibar2(01) =   269.50
                          Prob > chibar2 =   0.0000
```