



PhD in Business and Management

Strategy Performance Relationship in Europe

BY

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A DISSERTATION

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Biography Note

Vitor Manuel dos Santos Cardoso was born on 30th of May of 1975 in Portugal and currently lives in Porto. Within a deep interest in the management field, he obtained a degree in Management at the University of Porto. In 2009, he also obtained a Master's Degree in International Business and Economics at faculty of economics of the University of Porto. With more than 20 years of experience, the author has a wide range of business professional experiences, in large and mid-companies, namely in the fields of auditing, controlling management and finance. The author has also an international experience in a consulting Big 4 company, in the beginning of his career. Currently, the author coordinates the financial management of a Group, in the automotive sector.

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Abstract

The present dissertation is composed by three studies that connect the relationship between business strategy and performance of listed companies in Europe in the STOXX index in different ways. Supporting our research on the framework developed by *Miles and Snow*, which is based on the way companies solve three fundamental problems: entrepreneurial, engineering, and administrative, our investigation aims to verify whether or not this strategic orientation is independent of the national culture, the degree of uncertainty and dynamism and the digital/technological transformation.

The first study investigates the importance of strategic orientation and national culture in the performance of listed companies in Europe. Analysing the strategic orientation of the listed companies for the period between 2012 and 2019, there is empirical evidence that strategy impacts significantly on firm performance. Moreover, our results show that national culture has a moderating influence in the strategy-performance linkage.

In the second study, we explore the strategic behaviour of the listed companies for the period between 2015 and 2019, in the context of uncertainty and dynamism (national innovation capabilities). The analyses carried out enables a better understanding of the strategic behaviour that better fits to these contexts and at different levels performance. In order to access that different performance levels, we introduced an econometric model with a quantile regression approach, to complement our research with a better understanding strategy-performance linkage, analysing the effect of the explanatory variables at various quantiles of conditional performance distribution at low and high levels.

Finally, the third study assess if the business strategy in the context of digital transformation, of high-technology companies listed on the STOXX600 index. Panel data results obtained for the period between 2015 and 2019, shows that prospector strategy impacts significantly on firm performance. Findings also suggest that the presence of *digital officer's* (CDO) in the top management team, is significant and impact on market value performance. Since this top manager's play an important role in the business transformation, acting as enabler's of digital transformation and helping in exploring new opportunities in the future.

Resumo

A presente tese é composta por três estudos que conectam a temática da relação entre a estratégia empresarial e a performance das empresas cotadas na Europa no índice STOXX. Tendo por base a tipologia estratégica desenvolvida por *Miles & Snow*, que assenta na forma como as empresas decidem resolver três problemas fundamentais: comerciais, de engenharia (ou operacionais), e administrativos, a nossa investigação pretende verificar se essa orientação estratégica é ou não independente da cultura nacional, do grau de incerteza e dinamismo nacional e da transformação digital/tecnológica.

O primeiro estudo investiga a importância da orientação estratégica e da cultura nacional na performance das empresas cotadas na Europa, analisando a orientação estratégica dessas empresas no período entre 2012 e 2019. Os resultados empíricos demonstram que a estratégia influencia de forma significativa a performance das empresas. Além disso, os resultados mostram ainda que a cultura nacional tem uma influência moderadora na relação entre estratégia e performance.

No segundo estudo, é investigado o comportamento estratégico das empresas cotadas na Europa no período entre 2015 e 2019, num contexto de incerteza e dinamismo (capacidade de inovação nacional). As análises efetuadas permitem uma melhor compreensão do comportamento estratégico que melhor se adapta a estes contextos e a diferentes níveis de performance. Por forma a se aferir os diferentes níveis de performance, aplicou-se um modelo econométrico baseado na regressão por quantis, como complemento da investigação. Para uma melhor compreensão da relação entre a estratégia e performance, analisou-se o efeito das variáveis explicativas em vários quantis da distribuição condicional, em níveis mais baixos e mais elevados de performance.

Por fim, no terceiro pretende-se assim avaliar se a estratégia das empresas ainda é válida no contexto da transformação digital, das empresas mais tecnológicas cotadas no índice STOXX600. Os resultados dos dados em painel obtidos no período entre 2015 e 2019 mostram que a estratégia prospectora (*prospector*) influencia significativamente a performance das empresas. Os resultados também sugerem, que a presença de *digital officer's* (CDO) na equipa de gestão de topo, tem um impacto positivo e significativo na

performance das empresas, uma vez que estes gestores de topo desempenham um papel importante na transformação do negócio, atuando como facilitadores da transformação digital e ajudando na exploração de novas oportunidades no futuro.

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Chapter 1 Introduction

1. Introduction

1.1. Motivation and purpose of this research

In an uncertain, high volatile and technological changing world, the relationship between strategy and performance focuses more and more attention on the fields of strategic management. The need for companies to constantly adapt to the environment, and at the same time responding to the constantly market performance demands from investors and shareholders, gives more importance to the strategic position of firms. In such a demanding environment, business strategy is considered a key element for company's performance success. There is also an increasing interest in the fields of strategic management to explore how organizations respond and adapt to the change environment (Bindra et al., 2019).

The purpose of the study presented, is to explore the relationship between business strategy and firm performance. Supporting our research on the framework developed by *Miles and Snow* (Miles et al., 1978; Snow & Hrebiniak, 1980), our analysis intends to verify if the business strategy is still valid in the context of national culture, uncertainty and technology (*context of digital transformation*), and thus seeking to fill a gap in the literature (Anwar et al., 2021).

The context and environment in which the managers of listed companies operate is increasingly demanding and high complex, influenced by technological, managerial, social, and cultural aspects. In this sense, we aimed to verify whether the strategic orientation tends to positively increase the impact on the performance of those listed companies, and if the strategic orientation of firms and its positioning (namely in the two extremes of *Miles and Snow* strategy orientation (more defensive - *Defenders* or more offensive - *Prospectors*) assumes more preponderance in those contexts.

Answering to these questions we aim to contribute to the strategic management research field filling a gap in the literature, since there is a lack of studies considering the strategy and performance relationship in those contexts.

1.2. Methodology

This study uses a sample of leading European companies listed on the major European stock exchanges (STOXX). The selection of our sample aimed to develop our research with as much rigour as possible. It is a fairly homogeneous sample since all the companies in the sample are large companies (together they represent the majority of the turnover achieved by European companies).

From a management point of view, all of them have excellent top management teams with the best academic backgrounds and outstanding professional experience. All these companies have high accountability, high disclosure obligations and high levels of scrutiny from the market as a whole, including investors, shareholders, and stakeholders. Their annual reports are, therefore, a very important, reliable, and consistent source of information. To ensure the homogeneity of the sample, companies from the financial sector (banks, insurance, and real estate companies) were excluded because these companies are subject to different rules since their regulated and specific nature and their financial information is very specific including different accounts on balance sheet and on demonstration of results. Therefore, consequently preventing from making fair comparisons. Thus, the differences between the listed companies of our sample lie mainly in the environment level: the national culture, the degree of innovation and the degree of digitalisation, and in the management level: the strategy adopted. The data sources are STOXX Index components and Datastream, within a period under analysis between 2012 to 2019. Starting with the company name, sector, and country of the components of the STOXX, we retrieved ISIN codes from Datastream database and collect data from fundamentals finance information, in order to construct a panel data combining time and cross-sectional data to enable statistical inferences. For each study presented in this dissertation we applied different econometric estimations to best respond to the research question in analysis.

1.3. Plan of Presentation

This dissertation is composed by five chapters which include the following three studies that were developed during the thesis period. All the three concern the relationship between strategy and performance. Following a brief introduction presented in Chapter 1, our first study (provided in chapter 2) explores the importance of strategic orientation and national culture on the performance of listed companies in Europe. After a literature review on the relation between strategy and performance, we identified a gap, in this area that we wanted to fill, in the present research. To operationalize our clusters of national culture we use the Hofstede cultural dimension as a proxy for culture (national culture). Our findings point out that national culture values and beliefs have an influence on firm performance, moderating the strategy-performance linkage.

Chapter 3 represents the second study which assess the strategic behaviour of the listed companies in an environment of uncertainty and in a context of dynamism (national innovation capabilities). A panel data of European companies from STOXX Index all Europe, for the period between 2015-2019 was used and presented by the operationalization of the quantile regression estimations, enabling a better understanding of the strategic behaviour at different levels of performance. It was found that prospectors strategy outperforms defenders and analyzers strategies in the context of uncertainty and dynamism (national innovation capabilities).

In chapter 4, and to complete our main research, we intend to verify if the business strategy is still valid in the context of digital transformation. In this sense, we aimed to verify whether the strategic orientation tends to positively increase the impact on the performance of technology companies. The study covers a sample of 119 high-technology European companies listed on the STOXX600 index, for the period of 2015-2019 (595 firm-year observations). Panel data regressions were carried out to evaluate the strategy-performance linkage in digital context (*digital transformation and digital focus*). In order to measure our strategic emphasis on digitalization we used two measures for digitalization: the presence of *digital officer's* (CDO) in the top management team and digitalization focus (Digitalization). To operationalize our main strategy variable (*Prospector and Defender*), we developed a content analysis using textual components

extracted from the annual reports, enabling to identify the strategic emphasis based in the framework of *Miles and Snow* typology dimensions: prospective (*Prospector*) and defensive (*Defender*) types. We found that the alignment of business strategy with digital transformation, can yield a competitive advantage and may enable a superior performance.

The first two studies examine the strategy-performance relationship, in the context of national culture and uncertainty. The third study complements and provides a deep understanding of the strategy-performance relationship in high-tech sector. Each chapter of this dissertation is organized as follows: a first section providing introduction; a second section with the literature review of the study; a section of methodology (data, main variables, sample models and statistics); a section of empirical results; and a final section of conclusions.

Chapter 2. The importance of strategic orientation and national culture in the performance of listed companies in Europe

1. Introduction

In an increasingly competitive and uncertainty world, companies try to gain advantages, and guide their strategic positioning to achieve a better performance.

The context and environment in which the managers of large, listed companies gravitate, influenced by technical, managerial, social and culture aspects is increasingly complex. Despite these times of uncertainty and constant change, culture has shown itself to be persistent and still resilient over time (Castellani, 2019).

Culture plays an important role in society and institutions, and also affects the decision-making process of the management of as a whole, namely when facing to take strategic decisions or implement strategic orientations from headquarters.

In recent years, we observed an emergent interest concerning strategic orientation (Aleksić & Rašić Jelavić, 2017; Anwar & Hasnu, 2016a; Marc Sollosy et al., 2019) and culture (Kaul, 2019). More recent studies focus on the influence of national culture on managerial preferences and performance, stating that culture is an important factor that affects economic decision-making (Breuer et al., 2018).

Other studies pointed out that national culture plays an important role in the adoption of governance and environmental practices (Gallego-Álvarez & Ortas, 2017; Graafland & Noorderhaven, 2018; Naghavi et al., 2020; F. (Sophie) Song et al., 2018), influence innovation and technological progress (Tian et al., 2018), influence the effect of strategy formulation on firm performance (Borrero et al., 2020), risk taking and debt (Chui et al., 2016; Gaganis et al., 2019; Mourouzidou-Damtsa et al., 2019), leverage decisions (D. Wang & Esqueda, 2014) and entrepreneurial orientation (Engelen et al., 2015).

However, there is still an opportunity to extend the debate and explore the importance of culture (national culture), in the strategy-performance relationship, bringing a new perspective and adding more insights, for example how high uncertainty avoidance

cultures, or high hierarchical cultures will moderate the strategy-performance relationship?

For listed companies, this analysis investigates whether stable factors like national culture of the company's country and firm strategy orientation can explain the performance of these companies – despite the fact that they live in a short-term, very financial environment determined by the evolution of share prices and stock market returns and suffer from high pressure coming from all types of stakeholders.

Our study focuses on listed companies, quoted in the most important European stock markets, that are obliged to high compliance standards, high levels of transparency and disclosure of financial information, environmental, social and governance practices under the observation of multiple stakeholders. This demands high levels of management capabilities to decide long-term investment strategies dealing at the same time with an active defence of share prices and returns that change at each instant in stock markets.

The analysis of their strategic management options in this context is especially important to attain better performance levels in these big organizations that are very international in terms of markets of goods and services, money, and capital markets, competing for management talent and other resources. In these organizations, managers are considerably exposed and hardly challenged to be competitive and creating yearly value to its shareholders. Managers assume a main role in the business decision-making process and strategic guidance, actively participating in collective management and exerting this influence on the company's activity and performance.

Facing this international (financial) environment, these companies may adopt the same, similar behaviour or, alternatively, the characteristics of the country of origin and their own history can influence performance in spite of the financially demanding short-term context of stock market – that is, can the national cultures of the countries of origin also influence the performance of these companies?

The novelty of our study lies in assessment of the importance of national culture and how it can moderate the strategy-performance relationship even in these companies, that have a strong position on the European stock market. These companies play also a very

important role in the European corporate business panorama, because of their size, value (market capitalization), innovation capacity and products development.

Concerning firm performance and following previous studies, (Anwar & Hasnu, 2016b) that mentioned a gap in the use of a market performance measure such as Tobin's Q, our study contributes to the development of this previous studies by introducing this market perception performance measure, fulfilment the gap and gaining a better understanding of the strategy-performance relationship, since national culture has an impact in the way organizations is adaptable to changes (Janicijevic, 2014). The main question in this research is to know whether more stable determinants, such as strategic options and national cultures, can offset (mainly) short-term stock management of listed company's performance.

In order to assess the strategic behaviour of the companies, in a multi-industry and multi-country context, we follow the M&S (Miles & Snow, 1978) framework that still responds to the adaptive cycle process deals (dealing with three main problems – the entrepreneurial, the engineering and the administrative) and where we construct our strategy proxy enabling the identification of strategic patterns: *Prospectors*, *Defenders*, *Analyzers* and *Reactors*. Since the majority of studies that used this framework were developed in the United States (Jennings et al., 2003; Parnell, 2010; Shortell & Zajac, 1990) or in single countries (Ingram et al., 2016; Jusoh & Parnell, 2008), our aim is to contribute to the existing literature by extending the research to 17 European countries.

To consider the national culture we must capture the main distinctive traits forming the concept of “national culture”. This empirical and conceptual analysis is made at the country level. For this we use Hofstede's culture framework due to the diversity of the six proposed variables and robustness of this analysis showed in multiple studies (Thanetsunthorn & Wuthisatian, 2019; Verma & Sharma, 2019; Zainuddin et al., 2020).

In short, the purpose of this study is to investigate the importance of strategic orientation and national culture in the performance of listed companies in Europe.

The research questions of the study are:

RQ1: Does business strategy have a significant effect on firm performance?

RQ2: Does national culture moderate the effect of business strategy on firm performance?

In the following, we developed an overview of the existing literature concerning strategy, strategy performance linkage, and national culture, including a set of hypotheses.

Then we will present the methodology applied, sample data, variables, and empirical model, where we describe all variables, namely strategy measurement and national culture clusters. Following sections contains empirical results and tests. Afterwards, we present our main findings, a set of conclusions, and future research opportunities.

2. Theoretical background

2.1 Strategy

Strategy is a key element for the success of organizations: superior performance and sustainable competitive advantage. Chandler (1962: 13), one of the leading contributors to define the concept of strategy, stressed that “strategy can be defined as the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals”. Strategy is considered a way to gain a sustainable competitive advantage (Lin et al., 2014), and consequently achieving a superior performance in the long run.

Performance is an intrinsic construct in the strategy literature (González-Rodríguez et al., 2018). Performance can be approached from a measurement perspective and in this way (Venkatraman & Ramanujam, 1986), pointed out that the financial performance represents the core concept of performance, measured by indicators such as sales growth and profitability ratios.

Concerning the theories of strategic typologies, we must underline that it is an emerged research area in strategic management field. Taxonomies and several strategic typologies have been developed in strategic management literature, where we can find different levels of strategy namely business strategy and corporate strategy (Chandler, 1962; Miles et al., 1978; Porter, 1980).

Classifications vary according to each researcher. Among others, the main management literature contributors in this field are Miles and Snow (1978) with the strategic types -

prospectors, analyzers, defenders, and reactors, and also Porter's (1980) with a concept of generic business strategies - cost leadership, differentiation, and focus.

In accordance with Miles and Snow (1978), three of the strategic types are considered "pure strategies" (*Prospectors*, *Defenders* and *Analyzers*). The fourth strategic type – *Reactors*, concerns the companies that behave inconsistently. This adaptive cycle process depends on how the organization reacts to three main problems – the entrepreneurial (how to manage market position), the engineering (how to implement solutions) and the administrative (how to adapt structure).

Table 2.1 summarize the framework of three viable strategy characteristics and how they deal with the three problems: entrepreneurial, engineering and the administrative.

Table 2.1 Key Problem-Solving characteristics of M&S strategic types and dimensions

Strategic Type	Entrepreneurial	Engineering	Administrative
<i>Defender</i>	• Stable domain • Ignore developments • Efficient, small product /market domain	• Cost-efficiency focus • Single-core technology	• Internal orientated • Cost orientated • Centralised control
<i>Prospector</i>	• Growth domain • Continuous developing • Creates change • Innovative	• Flexible technologies • Multiple technologies • Low degree of automation	• Marketing and research • Problem orientated • Decentralised control
<i>Analyzer</i>	• Hybrid domain • Balance and adaptive	• Dual-core technology • Large engineering group • Moderate degree of technical rationality	• Intensive planning • Matrix structure • Moderate control

Source: Based on M&S (Miles et al., 1978)

2.2 Strategy and Performance Relationship

Despite the individual differences in the studies, we observed that most of studies were carried in the United States. As we can observe in the following table (table 2.2.), there is a lack of studies carried in European countries, opening up an opportunity for research in different countries/regions (Anwar et al., 2021). The methodology for specification of strategic type varies from self-typing approach to cluster analysis. The main typologies covered are based in Miles and Snow (1978), Porter (1980) and some variations. In table 2.2, we present an overview of the studies concerning the strategy and performance relationship (including M&S framework) over the last decades. Previously, the strategic typologies that were presented derived from generic competitive strategies which are called *pure strategies*. Companies pursuing multiple advantages can combine those strategies. This (combination) hybridization of strategic orientation is based on efficiency and differentiation. Hence the possibility to make different combinations of generic strategies (“pure” strategies) may enable companies to gain competitive advantage (Claver-Cortés et al., 2012).

Table 2.2 Summary of literature review on the Strategy Performance Relationship

Reference	Strategy Approach	Country	Industry Scope	Performance Measures	Data	Methods
(Snow & Hrebiniak, 1980)	M&S	U.S.	Automotive, Plastics	ROA	Questionnaire/ Secondary data	Self-typing
(Donald C. Hambrick, 1983)	M&S Porter	U.S.	Air Transport, Semiconductors	ROI, CFOI, Market Share	PIMS database	Cluster Analysis
(McDaniel & Kolari, 1987)	M&S	US	Banking	Marketing elements	Questionnaire	Self-typing
(Smith et al., 1986)	M&S	U.S.	Electronic	Growth in Sales ROA	Questionnaire	Score Ranking Cluster Analysis
(Conant et al., 1990)	M&S	U.S.	Health Maintenance Organisations	ROI	Questionnaire	Self-typing
(Shortell & Zajac, 1990)	M&S	U.S.	Health Care	PMR	Questionnaire	Factor Analysis
(Thomas & Ramaswamy, 1996)	M&S	U.S.	Electronics, Chemical and Petroleum refining	ROS, ROA, ROE	Secondary data	Cluster Analysis

Reference	Strategy Approach	Country	Industry Scope	Performance Measures	Data	Methods
(Woodside et al., 1999)	M&S	Finland	Multi Industry	ROI	Questionnaire	Self-typing
(Parnell et al., 2000)	M&S	U.S.	wholesale grocers	ROA	Questionnaire	ANOVA
(Jennings et al., 2003)	M&S	U.S.	Services	Sales & Earnings Growth ROS, ROI	Questionnaire	Self-typing
(Dimara et al., 2004)	Porter	Greece	Multi Industry Manufacturing/ Services	ROI, RCE Sales Growth	Questionnaire	Self-typing
(Spanos et al., 2004)	Porter	Greece	Multi Industry Manufacturing	Price Cost Margin	Secondary data NSSG	Score Ranking
(Yeung et al., 2006)	Porter	Hong Kong	Services Logistics	ROS, ROA, Sales Growth, Market Share	Questionnaire Secondary data HKLA	Cluster Analysis
(Jusoh & Parnell, 2008)	M&S	Malaysia	Multi Industry Manufacturing	Sales Growth ROI, CFlow	Questionnaire FMM	Self-typing
(Vorhies et al., 2009)	Taxonomy of three elements	U.S.	Transportation Multi Industry	CFROA	Questionnaire Secondary data Fortune 500	Score Ranking
(Parnell, 2010)	M&S	U.S.	Retail trade	Sales Growth ROA, ROE, ROS Market Share	Questionnaire	Self-typing
(Parnell, Koseoglu, et al., 2012)	M&S	China Turkey	Multi Industry	Sales Growth ROA, ROE, ROS Market Share	Questionnaire	Self-typing Factor Analysis
(Blackmore & Nesbitt, 2013)	M&S	Australian	Multi Industry	Sales Growth, Assets Growth ROA, ROE	Secondary data Survey	Cluster Analysis
(Asdemir et al., 2013)	Porter	U.S.	Multi Industry	Tobin's Q Abnormal returns	Secondary data Compustat	Confirmatory factor analysis
(Zamani et al., 2014)	M&S	Iran	Multi Industry Manufacturing	Sales Growth, ROA, Market Share	Questionnaire	Self-typing

Reference	Strategy Approach	Country	Industry Scope	Performance Measures	Data	Methods
(Sarac et al., 2014)	M&S	Turkey	Multi Industry	ROA	Secondary data Borsa Istanbul 100 Index	Cluster Analysis
(Parnell et al., 2015)	M&S	U.S. China	Manufacturing Hospitality Services	ROA, ROE, ROS	Survey	Factor Analysis
(Luoma, 2015)	Strategy Content Typology	Finland	Multi Industry	CNS, OM, PM, ROCE, ROTC	Secondary data Content Analysis	Cluster Analysis
(Anwar & Hasnu, 2016a)	M&S	Pakistan	Multi Industry	ROA, ROE, ROS, ROCE	Secondary data Karachi Stock Exchange	Score Ranking
(Anwar & Hasnu, 2016b)	M&S	Pakistan	Textile	ROA, ROE, ROS, ROCE	Secondary data Karachi Stock Exchange	Score Ranking
(Ingram et al., 2016)	M&S	Poland	Manufacturing	ROI, ROA, ROE, ROS, Growth, Profitability, Cost	Questionnaire	Score Ranking
(Anwar & Hasnu, 2017a)	M&S	Pakistan	Multi Industry	ROA, ROE, ROS, ROCE	Secondary data Karachi Stock Exchange	Score Ranking
(Anwar & Hasnu, 2017b)	M&S	Pakistan	Multi Industry	ROA, ROE, ROS, ROCE	Secondary data	Cluster Analysis
(Heiens et al., 2018)	M&S	Malaysia	Financial Services Manufacturing	Market share, Profit	Questionnaire	ANOVA Score Ranking
(Chatzoglou et al., 2018)	VKT	Greece	Manufacturing	ROA, Sales, Profit	Questionnaire	Structure equation model
(Lopo Martinez & Ferreira, 2019)	M&S	Brazil	Commercial Construction Energy Transportation	ETR Cash VATR	Secondary data Bovespa stock exchange	Score Ranking

Source: Adapted from previous studies (Anwar & Hasnu, 2016a; Luoma, 2015).

Legend: M&S - Miles and Snow Typology (1978) / Porter - Porter's Typology (1980) / VKT - Venkatraman (1989) / ROA = Return of Assets / ROI - Return on Investment / CFOI = Cash flow on investment / PMR = Profit Margin Ratio/ PIMS = Profit Impact of Market Strategies / RCE = Return on Capital Employed / CFROA = Cash Flow on Return on Assets / CNS = Change of Net Sales / OM = Operating Margin / PM = Profit Margin / ROTC = Return on Total Capital.

In the last years we assist an increase of studies, but mostly single country focused, despite the evolution of the analysis of the strategic behaviour at industry level.

The majority of the studies emphasize the *Defender*, *Prospector* and *Analyzer* strategic types, giving less importance to the reactive strategies (Reactor). They also stress that *Analyzers* are considered as having a mix of characteristics of both defenders and prospectors, competing sometimes on a defensive or an offensive way (Desarbo et al., 2005). Other studies, try to explore the concept of hybrid strategies (Anwar & Hasnu, 2017b; Salavou, 2013; Spanos et al., 2004) and assess if those strategies outperform pure strategies.

Concerning firm performance measurement, the previous table summarises the main performance measures used in several empirical investigations, where we can observe that the most of them were based in profitability measures and sales growth (as a volume-related measure), return on assets (ROA), return on investment (ROI), as proxies for economic performance.

In this way, there is an opportunity to improve the discussion on the linkage between strategy and performance, by introducing another measure of performance to capture the market perception, such as QTOBIN (a measure of firm's market performance), namely when analysing listed companies, assessing how the capital markets value the firm strategy choices (*more prospective vs more defensive*).

Firm specific characteristics such as size and leverage may influence performance, and have been considered as factors to control (Anwar & Hasnu, 2017b; Lopo Martinez & Ferreira, 2019).

Therefore, the first proposed hypothesis is as follows:

H1. Business strategy has a significant impact on firm performance.

2.3 National Culture

National culture represents an important (informal) institutional factor (Castellani, 2019), influencing the expected behaviour of organizations, strategy formulation and corporate decision making (Borrero et al., 2020) as well as manager's perceptions of distance to foreign markets (I. C. M. Antunes et al., 2019). Cultural factors also impact in capital structure, firm performance, and company value (Gleason et al., 2000), and influences the innovation strength (Moonen, 2017).

Recent studies have emphasized the importance of cultural characteristics in the strategy and performance linkage (I. Antunes et al., 2013; Anwar & Hasnu, 2016a; Hilgen & Huang Kabir HC van Beusichem, 2014; Ingram et al., 2016; Kaul, 2019). Moreover, national culture influence management decision process and investment practices (Shi & Veenstra, 2021).

A fundamental question arises: does the same strategy has the same performance no matter the national culture? How can we explain the way culture interferes in the adoption and performance of a strategy?

To fill this gap, in the present research, we use the Hofstede cultural dimension as a proxy for culture (national culture). In accordance with Hofstede (1991), culture which he defines as *“the collective programming of the mind which distinguishes the members of one human group from another, ...it is the interactive aggregate of common characteristics that influence a human group's response to its environment”*, incorporate different features that are reflected through behavioural patterns, rituals, values, beliefs, and underlying assumptions. Since context can influence the ways in which organizations perform, there is an opportunity to contribute with more research and test the moderating effect that national culture has on the strategic behaviour of European listed companies' performance.

The Hofstede's model based on a research which includes 116.000 managerial and non-managerial respondents of 72 countries, has been the most widely accepted representation of national culture dimensions characterizing societies (G. Hofstede, 1991, 2001).

This framework has been used by academics and practitioners in multiple countries and in different areas as for example management, accounting, international business, etc. to explain several situations, namely differences in management practices, selection of international markets, entry modes, foreign investment location, subsidiary performance, etc. (I. Antunes et al., 2013).

It should be also noted that all subsequent models of culture have included Hofstede's cultural dimensions. For example, Kogut and Singh's cultural distance index (Kogut & Singh, 1988) uses scores and variances of Hofstede's dimensions.

Lately, the Globe project (House, R. J., Hanges, P. J., Javidan, M., Dorfman, P. W., 2004) with nine dimensions was also influenced by the work of Hofstede et al. This framework encompasses 62 societies/cultures and a sample of 250 respondents per culture. The sample includes only middle managers of only 3 chosen industries: Financial Services, Food Processing, and Telecommunication Services.

Hofstede framework, initially with only four dimensions (Power Distance, Individualism, Masculinity and Uncertainty Avoidance) has been continuously updated with validations, clarifications and two other dimensions, the fifth: Long Term Orientation and then, in 2010, the sixth dimension resulting from Minkov's research: Indulgence.

Each dimension enables comparison between countries since each country cultural dimension score reflects its relative position when comparing to other countries. The scores for each dimension vary from 0 to 100, representing proportionally the intensity of each country in each culture dimension. We use the all the six cultural dimensions to operationalize our clusters of national culture: Power Distance Index (PDI), Individualism versus Collectivism (IDV), Masculinity versus Femininity (MAS), Uncertainty Avoidance index (UAI), Long Term Orientation (LTO) and the degree of indulgence (IVR).

Table 2.3 presents the characterization of each dimension and expected impact in performance model and influence in strategy.

Table 2.3 Characteristics of Hofstede cultural dimensions

Dimensions	Characteristics	Signal	Strategy Orientation
Power Distance Index (PDI)	The extent to which a society accepts unequal distribution of power and impact on leadership style, flow of information	+	Decision making
Individualism versus Collectivism (IDV)	Reflects the extent to which members of society take care of themselves and others, and impacts on decision-making team's performance, cooperation in workgroup	+/-	Assertiveness
Masculinity versus Femininity (MAS)	The extent to which the dominant values of a society are "masculine" and impacts on partnerships' management, organization commitment	+	Aggressive
Uncertainty Avoidance index (UAI)	Reflects the extent to which a society feels threatened by the uncertain conditions impacts on the use of special information systems, business ownership, public image	-	Defensive/Risk Taking
Long-Term Orientation (LTO)	Long-term vs. short-term orientation impacts on investment decisions, stability	+	Resiliency
Degree of indulgence (IVR)	Permissive vs restrictive impacts on flexibility, control, innovation, liability	+	Proactiveness

Source: Based on Hofstede (Hofstede et al., 2010)

Power distance

Concerning power distance index (PDI), this dimension can be defined as “the extent to which the less powerful members of organizations and institutions accept and expect that power is distributed unequally” (Hofstede 2011, p.9). Thus, a larger PDI is associated with centralization and hierarchy in organizations, that reflects the existential inequality between top-down structures, CEOs and subordinates (Naghavi et al., 2020), departments

and corporate structures. In low-PDI countries will be more trusting and will consequently have more appetite for risk, namely in searching for new markets and development of new products. Listed companies in low power distance (PDI) countries are more exposed to risk (Gaganis et al., 2019) and consequently more pressured for disclosure of governance information (Mohamed Adnan et al., 2018). The defender strategy may fit with a more centralized style, based in planning and control. By opposite the prospector strategy incentive flexibility, creativity, and decentralization within organization.

Individualism

The degree of individualism of a culture reflects the “level of interdependence a society maintains among its members” (Hofstede, 2010). Considering that Prospectors tend to incentive new ideas, new products, and search for new markets, it may be expected that the greater the individualism in cultures, the greater the innovation capabilities. By contrast, Defenders tend to be more passive and focusing more on internal efficiency and prefer a stable market environment.

Masculinity

In a masculine (MAS) society, managers are expected to be competitive, and performance orientated. Prospectors tend to be more active (aggressive) in business since they seek new opportunities (prospect). On the other hand, Defenders focus mainly on their current markets or niche markets, instead of entering in new ventures or taking risks.

Uncertainty avoidance

Uncertainty avoidance (UAI) regards ambiguity aversion and a preference for predicable comfortable situations, namely in a context of listed companies that are more forced to monitoring and control this uncertainty. A country cultures with a strong uncertainty avoidance index reflect a need for rules, even though the rules never work properly. By contrast, a country culture with a weak UAI, emphasizes that there should exist a balance (equilibrium) of rules. Defender are more exposed to a control and planning environment, then Prospector.

Long-term orientation

Long term orientation (LTO) is connected with the sustainable development and persistence. Analyzers, since they have both characteristics of Prospectors and Defenders, they tend to follow longer-term planning. Prospectors tend also to fit within flexibility than with a strict planning orientation.

Indulgence

The degree of indulgence (IVR) is connected with the level of tolerance (permissive) or by opposite the level of restrictive practices or strict rules (restraint). In this sense, Defenders and Analyzers tend to be less flexible than Prospectors, since the later are more adaptable to change and foster creativity and innovation.

Based on the above, we propose the following research hypothesis:

H2: National culture moderates the strategy-performance linkage

3. Methodology

The population for this research consists of 853 companies listed across 17 European countries of the STOXX Europe Total Market Index (TMI). This index represents the largest European companies, and it is composed by 1.810 components of financial and non-financial sector that covers approximately around 95 percent of the free float market capitalization in Europe: Austria, Belgium, Poland, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. The final number of listed companies that constitute our sample represents around 47% of the total population. Financial services sector was excluded from our sample because of their regulatory and specific nature. The data sources are STOXX Index components and Datastream. Our final sample consisted of 853 listed firms headquartered in Europe from 2012 to 2019. Starting with the company name, sector, and country of the components of the STOXX, we retrieved ISIN codes from Datastream database and collect data from fundamentals finance information. The following table presents a breakdown of the final sample procedures:

Table 2.4 Sample

STOXX Europe Total Market	
<i>Components (as of date: Jan. 21, 2022)</i>	1810
Less financial sector and real estate sector	-384
Less missing data	-156
Less firms with double shares (A/B)	-30
Less missing data to construct strategy variable	-376
Less missing data for dependent variable	-11
Less residual country data	-8
Final Sample	853

Proxies for Strategy

In our studies we followed the next steps to capture the strategic orientation of the listed firms. Our first step is related to the operationalization of our composite measure based on five variables covering the three following dimensions of Miles and Snow's strategic framework: entrepreneurial, engineering and the administrative. The second step is to

capture the strategy consistency over the time. The main variables of our strategy composite is based on variables and procedures used in recent studies (Anwar et al., 2016; Bentley et al., 2013; Habib & Hasan, 2017; Kong et al., 2020). Following these studies to operationalize our strategy composite measure, we construct the following five indicators. Considering the first one, and to capture the firm propensity to explore new markets (Thomas & Ramaswamy, 1996), we employed a market efforts ratio, computed by the *ratio of selling, general and administrative expenses to sales* (Anwar & Hasnu, 2016b; Bentley et al., 2013), representing an entrepreneurial dimension. It's expected that Prospectors have a more significant market efforts than Defenders and Analyzers. To measure internal efficiency (production efficiency) we used the *ratio of cost of goods to sales* (Anwar & Hasnu, 2016b) , that is linked with firm efficiency (Lin et al., 2014). In this case, defenders are expected to be more focused on efficiency than Prospectors. In order to capture the growth orientation (grow pattern), we used a *compound annual sales growth ratio* (Anwar & Hasnu, 2016b) , five years based (Bentley et al., 2013). This measure points out the growth trend and it represents the entrepreneurial dimension. Concerning the commitment to technology efficiency we employed an asset efficiency ratio that consists on the *ratio of net property, plant, and equipment to total assets* (Anwar & Hasnu, 2016b; Bentley et al., 2013). At last, our fifth variable of the strategy composite is related to the propensity to search for new products, patents, and brands. Considering that some firms do not disclose properly and assertively R&D expenditure, we use net intangible assets, to construct the *ratio of net intangible assets to sales* (Kong et al., 2020; K. Wang et al., 2019), that represents firms propensity to search for new products. Net intangibles consist of patents, copyrights, franchises, trademarks, trade names, secret processes, and capitalized research and development costs. There is an increasing importance of maintaining levels of intangibles¹ for assuring a continuous and sustainable competitive advantage by entrepreneurs and managers (Jardón et al., 2018), enabling innovation in products and services in a more competitive market (Ferdaous & Rahman, 2019). Based on the above-mentioned studies, a scoring methodology was operationalized, to construct the strategy composite measure. In this way, all the previously mentioned variables are calculated using a rolling average over the previous

¹ Figure 2.5, Figure 2.6, in Appendix illustrate this tendency.

five years. Following previous research, strategy composite variables are ranked by quintiles (Bentley et al., 2013), where the highest quintiles are given a score of 5, while the lowest quintiles are given a score of 1. This method is applied to all strategy measures, except for the asset efficiency ratio (*net property, plant, and equipment to total assets*), where a reverse ranking is calculated. The final score results from the sum of the five variables. Following this procedure, firms were classified into strategic types as follows: defenders (5-11), analyzers (12-18) and prospectors (19-25). The highest strategy ranking score represents firms classified as prospector, and the lowest strategy ranking score represents those firms classified as defenders.

To operationalize and capture strategy orientation over the time, we followed a criteria based in a recent research (Anwar & Hasnu, 2016b, 2017b) and we extend from four to five points in time, to gain more consistency of analysis of final strategy type (Prospector, Analyzer, Defender or Reactor):

Table 2.5 Strategy consistency over time

<i>Time 1</i>	<i>Time 2</i>	<i>Time 3</i>	<i>Time 4</i>	<i>Time 5</i>
(2019-2015)	(2018-2014)	(2017-2013)	(2016-2012)	(2019-2012)
<i>rolling</i>	<i>rolling</i>	<i>rolling</i>	<i>rolling</i>	<i>Overall</i>
<i>PRO, ANL, DEF</i>	<i>PRO, ANL, DEF</i>	<i>PRO, ANL, DEF</i>	<i>PRO, ANL, DEF</i>	<i>PRO, ANL, DEF</i>

As we have mentioned, in this study strategy scores were calculated at five points in time, capturing the overall long-term strategic orientation of the firms, based on an eight-year average data (from 2012 to 2019), whereas the short and medium-term strategic orientation of the firms by taking into consideration the years 2016, 2017, 2018 and 2019. This procedure enables the identification of strategy consistency over the time and capturing in a dynamic way.

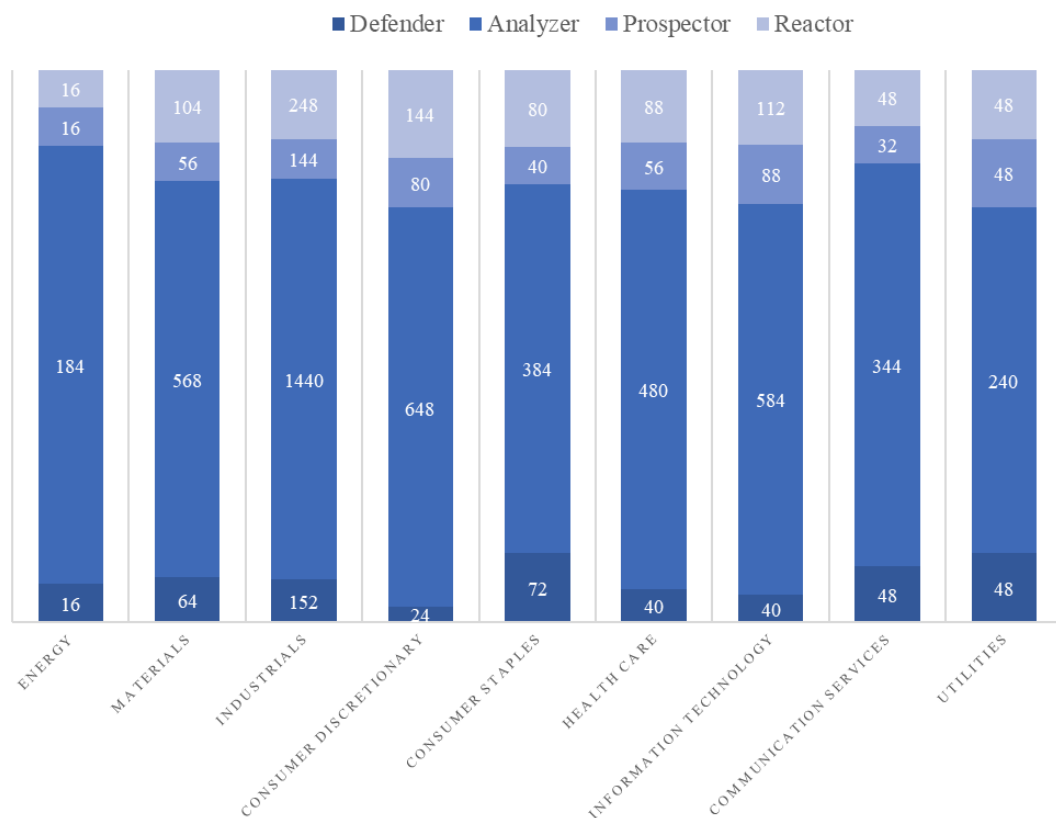
The final strategic classification is the result of the strategic orientation of each firm on those five points at time, allowing the identification of viable, consistent, flexible and reactor strategic types. Consistent with prior research (Anwar & Hasnu, 2016b), and in order to classify a firm having a viable strategy, it was applied the criteria that each firm must follow the same strategy in at least four times out of five, otherwise those firms are

classified as a reactor strategic type. Table 2.6 and figure 2.1, presents the following final classification and distribution by global industry classification standard (GICS).

Table 2.6 Strategy descriptive statistics (full-sample company-years)

Two-digit GICS	Defender		Analyzer		Prospector		Reactor		Full Sample	
	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%
10 Energy	16	3%	184	4%	16	3%	16	2%	232	3%
15 Materials	64	13%	568	12%	56	10%	104	12%	792	12%
20 Industrials	152	30%	1440	30%	144	26%	248	28%	1984	29%
25 Consumer Discretionary	24	5%	648	13%	80	14%	144	16%	896	13%
30 Consumer Staples	72	14%	384	8%	40	7%	80	9%	576	8%
35 Health Care	40	8%	480	10%	56	10%	88	10%	664	10%
45 Information Technology	40	8%	584	12%	88	16%	112	13%	824	12%
50 Communication Services	48	10%	344	7%	32	6%	48	5%	472	7%
55 Utilities	48	10%	240	5%	48	9%	48	5%	384	6%
Total (Company-years)	504	100%	4872	100%	560	100%	888	100%	6824	100%

Figure 2.1 Strategy descriptive statistics (full-sample company-years)



Proxies for National Culture (Cluster analysis)

To capture the national culture groups, we used the statistical technique of cluster analysis (Hair, 2010). Cluster analyses was performed under the Ward's linkage method. In Ward's methodology similarity is defined not by a single measure of distance but rather by the sum of squares within one cluster for all six variables (dimensions) that composed the national culture dimensions (Geert Hofstede, 2011).

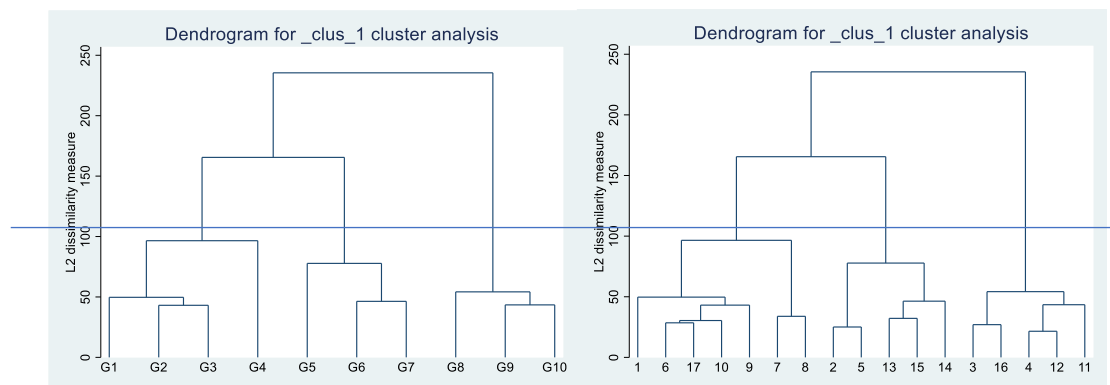
The following table presents a briefly statistical description of the six dimensions of Hofstede model national culture along the seventeen countries used to account for the national culture patterns, and scores:

Table 2.7 Description of National Culture Dimensions

Variable	Obs	Mean	Std. Dev.	Min	Max
PDI	17	41,47	17,40	11,0	68,0
IDV	17	66,24	13,69	27,0	89,0
MAS	17	45,41	24,52	5,0	79,0
UAI	17	63,53	23,84	23,0	99,0
LTO	17	53,19	18,18	24,4	82,9
IVR	17	54,58	14,95	29,2	77,7

In a first stage of our clusters analysis procedures, we performed in STATA 16 a graphical analysis (dendrogram) with 10 top and full branches, as presented in the following figure:

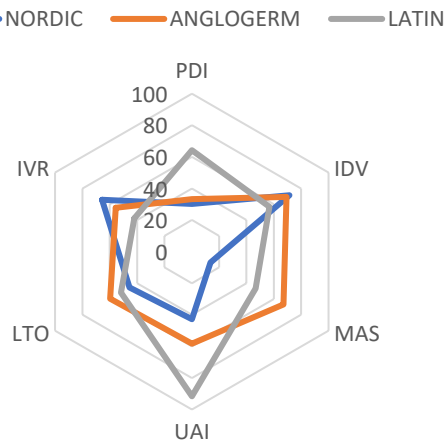
Figure 2.2 Dendrogram for cluster analysis



From a second stage and in order to select the most appropriate number of groups, we performed the Calinski–Harabasz pseudo-F stopping-rule index (Caliński & Harabasz, 1974), where the large values of the pseudo-F index ($F = 10.05$) indicated a distinct cluster

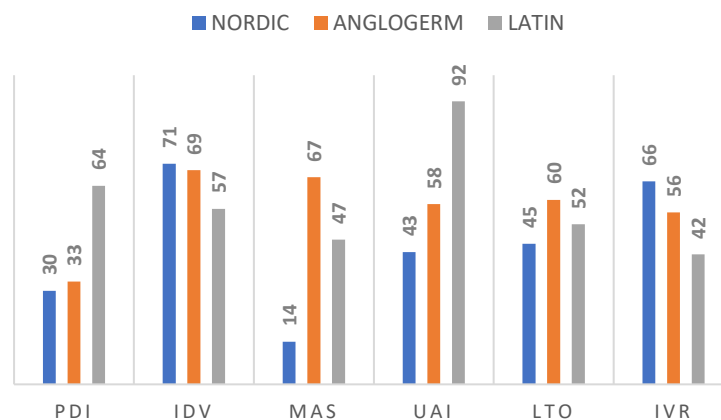
structure for three clusters. Figures 2.3 and 2.4, presents the national culture clustering results: NORDIC, ANGLOGERM and LATIN clusters.

Figure 2.3 National Culture clustering results



The first cluster (NORDIC) is characterized by a lower score on power distance and masculinity and higher scores for individualism and indulgence. The members of this cluster are the following: *Denmark, Finland, Netherlands, Norway, and Sweden*. The second cluster (ANGLOGERM) is characterized by a higher score on individualism, masculinity, long-term orientation, and lower scores for power distance. The members of this cluster are the following: *Austria, Germany, Italy, Ireland, Luxembourg, Switzerland, and United Kingdom*. The third cluster (LATIN) is characterized by a higher score on uncertainty avoidance and power distance and lower scores for masculinity, individualism, and indulgence. The members of this cluster are the following: *Belgium, France, Poland, Portugal, and Spain*.

Figure 2.4 National Culture clustering results (average scores)



Main Variables

The main variables of our studies are resumed in the following table. To measure firm performance, we used the variable Tobin's Q (market value divided by total assets) as a referential of market value perception of the value and sustainability of the listed companies. In line with other studies (Lin et al., 2014; M. Sollosy et al., 2015), we control for firm characteristics such as size, and leverage. Concerning firm size (SIZE), we applied the natural logarithm value of market capitalization to eliminate the effect of outliers (Aouadi & Marsat, 2018). To assess the risk (solvency) and capital structure we introduced the variable of leverage (LEVERAGE).

Table 2.8 Description of variables in the research model

<i>Dependent variable</i>	<i>Explanation</i>
QTOBIN	Firm performance, represented by natural logarithm of Tobin's Q: Tobin's Q = Market value / book value of total assets
<i>Strategy variables</i>	<i>Explanation</i>
PRO	Dummy variable equals 1 if Prospector strategy, and 0 otherwise
DEF	Dummy variable equals 1 if Defender strategy, and 0 otherwise
ANL	Dummy variable equals 1 if Analyzer strategy, and 0 otherwise
REACTOR	Dummy variable equals 1 if Reactor strategy, and 0 otherwise
<i>National Culture</i>	<i>Explanation</i>
NORDIC	Dummy variable equals 1 if NORDIC cluster, and 0 otherwise
LATIN	Dummy variable equals 1 if LATIN cluster, and 0 otherwise
ANGLOGERM	Dummy variable equals 1 if ANGLOGERM cluster, and 0 otherwise
<i>Firm Controls</i>	<i>Explanation</i>
SIZE	Natural logarithm of market capitalization (<i>winsorized</i>)
LEVERAGE	Leverage, total long-term debt/assets (unsystematic firm risk)

4. Econometric Model

The following five models were estimated to test the effect of national culture in the strategy and performance linkage.

Base Model

Performance = f (**Strategy; National Culture; Controls; error term**)

Model (1)

QTOBIN $it = \beta_1 + \beta_2 \text{ PRO } it + \beta_3 \text{ DEF } it + \beta_4 \text{ ANL } it + \text{Year Dummies} + \text{Sector Dummies} + uit$

Model (2)

QTOBIN $it = \beta_1 + \beta_2 \text{ PRO } it + \beta_3 \text{ DEF } it + \beta_4 \text{ ANL } it + \beta_5 \text{ LEVERAGE } it + \beta_6 \text{ SIZE } it + \text{Year Dummies} + \text{Sector Dummies} + uit$

Model (3)

QTOBIN $it = \beta_1 + \beta_2 \text{ PRO } it + \beta_3 \text{ DEF } it + \beta_4 \text{ ANL } it + \beta_5 \text{ NORDIC } it + \beta_6 \text{ LATIN } it + \beta_7 \text{ LEVERAGE } it + \beta_8 \text{ SIZE } it + \text{Year Dummies} + \text{Sector Dummies} + uit$

Model (4)

QTOBIN $it = \beta_1 + \beta_2 \text{ PRO } it + \beta_3 \text{ DEF } it + \beta_4 \text{ ANL } it + \beta_5 \text{ PRO } \times \text{NORDIC } it + \beta_6 \text{ PRO } \times \text{LATIN } it + \beta_7 \text{ DEF } \times \text{NORDIC } it + \beta_8 \text{ DEF } \times \text{LATIN } it + \beta_9 \text{ ANL } \times \text{NORDIC } it + \beta_{10} \text{ ANL } \times \text{LATIN } it + \beta_{11} \text{ LEVERAGE } it + \beta_{12} \text{ SIZE } it + \text{Year Dummies} + \text{Sector Dummies} + uit$

Model (5)

QTOBIN $it = \beta_1 + \beta_2 \text{ PRO } it + \beta_3 \text{ DEF } it + \beta_4 \text{ ANL } it + \beta_5 \text{ NORDIC } it + \beta_6 \text{ LATIN } it + \beta_7 \text{ PRO } \times \text{NORDIC } it + \beta_8 \text{ PRO } \times \text{LATIN } it + \beta_9 \text{ DEF } \times \text{NORDIC } it + \beta_{10} \text{ DEF } \times \text{LATIN } it + \beta_{11} \text{ ANL } \times \text{NORDIC } it + \beta_{12} \text{ ANL } \times \text{LATIN } it + \beta_{13} \text{ LEVERAGE } it + \beta_{14} \text{ SIZE } it + \text{Year Dummies} + \text{Sector Dummies} + uit$

Where,

“i” = 1 to 853 listed companies of STOXX Total Europe (TMI) and “t” index for the years 2012 to 2019

5. Results

Table 2.9 provides the descriptive statistics, namely the mean, standard deviation, and percentiles for each variable (50th percentile and interquartile range). Tobin's Q has a mean of 1.3 (median = 0.87) within an interquartile range (25-75) of 1.09 and at upper quartile (75) of 1.57.

Table 2.9 Descriptive statistics

variable	mean	p50	iqr	p25	p75	cv	sd	N
QTOBIN	1.302807	.8650549	1.093579	.4794452	1.573024	1.125214	1.465937	6824
PRO	.0820633	0	0	0	0	3.34475	.2744813	6824
DEF	.073857	0	0	0	0	3.541401	.2615572	6824
ANL	.7139508	1	1	0	1	.633021	.4519458	6824
REACTOR	.130129	0	0	0	0	2.585665	.3364699	6824
LEVERAGE	.1673197	.1534436	.1935234	.0541785	.2477019	.8079165	.1351804	6824
SIZE	7.419161	7.386527	2.401909	6.244776	8.646685	.2437458	1.808389	6824
ANGLOGERM	.4618992	0	1	0	1	1.079419	.4985827	6824
LATIN	.2872216	0	1	0	1	1.575435	.452499	6824
NORDIC	.2508792	0	1	0	1	1.728126	.4335509	6824

In order to check the presence of multicollinearity we have performed the variation inflation factors (VIF), and results were within the limit of 10 and the post estimation mean of VIF = 3.66 (Hair et al., 2010; Mansfield et al., 2016). Since in our model we have time-invariant cultural dimensions (e.g., clusters of national culture), these types of variables will be omitted in a fixed effects model (Wooldridge, 2002), and in this way, we will use a random effects model with robust standard errors in the regression analysis, enabling to assess the moderating effect of national culture in the relationship between strategy and firm performance (Gaganis et al., 2019; Zheng et al., 2012). The Breusch–Pagan Lagrange Multiplier (LM) test between random effects (RE) and pooled OLS pointed out that the random effects model is more appropriate for our study. We add the option ‘robust’ in STATA 16 to control for heteroskedasticity (White, 1980; Ye & Sun, 2018). We included a set of eight-year dummies from 2012 to 2019, with 2012 as the base year, to capture year effects and macro-economic fluctuations and also a set of nine GICS (*global industry classification standard*) sectors to capture industry effects. The results

of panel data regressions are presented in table 2.10, that reports the regression coefficients estimates for the overall models and in table 2.11 with hypothesis results, as follows:

Table 2.10 Regression results

VARIABLES	Model 1 QTOBIN	Model 2 QTOBIN	Model 3 QTOBIN	Model 4 QTOBIN	Model 5 QTOBIN
PRO	0.241** (0.117)	0.302* (0.176)	0.284* (0.172)	0.329* (0.193)	0.631*** (0.214)
DEF	-0.159 (0.122)	-0.447*** (0.163)	-0.415*** (0.160)	-0.720*** (0.186)	-0.424** (0.208)
ANL	-0.104 (0.078)	-0.298** (0.120)	-0.258** (0.116)	-0.415*** (0.130)	-0.113 (0.159)
LEVERAGE		-1.072*** (0.104)	-1.073*** (0.104)	-1.068*** (0.104)	-1.071*** (0.104)
SIZE		0.620*** (0.014)	0.619*** (0.014)	0.620*** (0.014)	0.621*** (0.014)
LATIN			0.124 (0.097)		0.105 (0.278)
NORDIC			0.421*** (0.092)		0.864*** (0.222)
PRO x NORDIC				0.422* (0.248)	-0.439 (0.334)
PRO x LATIN				-1.032** (0.422)	-1.132** (0.507)
DEF x NORDIC				0.247 (0.279)	-0.610* (0.359)
DEF x LATIN				0.880*** (0.264)	0.778** (0.386)
ANL x NORDIC				0.322*** (0.116)	-0.541** (0.251)
ANL x LATIN				0.156 (0.112)	0.051 (0.301)
Year Dummies Effects	Yes	Yes	Yes	Yes	Yes
Sector Dummies Effects	Yes	Yes	Yes	Yes	Yes
Constant	-0.936*** (0.132)	-5.359*** (0.235)	-5.523*** (0.235)	-5.371*** (0.227)	-5.661*** (0.260)
Observations	6,824	6,824	6,824	6,824	6,824
Number of ID	853	853	853	853	853

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Following we present the estimation results. Business strategy impact significantly on firm performance, in overall models. Findings indicate that companies that pursue a

prospector strategy characteristic, outperform companies with the other strategy characteristics. This strategy dimension is related to strong market orientation and its impact is significant when assessing the market perception of strategy, by QTOBIN performance measure.

When capturing the short-term effects of the markets by the profitability of shares, this tendency it is confirmed, and it becomes statistically significant in QTOBIN models, which capture the market perception and the orientation of the managers to deal with constant market pressure and stocks price. Our findings reveal that firms with a prospector strategy type have a higher firm value.

Table 2.11 Hypothesis Results

Hypothesis	Results
<i>H 1</i> : Business Strategy has a significant impact on firm performance	Supported
<i>H 2</i> : National culture moderates the strategy-performance linkage	Supported

Consistent with our predictions, our clusters of national culture are significant and assume a preponderance on firm performance. The results included in model 4 to model 5 indicate a significant moderating role for national culture clusters in the relation between strategy and performance. The Nordic cluster (NORDIC), that is characterized by a lower score on power distance and masculinity and higher scores for individualism and indulgence, has a positive impact in models 3 and 5. The Latin cluster (LATIN), that is characterized by a higher score on uncertainty avoidance and power distance and lower scores for masculinity, individualism, and indulgence, it is not significant in model 3.

In model's 4-5, we present the interaction effects of clusters of national culture in the strategy-performance relationship. Our findings reveal that Latin cluster (LATIN) has a significant positive effect in Defender strategy type. Defenders under these cultures are

more suitable to fit properly since they search for stability and maintaining their position with the current markets and products, avoiding high-risk business or expansions.

Model 3 reveals that cultures with low individualism such as presented in Latin cluster (LATIN) have not a significant influence on firm performance. When assessing the interaction effects of the Nordic cluster (NORDIC) within Analyzers will be negatively impact on firm value, as observed in model 5.

Analyzers are in the mid between Prospectors and Defenders. The organization with this strategy type is characterized by a hybrid domain (duality: stable and changing).

At the firm level controls and concerning the dimension of the firms (SIZE), reveals a significant impact on firm performance, in the overall models. In relation to the financial stability and overall riskiness (LEVERAGE) of the listed companies presented in our models, results point out a significant impact on firm value.

6. Conclusions and Future Research

The aim of this study is to investigate the importance of strategic orientation and national culture on firm performance. One of the main contributions of this study fall on the sample of 853 European listed companies across 17 countries representing the largest European sample with a great diversity of countries and industries and data collection over eight years.

Another specificity of this research is the introduction of the *market perception of firm performance* (measured by QTOBIN) for a better understanding of the strategy-performance linkage.

This study contributes to the literature on the assertion of the impact of national culture on firm performance, where national culture plays a relevant role at strategy level (Kaul, 2019) and influence firms proactive behaviour and risk (Kreiser et al., 2010).

Results stress that national culture values and beliefs have an influence on firm performance, moderating the strategy-performance linkage. Findings pointed out that

Latin cluster and Nordic cluster moderate significantly the relation of strategy on firm value (performance).

This study also provides brief recommendations for managers and also relevant policy implications. Acting in a global market, managers and investors should be aware of strategic behaviour since companies with different strategy orientation behave differently in the continuous adaptation to external environment and market dynamics.

Regarding the policy front, suggestions with respect to the increase of the levels of sustainability concerns and practices, at firm and country level, findings may suggest that prospectors' characteristics may represent the gain of a sustainable competitive advantage between companies and within different countries.

In future research, the development of the strategy proxies, namely the scoring methodology, may be another important development theme to study.

7. Appendix

Figure 2.5 Intangible's evolution (net intangibles)

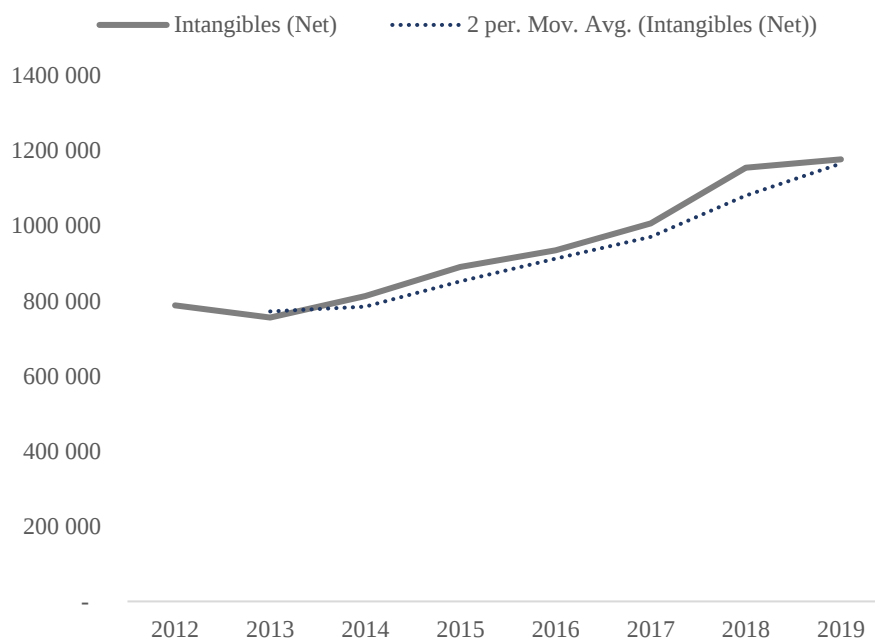


Figure 2.6 IAS (net intangibles on Sales) evolution

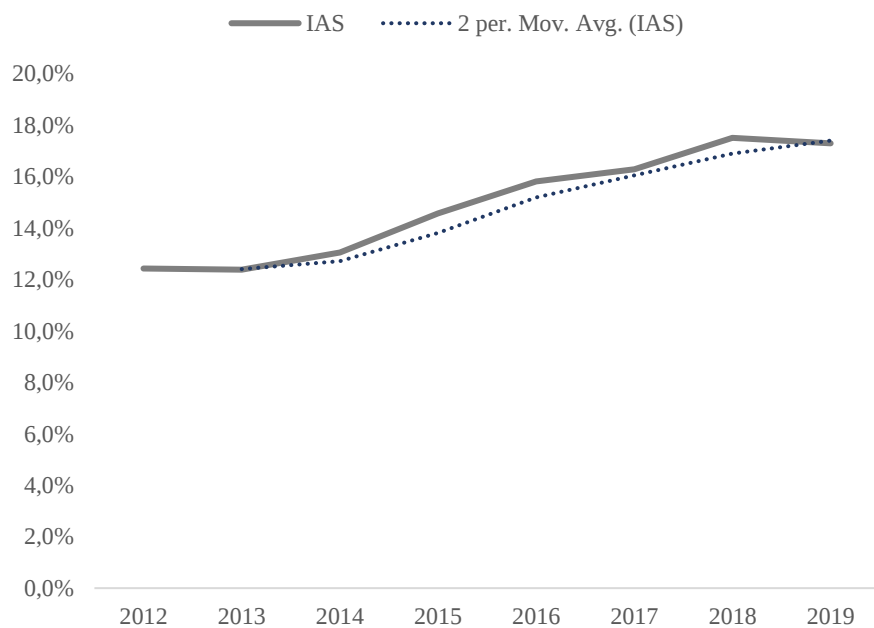


Table 2.12 Hofstede dimensions for countries

country	PDI	IDV	MAS	UAI	LTO	IVR
Austria	11	55	79	70	60	63
Belgium	65	75	54	94	82	57
Denmark	18	74	16	23	35	70
Finland	33	63	26	59	38	57
France	68	71	43	86	63	48
Germany	35	67	66	65	83	40
United Kingdom	35	89	66	35	51	69
Ireland	28	70	68	35	24	65
Italy	50	76	70	75	61	30
Luxembourg	40	60	50	70	64	56
Netherlands	38	80	14	53	67	68
Norway	31	69	8	50	35	55
Poland	68	60	64	93	38	29
Portugal	63	27	31	99	28	33
Spain	57	51	42	86	48	44
Sweden	31	71	5	29	53	78
Switzerland	34	68	70	58	74	66

Source: <https://www.hofstede-insights.com/fi/product/compare-countries/>

Table 2.13 Descriptive statistics and correlations

	QTOBIN	PRO	DEF	ANL	LEVERAGE	SIZE	LATIN	NORDIC
QTOBIN	1.0000							
PRO	0.1013*	1.0000						
DEF	-0.0497*	-0.0844*	1.0000					
ANL	-0.0607*	-0.4724*	-0.4461*	1.0000				
LEVERAGE	-0.2832*	0.0022	0.1257*	-0.0689*	1.0000			
SIZE	0.1474*	-0.0611*	0.0633*	0.0427*	0.2345*	1.0000		
LATIN	-0.1915*	-0.0671*	-0.0307*	0.0521*	0.0077	-0.1043*	1.0000	
NORDIC	0.1349*	0.0930*	0.0020	-0.1004*	-0.0664*	-0.1087*	-0.3674*	1.0000

Pearson correlation matrix. *Significance at 5% level

Table 2.14 Panel Regression results (including Year and GICS Sector Dummies effects)

VARIABLES	Model 1 QTOBIN	Model 2 QTOBIN	Model 3 QTOBIN	Model 4 QTOBIN	Model 5 QTOBIN
PRO	0.241** (0.117)	0.302* (0.176)	0.284* (0.172)	0.329* (0.193)	0.631*** (0.214)
DEF	-0.159 (0.122)	-0.447*** (0.163)	-0.415*** (0.160)	-0.720*** (0.186)	-0.424** (0.208)
ANL	-0.104 (0.078)	-0.298** (0.120)	-0.258** (0.116)	-0.415*** (0.130)	-0.113 (0.159)
LEVERAGE		-1.072*** (0.104)	-1.073*** (0.104)	-1.068*** (0.104)	-1.071*** (0.104)
SIZE		0.620*** (0.014)	0.619*** (0.014)	0.620*** (0.014)	0.621*** (0.014)
LATIN			0.124 (0.097)		0.105 (0.278)
NORDIC			0.421*** (0.092)		0.864*** (0.222)
PRO x NORDIC				0.422* (0.248)	-0.439 (0.334)
PRO x LATIN				-1.032** (0.422)	-1.132** (0.507)
DEF x NORDIC				0.247 (0.279)	-0.610* (0.359)
DEF x LATIN				0.880*** (0.264)	0.778** (0.386)
ANL x NORDIC				0.322*** (0.116)	-0.541** (0.251)
ANL x LATIN				0.156 (0.112)	0.051 (0.301)
2013.YEAR	0.233*** (0.012)	0.084*** (0.007)	0.085*** (0.007)	0.084*** (0.007)	0.084*** (0.007)
2014.YEAR	0.216*** (0.016)	0.034*** (0.009)	0.035*** (0.009)	0.034*** (0.009)	0.034*** (0.009)
2015.YEAR	0.314*** (0.021)	0.027** (0.012)	0.027** (0.012)	0.027** (0.012)	0.027** (0.012)
2016.YEAR	0.323*** (0.020)	-0.006 (0.013)	-0.005 (0.013)	-0.006 (0.013)	-0.006 (0.013)
2017.YEAR	0.440*** (0.022)	0.010 (0.015)	0.010 (0.015)	0.010 (0.015)	0.009 (0.015)
2018.YEAR	0.214*** (0.024)	-0.122*** (0.015)	-0.121*** (0.015)	-0.122*** (0.015)	-0.122*** (0.015)
2019.YEAR	0.275*** (0.026)	-0.131*** (0.017)	-0.131*** (0.017)	-0.132*** (0.017)	-0.132*** (0.017)
Materials	0.412*** (0.131)	0.664*** (0.212)	0.678*** (0.205)	0.651*** (0.202)	0.645*** (0.207)
Industrials	0.482*** (0.121)	1.027*** (0.195)	1.012*** (0.189)	1.029*** (0.186)	1.018*** (0.191)
Consumer Discretionary	0.731*** (0.136)	1.110*** (0.218)	1.135*** (0.211)	1.149*** (0.209)	1.123*** (0.214)
Consumer Staples	0.736*** (0.137)	0.822*** (0.224)	0.808*** (0.215)	0.832*** (0.208)	0.814*** (0.211)
Health Care	1.276*** (0.138)	1.685*** (0.235)	1.666*** (0.226)	1.714*** (0.226)	1.662*** (0.228)
Information Technology	0.934*** (0.132)	1.866*** (0.210)	1.851*** (0.202)	1.844*** (0.199)	1.817*** (0.204)
Communication Services	0.517*** (0.144)	0.807*** (0.245)	0.818*** (0.237)	0.815*** (0.235)	0.807*** (0.239)
Utilities	-0.260* (0.133)	-0.177 (0.247)	-0.096 (0.242)	-0.089 (0.237)	-0.078 (0.241)
Constant	-0.936*** (0.132)	-5.359*** (0.235)	-5.523*** (0.235)	-5.371*** (0.227)	-5.661*** (0.260)
Observations	6,824	6,824	6,824	6,824	6,824
Number of ID	853	853	853	853	853

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Chapter 3. Strategy and performance linkage under uncertainty and national innovation capabilities: A quantile regression analysis of European listed companies

1. Introduction

There is a strong consensus that innovation drives economic growth and enables the gain of competitive advantages of countries and firms, respectively (Menna et al., 2019). Governments are doing considerable investments to promote innovation in order to achieve a sustainable economic and social development (GII, 2022). Consequently, economies are more than ever focusing their growth strategies based on innovation. Despite environment uncertainty, firm's business strategy are continuously adapting to this context (Bayraktar et al., 2017), prospecting for new opportunities and increasing sharply innovations expenditures.

Notwithstanding the evolution of innovation levels of the majority of countries, there is still a gap between economies innovation outputs (GII, 2022), which translates into the existence of countries with greater or lesser innovation capabilities. Moreover, recent research stressed the importance of sustainability innovation initiatives would have positive impacts on firm financial performance when such initiatives enable the fit between the firm and its business environment. (Cavaleri & Shabana, 2018).

To achieve a better performance firms, tend to be more adaptable to the context and align constantly its strategic orientation, resulting in a proper fit with its external environment (Parnell, Lester, et al., 2012). The firm's environment uncertainty, and countries innovation capabilities context and business conditions may enable certain firms strategically gain a competitive advantage.

In our study, we operationalize the main business strategy types based on Miles and Snow framework (Miles et al., 1978) which allowed the classification of firms strategic orientation over a period of time (*dynamic view of strategy orientation*), as prospectors,

who see the environment as dynamic and uncertain (Parnell, Lester, et al., 2012), analysers that are considered simultaneous mix of both (*prospector and defenders*) and defenders that have a strong focus on efficiency (Desarbo et al., 2005), which are presented in the next sections. With this research we intend to carry out an analysis of the strategic behaviour of listed companies in an environment of uncertainty and in a context of dynamism (national innovation capabilities).

By assessing the strategic behaviour of STOXX firms and at different levels of firm performance (different quantiles of market performance), our study contributes to the exploration of the better adaptative capacity that this European firms may have thoroughly different context conditions, understanding in that way which strategy stands out the most.

Another important contribution of this study is to explore the interaction of strategy under uncertainty, and consequently that effect on firm performance.

The main research question of this study is:

RQ: Does business strategy have a significant effect on firm performance under uncertainty and national innovation capabilities?

The following section of this study focuses on the theoretical literature review of the strategy and performance relationship hypothesis in the context of uncertainty and national innovation capabilities. The next section focuses on methodology (data, sample, and quantitative models), followed by the results of model's estimations.

In the final section of this research, we then discuss the theoretical assumptions, practical implications, policy implications, limitations, followed by a set of conclusions.

2. Literature review and research hypothesis

2.1 Business Strategy

Strategy has been considered crucial to enable the achievement of goals, performance results and business sustainability. Business strategy may vary from an organization and managers perceptions of the environment, thus conditioning how to take advantage of the business context, namely under uncertainty and market turbulence (M. Sollosy et al., 2015).

The strategic typology considered in our research derives from by Miles and Snow framework (Miles et al., 1978; Snow & Hrebiniak, 1980), that classifies firms into four archetypes of consistent and inconsistent behaviour of strategy, namely, Defender, Analyzer, Prospector, and Reactor (*Miles et al., 1978*).

The strategic decision of managers is based on how they find a solution to respond to the three main “problems” of organizational adaptation: entrepreneurial problems related to product and market domain, engineering problems focuses on technology adoption, and administrative problems linked to structure and process (Smith et al., 1986). In this sense and according to the strategic types mentioned above, prospectors tend to be more capable in searching and exploiting new product and market opportunities, namely in a dynamic context and uncertainty environment (L. Song et al., 2016). This strategic type seeks a constant changing environment and requires a high degree of flexibility, choosing innovation over efficiency and adapting better to market risk and volatility.

Several recent studies support this strategic pattern of prospectors (Habib & Hasan, 2017; Lopo Martinez & Ferreira, 2019). This strategic orientation is commonly referred as market makers or pioneers. Prospectors tend to leverage change in the industry and develop a competitive value proposition (Olson et al., 2005). Defenders are by nature protectors. They focused mainly on the efficiency of internal process and in maintaining current markets, by protecting their position (in current markets) to prevent competition in the markets where they maintain business operations. Analysers present a hybrid domain combining a mix of characteristics of defenders and prospectors. They seek to minimize the risk of operations and pursue a superior performance. This hybrid behaviour

enables the maximization of current markets and the development of new opportunities (Pertusa-Ortega et al., 2009). Reactors are categorized by an undefined strategy, as they react on an unpredictable way to change and market uncertainty. Considering the three viable business strategies from *Miles and Snow*, table 3.1 presents a summary of the following characteristics:

Table 3.1 Business Strategy, Uncertainty, Technology, and Innovation domain

	Defenders	Analyzers	Prospectors
Strategy	Cost-leadership strategy	Hybrid Domain	Generating new products, change maker (innovation)
Market	Low product development and related to current products	Steady growth through market penetration and market development	High Product and market development
Uncertainty	Risk aversion	Moderate Risk	Risk taker
Technology/ Innovation	Efficiency and stability	Stability and flexibility	Market innovation

Source: based on Miles and Snow (1978)

2.2 Strategic Behaviour and Uncertainty

The unpredictability of markets, changes in the market structure, changes in consumer patterns, and changes in the level of competition (L. Song et al., 2016) increase the degree of uncertainty. High market uncertainty forces firms to be more adaptive to environmental changes (Desarbo et al., 2005). To adapt and adjust to these environmental change's firms may have to develop more efficiently their current markets, or change and explore new ones (Marc Sollosy et al., 2019). Other recent study pointed out that environmental uncertainty is often driven by high competition and the unpredictable time to market of new technology or innovations (Kafetzopoulos et al., 2019). The change or variability in the firms external environmental increases complexity in management strategic orientation, and increases unpredictability of future events. (Fernandes & Solimun, 2017).

Firm performance is influenced effectively and efficiently by business strategy (Olson et al., 2005).

Recent studies find that under highly uncertain conditions, prospector strategy has a better fit in the strategy performance linkage, than defender and analyzers strategies (Arieftiara et al., 2017, 2020). We expect that prospector firms, as they tend to see environment as dynamic and uncertain (Parnell, Lester, et al., 2012), to perform better than defenders, namely for two reasons. Firstly, since they have a better adaptable capacity since they seek for change and explore new market opportunities, and secondly a more risk-taking propensity and openness to innovation.

2.3 National Innovation capabilities

In the last two decade we assisted a growing interest in the study of national innovation capabilities (national innovation system), and its impact on international competitiveness (Lundvall, 1998; Maloney, 2017; X. Wang et al., 2020). Behind the concept of the national innovation system (Schmid & Wang, 2017), is the intention that it can enhance national political strategies for a more sustainable and competitive environment (Chaminade, C., Lundvall, B-A., & Haneef, 2018). This growing significance for the national innovation capabilities enable the development of the necessary key conditions (Menna et al., 2019), to increase the attractiveness and competitiveness of a country (Watkins et al., 2015), fostering change and challenging the strategic behaviour of companies, namely those listed on the stock exchange, which have a higher degree of demand by their investors' namely, in terms of their performance and return (Samara et al., 2012).

Recent studies stated that a prospective and innovative company tends to be more flexible, and more easily adaptable to the business environment, enabling opportunities better than competitors (Kafetzopoulos et al., 2019). As external environmental conditions tend to be dynamic, we postulate that the national country innovative capabilities contribute to increase competitiveness and firm performance (Sohn et al., 2016). To operationalize the innovation capability of each country we introduced the Global Innovation Index (GII), using yearly innovation score (*GII*, 2022). It is expected

that prospector firms in a context of high national innovation capabilities have higher levels of performance than defenders.

Based on the above, we propose the following research hypothesis:

H1. In a highly uncertain and dynamic environment, prospector or defender strategy outperform the analyzer strategy.

H2: Uncertainty has a negative influence on firm performance

H3: National innovation capabilities have a positive influence on firm performance

H4: Business strategy positively and significantly moderates the impact of uncertainty on firm performance

3. Methodology

3.1 Data and descriptive statistics

The study sampled 865 listed companies across European countries of the STOXX Europe Total Market Index (TMI). This index represents the largest European companies and it's composed by 1.810 components of financial and non-financial sector that covers approximately around 95 percent of the free float market capitalization in Europe, namely Austria, Belgium, Poland, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. The final number of listed companies that constitute our sample represents around 47% of the total population. Financial services sector was excluded from our sample because of their regulatory and specific nature (Bentley et al., 2013). The data sources are STOXX Index components and Datastream. Our final sample is composed of listed firms headquartered in Europe, constituting 47,8% of the total population. Financial services sector was excluded from our sample. Using GICS classification (*global industry classification standard*), table 3.2 presents the composition

and distribution of firms by business sector, where we can observe that the Industrials and Materials sector represents the majority, which is around forty percent of the total sample.

Table 3.2 Distribution of firms by sector

Sector Name (GICS)	Companies	%
Communication Services	59	7%
Consumer Discretionary	117	14%
Consumer Staples	73	8%
Energy	31	4%
Health Care	83	10%
Industrials	252	29%
Information Technology	103	12%
Materials	99	11%
Utilities	48	6%
Total	865	100%

The data sources are STOXX Index components, Amadeus, Datastream, and Morningstar, constituting a final number of 4.325 observations, for the years 2015 to 2019. Starting with the company name, sector, and country of the components of the STOXX, we retrieved ISIN codes and collect data from Datastream (fundamentals finance data). The following table, presents a breakdown of the final sample procedures:

Table 3.3 Sample procedures

STOXX Europe Total Market	
<i>Components (as of date: Jan. 21, 2022)</i>	1810
Less financial sector and real estate sector	-384
Less missing data	-154
Less firms with double shares (A/B)	-30
Less missing data to construct strategy variable	-376
Less missing data for dependent variable	-11
Final Sample	865

3.2 Strategy Measures

To capture the strategic orientation of the listed firms, we proceed by the operationalization of our composite measure covering the Miles and Snow's dimensions. The main variables of our strategy composite is based on variables used in recent studies

(Anwar et al., 2016; Bentley et al., 2013; Habib & Hasan, 2017; Kong et al., 2020). Following these studies and to operationalize our strategy composite measure, we construct the following five indicators.

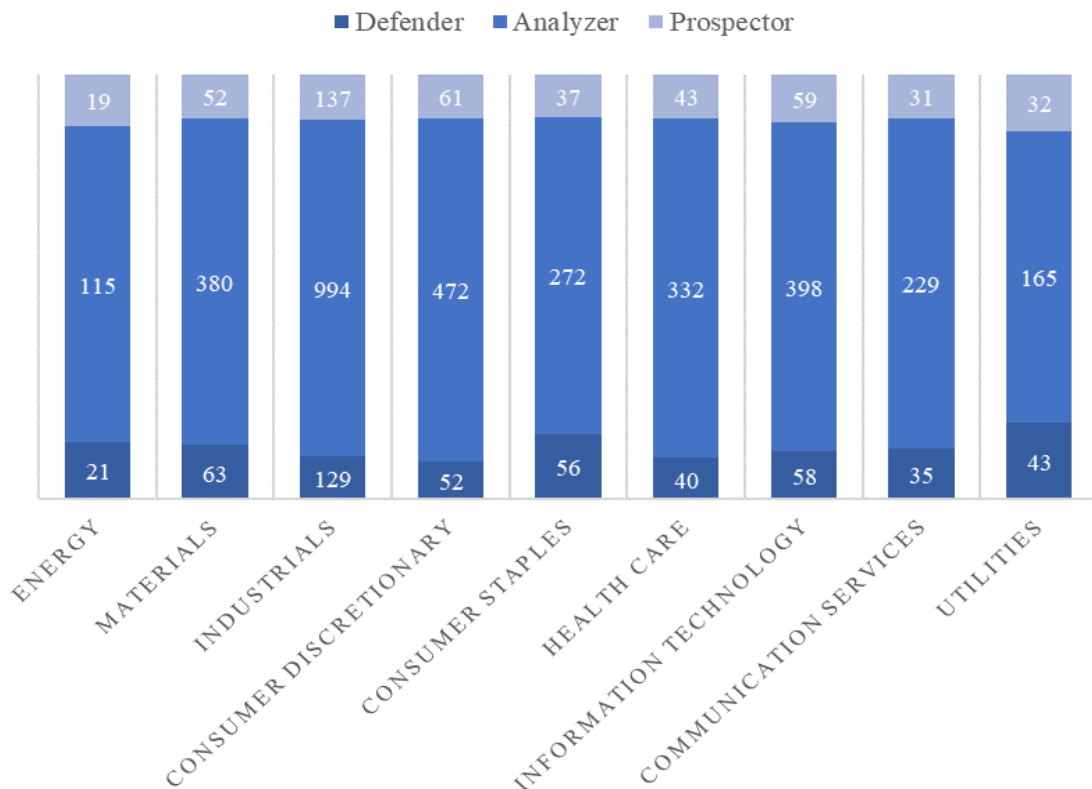
Firstly, and to capture the firm propensity to explore new markets (Thomas & Ramaswamy, 1996), we employed a market efforts ratio, computed by the *ratio of selling, general and administrative expenses to sales* (Anwar & Hasnu, 2016b; Bentley et al., 2013), representing an entrepreneurial dimension. As mentioned previously, it's expected that Prospectors have a more significant market efforts than Defenders and Analyzers. Then, to measure internal efficiency (production efficiency) we used the *ratio of cost of goods to sales* (Anwar & Hasnu, 2016b), that is linked with firm efficiency (Lin et al., 2014), where it's expected that defenders will be more focused than prospectors. Concerning the growth pattern, that represents the entrepreneurial dimension, we used a *compound annual sales growth* (Anwar & Hasnu, 2016b), five years based (Bentley et al., 2013). In relation to the commitment to technology efficiency we employed an asset efficiency ratio that consists on the *ratio of net property, plant, and equipment to total assets* (Anwar & Hasnu, 2016b; Bentley et al., 2013). Finally, our last variable intends to capture the propensity to search for new products, patents, and brands, measured by the *ratio of net intangible assets to sales* (Kong et al., 2020; K. Wang et al., 2019). Based on the above-mentioned studies, a scoring methodology was operationalized, to construct the strategy composite measure. In this way, all the five variables are calculated using a rolling average over the previous five years. Following previous research, strategy composite variables are ranked by quintiles (Bentley et al., 2013), where the highest quintiles are given a score of 5, while the lowest quintiles are given a score of 1. This method is applied to all strategy measures, except for the asset efficiency ratio (*net property, plant, and equipment to total assets*), where a reverse ranking is calculated. The final score results from the sum of the five variables. Following this procedure, firms were classified into strategic types as follows: defenders (5-11), analyzers (12-18) and prospectors (19-25). The highest strategy ranking score represents firms classified as prospector, and the lowest strategy ranking score represents those firms classified as defenders.

The following table and figure 3.1, presents the strategy distribution by GICS sector:

Table 3.4 Strategy descriptive statistics (full-sample company-years)

Two-digit GICS	Defender		Analyzer		Prospector		Full Sample	
	Nr.	%	Nr.	%	Nr.	%	Nr.	%
10 Energy	21	4%	115	3%	19	4%	155	4%
15 Materials	63	13%	380	11%	52	11%	495	11%
20 Industrials	129	26%	994	30%	137	29%	1260	29%
25 Consumer Discretionary	52	10%	472	14%	61	13%	585	14%
30 Consumer Staples	56	11%	272	8%	37	8%	365	8%
35 Health Care	40	8%	332	10%	43	9%	415	10%
45 Information Technology	58	12%	398	12%	59	13%	515	12%
50 Communication Services	35	7%	229	7%	31	7%	295	7%
55 Utilities	43	9%	165	5%	32	7%	240	6%
	497	100%	3357	100%	471	100%	4325	100%

Figure 3.1 Strategy descriptive statistics (full-sample company-years)



3.3 Uncertainty Measure

As a measure of uncertainty and in order to capture the external environment of a business, and following previous studies, we used a composition of three variables as a proxy of uncertainty (EUC), as follows: market uncertainty, technological uncertainty and income uncertainty (Gordon et al., 2009; Kren, 1992).

Market uncertainty indicates changes in consumer tastes, measured by the coefficient of variation of sales (Arieftiara et al., 2017; Habib et al., 2011; Johnson et al., 2015). Technological uncertainty indicates the rate of technological change and is measured by the coefficient of variation of the sum of R&D and capital expenditures divided by total assets. The income uncertainty indicates income volatility measured by the coefficient of variation of net income.

The coefficient of variation is calculated for the period of 2015-2019, based on five previous years including the current year (using historical data ranging from the period of 2011 to 2019).

Following the above-mentioned studies, we construct the composite measure of EUC (natural logarithm of the sum of coefficient of variation of market, coefficient of variation of technological and coefficient of variation of income), that is calculated as follows (Gordon et al., 2009).

$$CV(X_{k,n}) = \frac{\sqrt{\sum_{n=1}^5 \frac{(Z_{K,n} - \bar{Z}_K)^2}{5}}}{[\bar{Z}_K]}$$

Where, CV represents the coefficient of variation of each k uncertainty measure in year n (*market, technological or income uncertainty*), Z is the k measure uncertainty firm observations in year n , and $\bar{Z}_K$ is the mean over a 5 year-period of the respective k measure of uncertainty.

3.4 National Innovation Measure

The Global Innovation Index (GII) ranks the innovation performance (innovation capabilities) of nearly 130 economies around the world and it compares the performance of national innovation capabilities across economies (Dutta et al., 2018). GII is composed by five pillars under the input sub-index and two output sub-index.

The analysis of innovation capability of each country is based on factors of each economy that enable innovative activities, including the following: institutions, human capital and research, infrastructure, market sophistication, business sophistication, knowledge and technology outputs and creative outputs. Using the dimensions of GII we composed year scores between 2015-2019 for each country in our sample (*GII*, 2022; World Bank, 2022).

3.5 Main Variables

The main variables of our study are resumed and presented in the following table 3.4. To measure firm performance, we used the variable Tobin's Q (QTOBIN) as a referential of firm performance, enabling to capture the market perception of the listed firms (Aleksic & Rasic, 2016; Asdemir et al., 2013; Salavou, 2013; Tavalaei & Santalo, 2019) .

In line with other studies (Lin et al., 2014; Marc Sollosy et al., 2019), we control for firm characteristics such as size and leverage. Firm's size representing the size of the firm can be measured by number of employees, sales, assets, market capitalization.

Concerning the dimensions of firms and the ability of taking advantage of economies of scale, namely for large firms, we include assets as a measure of firm size (SIZE) to control. To assess the risk (long term liquidity risk) and capital structure we introduced the variable of leverage (LEV).

Table 3.5 Description of variables in the research model

<i>Dependent variable</i>	<i>Explanation</i>
QTOBIN	Firm performance, represented by Tobin's Q: Natural logarithm of Tobin's Q = Market value / book value of total assets
<i>Strategy variables</i>	<i>Explanation</i>
Analyzer	Dummy variable, represents Analyzer strategy type
Defender	Dummy variable, represents Defender strategy type
Prospector	Dummy variable, represents Prospector strategy type
Strategy	Higher STRATEGY score represents firms with Prospector strategies, and lower scores represent firms with Defender strategies
<i>Context variables</i>	<i>Explanation</i>
EUC	Environmental Uncertainty Composite
GII	Country Innovation capabilities is based on Global Innovation Index (index year data from 2015-2019)
<i>Control variables</i>	<i>Explanation</i>
SIZE	Natural logarithm of total assets
LEVERAGE	Total debt/equity (unsystematic firm risk)

4. Econometric Models

The following section presents the main characteristics of the quantile regression (QR) approach operationalized in this study. This procedure is different from the conventional ordinary least squares regressions (OLS). Quantiles are “robust” measures of location and are estimated using a “robust” estimator (Koenker, 2004; Koenker & Bassett, 1978). In the model estimations, beyond the OLS, fixed and random effects method with robust standard errors, we undertook a quantile estimation (quantile regression), because this procedure (Canay, 2011) has a main advantage since it can provide a better detailed information, namely to evaluate firm performance at different levels (Chernozhukov & Hansen, 2008). This allowed to complement our analysis with a better understanding of the linkage between strategy and firm performance, analysing the effect of the explanatory variables at various quantiles of conditional performance distribution (Gallego-Álvarez & Ortas, 2017), at different performance levels (*low levels to high levels*).

Follows the base model and interaction models that will be estimated:

(1)

$$\mathbf{Qq} \text{ (QTOBIN)}_{it} = \beta_{0it}(q) + \beta_{1(q)} \mathbf{PROSPECTOR}_{it} + \beta_{2(q)} \mathbf{DEFENDER}_{it} + \beta_{3(q)} \mathbf{EUC}_{it} + \beta_{4(q)} \mathbf{GII}_{it} + \beta_{5(q)} \mathbf{LEV}_{it} + \beta_{8(q)} \mathbf{SIZE}_{it} + u_{it} ,$$

$$\mathbf{Qq} \text{ (QTOBIN)}_{it} = \beta_{0it}(q) + \beta_{1(q)} \mathbf{STRATEGY}_{it} + \beta_{2(q)} \mathbf{EUC}_{it} + \beta_{3(q)} \mathbf{STRATEGY} * \mathbf{EUC}_{it} + \beta_{4(q)} \mathbf{GII}_{it} + \beta_{5(q)} \mathbf{LEV}_{it} + \beta_{6(q)} \mathbf{SIZE}_{it} + u_{it} ,$$

The quantile regression model (Koenker, 2004) is operationalised as follows:

$$y_i = x_i' \beta \theta + u_i \text{ with } \text{Quant}_{\theta}(y_i | x_i) = x_i' \beta \theta \quad (2)$$

Where,

y_i is the performance (dependent) variable, x is a vector of regressors and β is the vector of parameters to be estimated, and u is a vector of residuals.

Q can assume any value of the interval (0,1). We estimated the model for $Q_{.10}$, $Q_{.25}$, $Q_{.50}$, $Q_{.75}$, $Q_{.90}$, to find out the differences of effect of the independent variables over the firm performance (QTOBIN). The definition of the q th regression quantile (θ th regression quantile, $0 < \theta < 1$) solves the following problem (Koenker & Bassett, 1978):

(3)

$$\text{Min } \sum_i |u_i| \text{ hi} \\ C, \beta$$

Where, $h_i =$

(4)

$$2q \text{ if } \mu_i > 0, \\ 2(1-q) \text{ if } \mu_i < 0.$$

For our study, we estimate OLS with *Year Effects*, Fixed, random and quantile regression (Koenker, 2004, 2017) to explore the strategy effects at different performance levels

5. Results

The descriptive statistics of the variables are presented in Table 3.6 and 3.7. Table 3.6 provides the descriptive statistics, namely the mean, standard deviation, and median. Concerning the performance variable (dependent variable), Tobin's Q has a mean of 1.39 (median = 0.91). In order to check the presence of multicollinearity it was performed the variation inflation factors (VIF), and results were within the limit's. The post estimation mean of VIF = 1.01 (Hair et al., 2010; Mansfield et al., 2016). We add the option 'robust' in STATA 16 in order to control for heteroskedasticity (White, 1980; Ye & Sun, 2018).

The results of panel data regressions are presented in table's 3.7 to 3.10, that reports the regression coefficients estimates for the overall models.

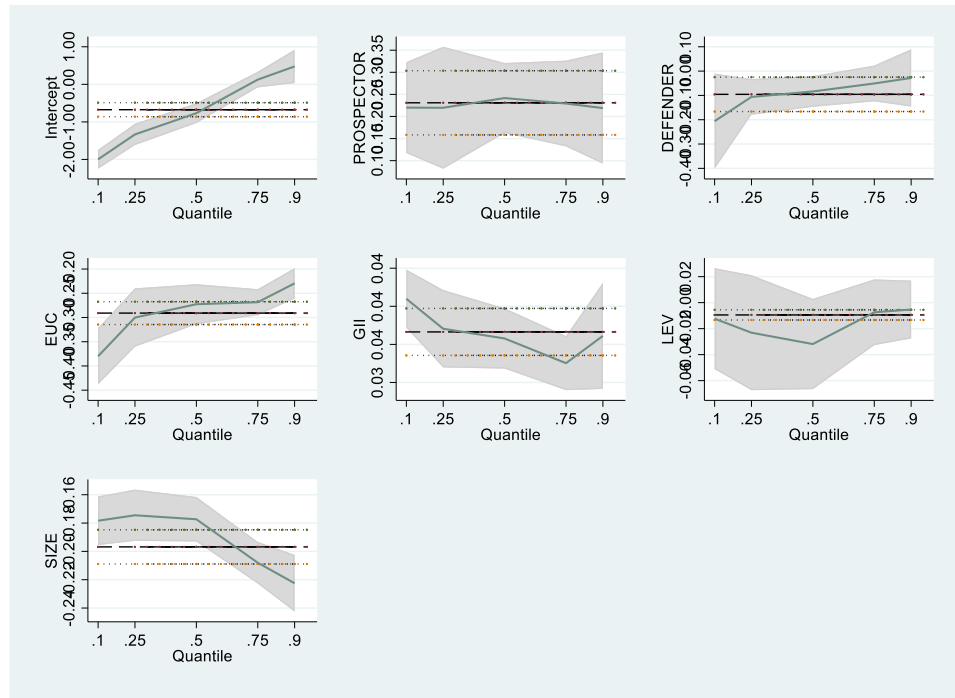
Table 3.6 Descriptive statistics and correlations of the model variables

variable	N	mean	median	sd	cv
QTOBIN	4325	1.393315	.9153719	1.603813	1.151077
STRATEGY	4325	14.93757	15	2.86374	.1917139
PROSPECTOR	4325	.1089017	0	.3115519	2.860853
DEFENDER	4325	.1149133	0	.3189542	2.775607
EUC	4318	-.1003968	-.2978446	.9612009	-9.57402
GII	4325	56.10523	58	7.369189	.1313459
LEV	4325	.7721962	.5137368	5.703175	7.385656
SIZE	4325	7.650289	7.58726	1.873667	.2449146

Table 3.7 Variables correlations

	QTOBIN	PROSPECTOR	DEFENDER	EUC	GII	LEV	SIZE
QTOBIN	1.0000						
PROSPECTOR	0.0904*	1.0000					
DEFENDER	-0.0199	-0.1260*	1.0000				
EUC	-0.1794*	0.0346*	0.0575*	1.0000			
GII	0.1892*	0.0489*	-0.0071	-0.1288*	1.0000		
LEV	-0.0439*	-0.0023	0.0278	0.0210	-0.0246	1.0000	
SIZE	-0.3072*	-0.0673*	0.0150	-0.0863*	0.1318*	0.0234	1.0000

Figure 3.2 Main variables coefficient over conditional quantiles (STATA command *grqreg*)



The quantile regression was estimated, and as we can observe below in Table 3.8 and 3.9, the impact of the variables on firm performance varies significantly along the distribution. Concerning our first hypothesis (*H1*), we can verify companies with prospector strategy characteristics pursue better performance, even in an uncertainty and dynamic context. Environmental uncertainty is significant and impact negatively on the firm performance, namely in the Q20-Q50. Prospectors' strategy type, as known by being more innovators and market explorer, type takes more advantage in a highly uncertain environment, than defender or analyzer strategies. Interestingly, we noticed that defenders were only significant in the first model at low levels of quantiles. Defenders in this context did not perform well, when compared to analyzers, underperform in low quantiles. Regarding our second hypothesis (*H2*), uncertainty (EUC) influence negatively firm performance. By opposite, results show that national innovation capabilities (GII) influence positively firm performance (*H3*). The effect of environmental uncertainty and national innovation capabilities is significant, as the expected impact signal.

Concerning the fourth hypothesis (*H4*), models presented in Table 3.9 (interaction models), STRATEGY influences firm performance positively and moderates the impact

of uncertainty. The results for some of the control variables of the model were statistically significant, namely SIZE that impact negatively firm performance, along all quantiles and was only significant between median to upper quantiles.

Table 3.8 Quantile regression model estimates

VARIABLES	OLS	FE	RE	Quantile Regression				
	QTOBIN	QTOBIN	QTOBIN	q10	q25	q50	q75	q90
PROSPECTOR	0.231*** (0.037)	0.082** (0.035)	0.085*** (0.033)	0.220*** (0.054)	0.220*** (0.064)	0.242*** (0.050)	0.229*** (0.051)	0.219*** (0.063)
DEFENDER	-0.096** (0.040)	-0.072** (0.029)	-0.070** (0.029)	-0.206*** (0.067)	-0.106* (0.061)	-0.084 (0.063)	-0.051 (0.047)	-0.028 (0.067)
EUC	-0.291*** (0.013)	-0.008 (0.014)	-0.050*** (0.013)	-0.380*** (0.019)	-0.300*** (0.021)	-0.273*** (0.015)	-0.268*** (0.015)	-0.230*** (0.015)
GII	0.037*** (0.002)	-0.001 (0.008)	0.035*** (0.003)	0.041*** (0.003)	0.037*** (0.003)	0.036*** (0.002)	0.033*** (0.002)	0.036*** (0.003)
LEV	-0.009** (0.004)	-0.003 (0.002)	-0.003* (0.002)	-0.012 (0.044)	-0.023 (0.036)	-0.032 (0.024)	-0.007 (0.018)	-0.005 (0.014)
SIZE	-0.197*** (0.006)	-0.374*** (0.043)	-0.225*** (0.014)	-0.178*** (0.015)	-0.174*** (0.012)	-0.177*** (0.009)	-0.208*** (0.010)	-0.223*** (0.013)
Constant	-0.675*** (0.099)	2.847*** (0.565)	-0.342* (0.204)	-1.997*** (0.173)	-1.334*** (0.171)	-0.767*** (0.130)	0.126 (0.139)	0.478** (0.187)
Observations	4,318	4,318	4,318	4,318	4,318	4,318	4,318	4,318
Number of ID		864	864					
R-squared	0.334	0.068						

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3.9 Interaction Model estimates (*strategy score*)

VARIABLES	OLS	FE	RE	Quantile Regression				
	QTOBIN	QTOBIN	QTOBIN	q10	q25	q50	q75	q90
STRATEGY	0.031*** (0.004)	0.028*** (0.006)	0.024*** (0.005)	0.036*** (0.007)	0.033*** (0.003)	0.027*** (0.004)	0.034*** (0.006)	0.030*** (0.006)
EUC	-0.574*** (0.074)	-0.131* (0.069)	-0.186*** (0.065)	-0.846*** (0.200)	-0.904*** (0.133)	-0.563*** (0.076)	-0.474*** (0.098)	-0.420*** (0.094)
STRATEGY x EUC	0.020*** (0.005)	0.008* (0.005)	0.009** (0.004)	0.031** (0.013)	0.041*** (0.008)	0.019*** (0.005)	0.014** (0.007)	0.013** (0.006)
GII	0.037*** (0.002)	-0.001 (0.008)	0.035*** (0.003)	0.039*** (0.003)	0.036*** (0.002)	0.036*** (0.002)	0.034*** (0.002)	0.038*** (0.003)
LEV	-0.010** (0.004)	-0.003 (0.002)	-0.003* (0.002)	-0.011 (0.038)	-0.026 (0.038)	-0.030 (0.027)	-0.007 (0.024)	-0.006 (0.019)
SIZE	-0.196*** (0.006)	-0.396*** (0.044)	-0.228*** (0.014)	-0.178*** (0.012)	-0.179*** (0.011)	-0.179*** (0.008)	-0.204*** (0.008)	-0.224*** (0.009)
Constant	-1.128*** (0.116)	2.558*** (0.550)	-0.685*** (0.219)	-2.430*** (0.217)	-1.711*** (0.116)	-1.186*** (0.152)	-0.472*** (0.099)	-0.074 (0.159)
Observations	4,318	4,318	4,318	4,318	4,318	4,318	4,318	4,318
		864	864					
R-squared	0.339	0.077						

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3.10 Quantile regression model estimates (*industry effects*)

VARIABLES	OLS	RE	Quantile Regression				
	QTOBIN	QTOBIN	q10	q25	q50	q75	q90
PROSPECTOR	0.257*** (0.036)	0.092*** (0.032)	0.236*** (0.054)	0.236*** (0.043)	0.251*** (0.038)	0.259*** (0.045)	0.303*** (0.064)
DEFENDER	-0.078** (0.036)	-0.058** (0.029)	-0.160** (0.080)	-0.055 (0.035)	-0.039 (0.040)	-0.009 (0.042)	-0.026 (0.048)
EUC	-0.282*** (0.013)	-0.052*** (0.013)	-0.384*** (0.019)	-0.291*** (0.018)	-0.274*** (0.017)	-0.267*** (0.017)	-0.239*** (0.021)
GII	0.034*** (0.002)	0.031*** (0.003)	0.043*** (0.002)	0.036*** (0.003)	0.032*** (0.002)	0.030*** (0.002)	0.031*** (0.003)
LEV	-0.008* (0.004)	-0.003 (0.002)	-0.016 (0.047)	-0.025 (0.041)	-0.031 (0.028)	-0.008 (0.021)	-0.010 (0.016)
SIZE	-0.168*** (0.007)	-0.192*** (0.015)	-0.169*** (0.016)	-0.147*** (0.016)	-0.153*** (0.007)	-0.183*** (0.006)	-0.190*** (0.009)
2016.YEAR	0.014 (0.033)	0.020* (0.011)	0.011 (0.066)	0.009 (0.043)	-0.003 (0.041)	0.021 (0.037)	-0.026 (0.064)
2017.YEAR	0.125*** (0.033)	0.135*** (0.016)	0.108*** (0.039)	0.134*** (0.040)	0.121*** (0.033)	0.132*** (0.041)	0.115*** (0.042)
2018.YEAR	-0.093*** (0.034)	-0.069*** (0.018)	-0.175*** (0.048)	-0.156*** (0.042)	-0.137*** (0.038)	-0.046 (0.045)	0.005 (0.049)
2019.YEAR	-0.020 (0.035)	0.013 (0.021)	-0.168*** (0.053)	-0.112*** (0.034)	-0.055* (0.033)	0.064* (0.034)	0.118** (0.055)
Materials	0.070 (0.080)	0.267* (0.157)	0.398 (0.315)	0.218* (0.131)	0.021 (0.106)	-0.176** (0.088)	-0.225*** (0.069)
Industrials	-0.105 (0.079)	0.132 (0.154)	0.180 (0.309)	-0.014 (0.145)	-0.151 (0.108)	-0.334*** (0.078)	-0.296*** (0.085)
Consumer Discretionary	0.159* (0.083)	0.425*** (0.164)	0.217 (0.292)	0.128 (0.145)	0.044 (0.115)	0.032 (0.098)	0.141 (0.094)
Consumer Staples	0.205** (0.085)	0.491*** (0.170)	0.231 (0.318)	0.175 (0.167)	0.189 (0.127)	0.105 (0.085)	0.116 (0.072)
Health Care	0.681*** (0.085)	0.900*** (0.166)	0.760** (0.333)	0.707*** (0.144)	0.638*** (0.112)	0.472*** (0.102)	0.595*** (0.088)
Information Technology	0.272*** (0.084)	0.454*** (0.166)	0.347 (0.341)	0.310** (0.153)	0.239** (0.122)	0.120 (0.101)	0.159* (0.091)
Communication Services	0.161* (0.085)	0.339** (0.166)	0.426 (0.294)	0.309** (0.123)	0.071 (0.104)	-0.175** (0.084)	-0.060 (0.093)
Utilities	-0.284*** (0.082)	-0.092 (0.159)	0.185 (0.318)	-0.184 (0.149)	-0.406*** (0.111)	-0.565*** (0.096)	-0.654*** (0.094)
Constant	-0.872*** (0.121)	-0.704*** (0.237)	-2.382*** (0.403)	-1.588*** (0.176)	-0.791*** (0.168)	0.112 (0.165)	0.434*** (0.139)
Observations	4,318	4,318	4,318	4,318	4,318	4,318	4,318
R-squared	0.405	0.864					

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

6. Conclusion and future research

This study contributes to the existing literature in following ways. First, the results of this study make a considerable and significant contribution to understand which business strategies outperform the other strategic types, in the context of firm's environmental uncertainty and national innovation system. Moreover, there is a lack of studies considering the strategy and performance relationship in Europe since the majority were developed in EUA. The main contribution that this work aims is to achieve a better understanding of the strategic behaviour of European listed companies that represent the majority of the STOXX Index all Europe, at different levels of performance, as presented by the operationalization of the quantile regression estimations.

Second, from a context perspective, this study emphasizes the importance of the national innovation capabilities and the ability for a firm to adapt in an that uncertainty and dynamic context. Our study suggests that prospectors who are highly flexible, are more able to adapt and fit better to the turbulent environment. Consistent with the hypothesis, we found that prospectors strategy outperforms defenders and analyzers in the context of uncertainty and high national innovation system. Findings may suggest that those context conditions, more dynamic (Castellacci & Natera, 2013) and complex, are more demanding from the point of view of strategic behaviour and effective management, namely when we are dealing with listed companies with a high degree of responsibility, since they are obliged to high compliance rules and norms, high levels of transparency, environmental, social and governance practices.

National innovation capabilities, as measured by GII, enables the comparison between countries, namely in generation of the conditions for gaining innovation capabilities, that are essential to promote and development local markets and increase firm's competition, and attract more international investment. Fostering innovation, demands a higher commitment to align countries and firms. In this sense, our study points out the importance of prospectors, because of their ability to adapt and take risks, and accepting change. Regarding the policy front, suggestions with respect to the increase of innovative capability of countries may represent the gain of a sustainable competitive advantage in

the world panorama. Future research could include an extension of GII data, namely the measurement variables used for the existing pillars, at high and low level.

From a management perspective, managers and investors should be aware of the strategic behaviour of firms and their consistency over time, in order to gain competitive advantages. In times of change and high uncertainty, the importance of the strategic fit is fundamental to achieve high levels of performance.

Concerning policy implications, policy makers may also align better their innovation capabilities, with the most innovative business (*prospectors*) and at the same time, creating more incentives to boost a more creative and innovative culture, namely for those firms that are more defensive (*defenders*).

Chapter 4. Strategy and Performance linkage, in the digital age context: evidence from listed High-Tech companies of STOXX600

1. Introduction

The purpose of the study presented, is to explore the relationship between business strategy and firm performance, in a digital context.

As businesses and society become more digital, companies try to explore this new advantages, and guide their strategic positioning, incorporating a digital strategy towards the creation of value and the search for continuously better results (Menz et al., 2021).

To become more competitive, companies will have to implement market-driven management in order to monitor the competition and create value. Both situations presuppose the ability to anticipate market behaviour. To achieve this, digitalisation is essential. And, in this sense, it is necessary to define its role in the management of the company: operational or strategic? and in the context of strategy: will digitalisation be an integral part of it?

The development of a digital agenda, namely at the management level and inside the organisations, will enable the promotion of digital projects and digital initiatives, creating a sense of a transformation urgency. Managers, as leaders of digital transformation seek to adapt to this new digital context, and in this way it is becoming more and more common, the presence of *digital officers* (CDO) in top management teams, enabling and improving firms digital orientation, influencing business strategy and organization adaptation (Wrede et al., 2020).

The strategic orientation of firms and its positioning assumes more preponderance in this context, namely in Tech companies where managers tend to be keen and sensitive to change. In addition to the strategic solution that is being studied, the digitalization

strategy is nowadays, in certain sectors, of greater interest and has been assumed as an important vector, that can be complementary to the strategic behaviour of the firms. There is also an increasing interest in the fields of strategic management to explore how organizations respond and adapt to the change environment (Bindra et al., 2019). For this purpose, technology companies were chosen to assess this effect.

Supporting our research on the framework developed by *Miles and Snow* (Miles et al., 1978; Snow & Hrebiniak, 1980), our analysis intends to verify if the business strategy is still valid in this context of digital transformation? In this sense, we aimed to verify whether the strategic orientation tends to positively increase the impact on the performance of technology companies.

Concerning firm performance, we also intend to verify if this digital transformation is also captured by the market, namely in terms of performance (*QTOBIN*). The existence of a digital officer and a digital focus tends to impact organization structure and firm performance (Kunisch et al., 2020).

With this study we aim to contribute to the strategic management research field filling a gap in the literature, since there is a lack of studies considering the strategy and performance relationship in this context. In this way, this research contributed to the assessment of *Miles and Snow framework* as still applicable in a digital context.

The study covers a sample of 119 high-technology European companies listed of STOXX600 index, for the period of 2015-2019 (595 firm-year observations). Panel data regressions were carried out to evaluate the strategy-performance linkage in digital context (digital transformation and digital focus).

In order to measure our strategic emphasis on digitalization we used two measures for digitalization: the presence of a digitalization officer (CDO) and digitalization focus (Digitalization). For the first measure, we performed an assessment of the presence of a digitalization officer (CDO) in the management team, as a measure of digital transformation since that presence may enable and accelerate digitalization from a strategic perspective.

The second measure was developed to assess the firm digitalization focus (Digitalization) and it was captured by performing a content analysis based on the 119 Stoxx High-Tech sample firms the annual reports for the years 2015-2019.

To enable this operationalization, we used an analytics software (MAXQDA) in order to count the number of occurrences of words containing the string “Digital*” in each year firm annual report. To operationalize our main strategy variable (*Prospector and Defender*), we developed a content analysis using textual components extracted from the annual reports, enabling to identify the strategic emphasis based in the framework of *Miles and Snow* typology dimensions: prospective (*Prospector*) and defensive (*Defender*) types.

The main contribution of this research to the extant literature is by empirically investigating the strategy-performance-relationship among listed high-technology companies in a digital context. Therefore, we asked the following research question:

RQ1: Does digitalization as an integral part of business strategy, impacts significantly firm performance?

RQ2: Does prospector business strategy outperforms defender business strategy?

In the following, we provide an overview of the existing literature concerning digitalization, business strategy and performance and present our hypothesis.

In the next sections will present the methodology applied, sample data procedures, main variables, and econometric, where we describe all variables, namely strategy measure and digitalization measures.

Following sections contains empirical estimations results and a resume of the main findings, conclusions, and future research opportunities.

2. Theoretical background and hypothesis development

2.1 *Digitalization, Business Strategy and Performance*

The digital transformation of business is still considered a recent phenomenon (Hanelt et al., 2021), where managers seek to create value and increase earnings to achieve a superior performance (Sousa-Zomer et al., 2020). Digitalization it's not only about technology (Kraus et al., 2021), and recent studies provide evidence of significant emphasis on strategy as a driver of digital transformation (Kane et al., 2015).

A recent study from large German firms stressed the importance of top managers as the shapers of firm strategy, understanding digitalization and leading change (Wrede et al., 2020). The presence of a digital leadership, also called "*digital officers*" in the top management team is positively captured by investors that expect that digital transformation efforts will be soon converted in the increasing of earnings (Kessel & Graf-Vlachy, 2021; Nie et al., 2019).

Since managers from listed firms face more pressure to increase earnings for shareholders and investors, they see digitalization as an opportunity to strategically transform their business and announce new digital technologies to the market (Nishant et al., 2020) and develop more international business. (Velinov et al., 2020).

Even though high-technology firms are seen as an example of innovation, high market pressures to digital transformation is considered an important factor to take in consideration for digital managers (Singh & Hess, 2017). Digital leadership also tends to play an important role in strategic activity of the business (Ruel et al., 2020), namely by promoting a more digital emphasis on organization projects, innovation activities (Agostini et al., 2019), and consequently on business strategy.

The sense of a transformation urgency accelerate the presence of this digital leadership as a key transformation role (Raković et al., 2022) , as supported from a recent empirical study based on a panel data set of 913 US and European firms (Firk et al., 2021).

As argued by recent research, digitalization requires an alignment of corporate strategy with digital strategy (Matt et al., 2015). The alignment of this approach, with business strategy based on Miles and snow framework (adaptive cycle), where organizations

seek to adapt to environmental changes (Miles et al., 1978; Snow & Hrebiniak, 1980), result in a combination where digitalization is an integrating part of strategic orientation.

In accordance with Miles and Snow framework (1978), it was developed a typology of strategic types (strategic patterns) where it can be identified four different behavioural patterns: *Prospectors*, *Defenders*, *Analyzers* (also considered as “pure strategies”) and *Reactors* (that considers the companies which have an inconsistent behaviour). This adaptive cycle deals with three main problems: entrepreneurial, engineering and the administrative. In our study we will consider the *Prospector* and *Defender* strategy type since they present the two main extremes of the typology and *Analyzers* are considered to be a hybrid type (a mix of *prospectors* and *defenders*). Table 4.1 summarize the framework of the two main strategy characteristics and how they deal with the three problems: entrepreneurial, engineering and the administrative:

Table 4.1 Main characteristics of Prospector and Defender strategies

Strategic Type	Entrepreneurial	Engineering	Administrative
<i>Prospective Strategy</i> <i>(Prospector)</i>	• Growth domain • Continuous developing • Creates change • Innovative/Pioneer • creator of change and uncertainty	• Flexible technologies • Multiple technologies • Low degree of automation	• Marketing and R&D • Problem orientated • Decentralised control
<i>Defensive Strategy</i> <i>(Defender)</i>	• Stable domain • Ignore developments • Efficient, small product /market domain • competitive pricing or high-quality products	• Cost-efficiency focus • Single-core technology • Emphasize efficiency	• Internal orientated • Cost orientated • Centralised control • Emphasize low cost

Source: Based on Miles and Snow (1978)

As mentioned above, in the first extreme we have *Prospectors* that are known to be pioneers (*first movers*) and characterized by focusing in searching and exploiting new

product and market opportunities (Kurtz et al., 2021; Miles et al., 1978; Parnell, 2010; M. Sollosy et al., 2015). On the other side, *Defenders*, are characterized by focusing on internal efficiency and mainly in the current domain (stable domain) of markets and products (Desarbo et al., 2005; D. C. Hambrick, 1983). This strategic type is more risk averse and has a low level of development of new products and exploring new markets.

The alignment of strategies can yield a competitive advantage and may enable a superior performance.

Insofar our hypothesis states:

H1: Digitalization has a significant impact on firm performance.

H2: The presence of digital officers, has a significant impact on firm performance.

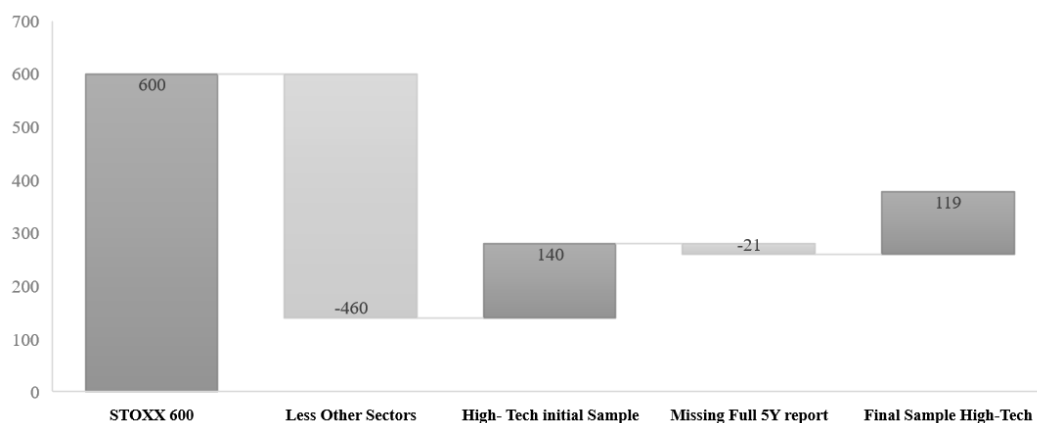
H3.: In the Digital context, *Prospector* strategy emphasis outperform *Defender* strategy emphasis.

3. Methodology

3.1 Sample selection and procedures

We selected a set of technology European companies listed in the STOXX Europe 600 Market Index, also known by STOXX600 which represents one of the most representative indexes in Europe within a market capitalization around €11 Trillion. We retrieved STOXX 600 data for the period of 2012 to 2019, from Reuters DATASTREAM database. The study final sample is constituted by 119 listed High-technology sector companies across 14 European countries of the STOXX 600 Market Index, after excluding financial sector firms and missing value for the main variables of our study. High-technology industries were identified by using an optimal six-digit GICS industry code (*Global Industry Classification Standard*) and the following (Kile & Phillips, 2009) are: [201010] Aerospace and Defense; [201040] Electrical Equipment; [255020] Internet and Direct Marketing Retail; [351010] Health Care Equipment and Supplies; [351020] Health Care Providers and Services; [352010] Biotechnology; [352020] Pharmaceuticals; [352030] Life Sciences Tools and Services; [451020] IT Services; [451030] Software; [452010] Communications Equipment; [452020] Technology Hardware, Storage and Peripherals; [452030] Electronic Equipment, Instruments and Components; [453010] Semiconductors and Semiconductors Equipment; [501010] Diversified Telecommunications Services; and [501020] Wireless Telecommunications Services. The following figure illustrates the sample procedures:

Figure 4.1 Sample procedures: High-Tech companies



3.2 Strategy measurement

To operationalize our main strategy variable, we developed a content analysis of strategic emphasis based in the framework of *Miles and Snow* typology dimensions, in order to identify and capturing firms' strategic emphasis on prospective (*Prospector*) and defensive (*Defender*) types.

We build this strategy proxies using textual components extracted from the annual reports of the listed companies of our sample. The annual reports of the listed companies are a very important source of information, reliable and consistent. Listed companies have high disclosure obligations of information, and high levels of scrutiny, by the market as a whole, including investors, shareholders, and stakeholders in general. In this sense and based on previous literature and *Miles and snow* framework to enable this operationalization, we developed a selection list of representative words that may characterize those main strategic types.

Based on previous literature (Kabanoff & Brown, 2008; Miles et al., 1978) and *Miles and Snow* framework to enable this operationalization, we used an analytics software (MAXQDA 2020) in order to count the number of occurrences of following words that may distinguish the strategy based on *prospector*, that are characterized by focusing in searching and exploring new product and market opportunities:

*advertis**, *brand* develop**, *creat* change**, *creativ**, *decentral**, *product develop**, *differenti**, *encourag* creat**, *encourag* flex**, *explor**, *explor**, *explore market**, *flexb**, *informal**, *innovat**, *intellectual propert**, *invention*, *market innov**, *market opp**, *marketing**, *new* market**, *new* product**, *patent**, *pioneer**, *problem solving*, *product engineer**, *product innov**, *project manag**, *project plan**, *new trademark**, *prototype**, *R&D*, *research and development*, *research expert**, *tech* flex**, *technolog* dev**, *new patent**

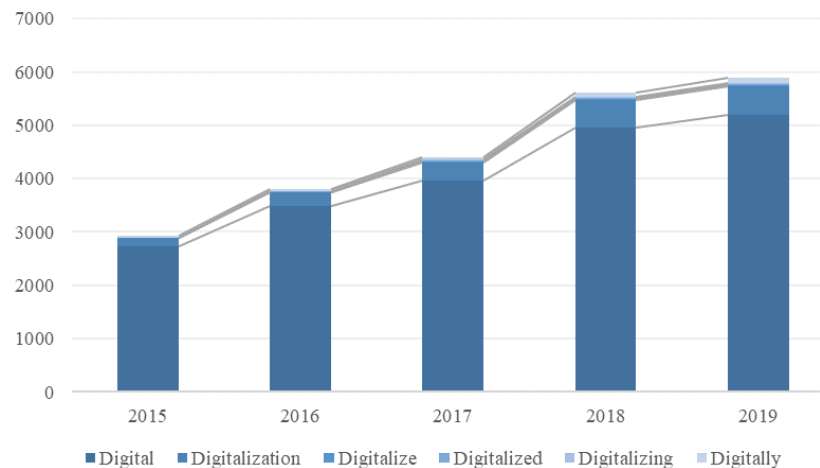
In this way, we search also for the following the words that may distinguish the strategy based on *defender*, that are mainly characterized by focusing on internal efficiency, cost control and focusing in a stable domain of markets and products (D. C. Hambrick, 1983):

*centrali**, *competitive pric**, *continuos improv**, *cost* effic**, *cost* control**, *cost* reduc**, *cost* saving**, *customer* service**, *efficien**, *efficien* prod**, *high qualit**, *limited market**, *limited Product**, *market penetration*, *market segment**, *niche market**, *norms**, *optimiz**, *planning control**, *internal control procedures*, *process* improvement**, *sales support**, *stable customer**, *stable product**, *standardi**, *tech* effic**, *vertical integration*, *low cost*, *mature market*, *functional structure*, *process control*, *stable growth*, *incremental growth*, *productivity*, *efficiency improvement**, *current customer**, *capacity* utilization**

3.3 Digitalization measurement

In order to measure our strategic emphasis on digitalization we used two measures for digitalization. For the first measure we use the presence of digital officer's (CDO) as a measure of digital transformation since that presence will facilitate and enable digitalization starting from a strategic perspective (Firk et al., 2021), and accelerate digital strategic activities along all organizations (Singh et al., 2020). We analysed information of the presence of digital officer's from Reuters DATASTREAM database for the 119 Stoxx High-Tech sample firms and also from other sources such as, the annual reports for the years 2015-2019, investor relations section from listed firms' websites and LinkedIn. In order to assess firm digitalization focus, we retrieve for the 119 Stoxx High-Tech sample firms the annual reports for the years 2015-2019 as PDF documents from each listed firm websites (namely investor relations section) and further we employ a content analysis. To enable this operationalization, we used an analytics software (MAXQDA 2020) in order to count the number of occurrences of words containing the string "Digital*" and also the total number of words in each year firm annual report. The following figure resumes the most frequently used "Digital*" words along the 2015-2019 period:

Figure 4.2 The most frequently used “Digital*” words



Following the count of “Digital*” frequency, the next procedure was to perform the calculation of the ratio of occurrence of the word “Digital*” in relation to the overall number of words in each year firm annual report (excluding numbers, punctuation, etc). MAXQDA analytics software 2020 provide pre-configured stop list files including the following subcategories: auxiliaries, prepositions, interjections, numerals, pronouns, determiners, conjunctions, particles (only available in German), 100 most common words in the respective language. The following figure illustrates the “Digital” word cloud.

Figure 4.3 Word Cloud “Digital”



3.4 Control Variables

We include several *control variables* commonly used in this research area, and in line with other studies (Lin et al., 2014; Marc Sollosy et al., 2019), we control for firm characteristics such as size, risk and intangible assets (intangible intensity) and liquidity.

To capture the dimension of the firms and the capability of taking advantage of economies of scale, namely for large high-technology firms, we include *firm size* (SIZE), measured by the natural logarithm of market capitalization, where we expect a positive impact on firm performance since larger firms have more attributes and resources to explore the digital transformation.

We include *firm risk*, which derives from the ratio of total debt to equity and is introduced as a proxy for long term risk. We expect a negative impact of leverage (LEV) on firm performance.

Since companies become more digital and more knowledge based, we also included intangible assets to measure intangible intensity (IA) in our analysis, where it is expected to access how the financial market infers and value the investment on this type of assets, as a predictor of future returns (Ferdaous & Rahman, 2019).

To capture the firm's ability to pay its obligations in the short term we include the liquidity ratio (LIQ) as a measure of financial health.

We hypothesize a significant impact of digitalization, as an integral part of business strategy, on firm performance (QTOBIN). In the following table 4.2, we stated a brief description and summary of the main variables in the research model.

Table 4.2 Description of variables in the research model

<i>Dependent variable</i>	<i>Explanation</i>
QTOBIN	Firm performance, represented by Tobin's Q: <i>Tobin's Q = Market value / book value of total assets</i>
<i>Strategy variables</i>	<i>Explanation</i>
PRO (Prospector)	Corresponds to the word count of prospector strategy emphasis of the prospector keyword list scaled by the total words in the annual report for company <i>i</i> in year <i>t</i> , and normalized 0-1 (excluding MAXQDA stop list, numbers, punctuation, words with less than ten occurrence and less than three characters), for the period of 2015-2019.
DEF (Defender)	Corresponds to the word count of defender strategy emphasis of the defender keyword list scaled by the total words in the annual report for company <i>i</i> in year <i>t</i> , and normalized 0-1 (excluding MAXQDA stop list, numbers, punctuation, words with less than ten occurrence and less than three characters), for the period of 2015-2019.
<i>Digitalization</i>	<i>Explanation</i>
CDO	Corresponds to the digital's officer presence in each company. For the operationalization, we code CDO presence with a dummy variable (1, 0 otherwise) for the period of 2015-2019.
DIGITAL	Digital focus, corresponds to the natural logarithm of one plus the word count of number of occurrences of words with string "Digital*" in the annual report for company <i>i</i> in year <i>t</i> (excluding MAXQDA stop list, numbers, and punctuation), for the period of 2015-2019.
<i>Firm Controls</i>	<i>Explanation</i>
IA	Natural logarithm of net intangibles assets
SIZE	Natural logarithm of market capitalization
LEV	Leverage: <i>long term debt/assets</i> (unsystematic firm risk)
LIQ	Liquidity: ratio of short-term ability to pay ($LIQ = \text{Current assets} / \text{current liabilities}$)

4. Econometric Model

To investigate whether digitalization as an integral part of business strategy, impacts significantly firm performance, we develop the following models:

The base model is the following:

Performance = f (**Strategy; Digitalization; Controls**; error term)

Model 1:

$$\text{QTOBIN}_{it} = \beta_1 + \beta_2 \text{PRO}_{it} + \beta_3 \text{DEF}_{it} + \beta_4 \text{CDO}_{it} + \beta_5 \text{DIGITAL}_{it} + \beta_6 \text{IA}_{it} + \beta_7 \text{SIZE}_{it} + \beta_8 \text{LEV}_{it} + \beta_9 \text{LIQ}_{it} + u_{it}$$

Model 2:

$$\text{QTOBIN}_{it} = \beta_1 + \beta_2 \text{PRO}_{it} + \beta_3 \text{DEF}_{it} + \beta_4 \text{CDO}_{it} + \beta_6 \text{IA}_{it} + \beta_7 \text{SIZE}_{it} + \beta_8 \text{LEV}_{it} + \beta_9 \text{LIQ}_{it} + u_{it}$$

Model 3:

$$\text{QTOBIN}_{it} = \beta_1 + \beta_2 \text{PRO}_{it} + \beta_3 \text{DEF}_{it} + \beta_4 \text{DIGITAL}_{it} + \beta_5 \text{IA}_{it} + \beta_6 \text{SIZE}_{it} + \beta_7 \text{LEV}_{it} + \beta_8 \text{LIQ}_{it} + u_{it}$$

Model 4:

$$\text{QTOBIN}_{it} = \beta_1 + \beta_2 \text{PRO}_{it} + \beta_3 \text{CDO}_{it} + \beta_4 \text{IA}_{it} + \beta_5 \text{SIZE}_{it} + \beta_6 \text{LEV}_{it} + \beta_7 \text{LIQ}_{it} + u_{it}$$

Where,

“i” = 1 to 119 listed High-Tech companies of STOXX 600 and “t” index for the years 2015 to 2019

5. Empirical results

The following tables provides an overview of the descriptive statistics, namely the mean, median, standard deviation, maximum, minimum and correlations for each variable. The QTOBIN performance variable indicate a mean of 2.13. The main Strategy variables (*prospector and defender*) indicates a mean score of 0.32 and 0.26 respectively. Descriptive statistics for our control variables are presented above, namely IA, SIZE, LEV, and LIQ, with a mean of 6.23, 9.04, 0.18 and 1.86 respectively.

Table 4.3 Descriptive statistics of variables

variable	N	mean	sd	cv
QTOBIN	592	2.131836	2.107931	.988787
PRO	595	.3177424	.2077973	.6539803
DEF	595	.256795	.1682829	.65532
CDO	595	.1579832	.3650321	2.310576
DIGITAL	595	.144391	.1955287	1.354161
IA	593	6.283044	2.193836	.3491678
SIZE	592	9.043926	1.287188	.1423262
LEV	595	.1800167	.1389862	.7720741
LIQ	595	1.857913	1.921911	1.034446

Table 4.4 presents the correlation of the main variables of the regression models.

Table 4.4 Correlation of variables

	QTOBIN	PRO	DEF	CDO	DIGITAL	IA	SIZE	LEV	LIQ
QTOBIN	1.0000								
PRO	0.1852*	1.0000							
DEF	-0.1513*	-0.0081	1.0000						
CDO	-0.1413*	0.0134	-0.0043	1.0000					
DIGITAL	-0.1994*	-0.1738*	0.1967*	0.2971*	1.0000				
IA	-0.4513*	-0.0617	0.1415*	0.2902*	0.2293*	1.0000			
SIZE	-0.1244*	0.0899*	0.0401	0.3520*	0.1494*	0.7506*	1.0000		
LEV	-0.3502*	-0.2015*	0.1262*	0.0830*	0.1415*	0.4279*	0.1684*	1.0000	
LIQ	0.3659*	0.3395*	-0.1303*	-0.1468*	-0.2222*	-0.4745*	-0.2499*	-0.2922*	1.0000

In order to check the presence of multicollinearity we have performed the variation inflation factors (VIF), and results were within the limit of 10 and the post estimation, as follows our mean of VIF = 1.74 (Hair et al., 2010; Mansfield et al., 2016). We performed the Hausman test to compare between fixed and random effects and the results stress the that fixed effects (FE) is more appropriate than random effects (RE). We also performed the Breusch–Pagan Lagrange Multiplier (LM) test between random effects (RE) and pooled OLS pointed out that the random effects model is more appropriate than OLS. We add the option ‘robust’ in STATA 16 in order to control for heteroskedasticity (White, 1980; Ye & Sun, 2018). The results of panel data regressions are presented in table 4.5, that reports the panel data fixed effects regression coefficients estimates for the overall models results, as follows:

Table 4.5 Panel Regression models (*fixed effects*)

QTOBIN VARIABLES	Model 1 FE	Model 2 FE	Model 3 FE	Model 4 FE
PRO	0.862** (0.402)	0.850** (0.397)	0.792** (0.390)	0.876** (0.389)
DEF	0.082 (0.205)	0.078 (0.206)	0.067 (0.205)	
CDO	0.152** (0.072)	0.147** (0.070)		0.146** (0.070)
DIGITAL	-0.100 (0.144)		-0.069 (0.143)	
IA	-0.624*** (0.109)	-0.623*** (0.109)	-0.620*** (0.109)	-0.624*** (0.109)
SIZE	1.490*** (0.144)	1.486*** (0.142)	1.491*** (0.144)	1.487*** (0.142)
LEV	-0.815* (0.419)	-0.812* (0.420)	-0.794* (0.423)	-0.801* (0.421)
LIQ	-0.254** (0.109)	-0.253** (0.109)	-0.254** (0.109)	-0.254** (0.108)
Constant	-7.115*** (1.171)	-7.093*** (1.165)	-7.103*** (1.175)	-7.092*** (1.161)
Observations	590	590	590	590
Number of ID	119	119	119	119
R-squared	0.418	0.418	0.416	0.418

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In relation to our first digitalization measure, we can also observe in model 1, model 2 and model 4, that the presence of *digital officers* in the top management team, as an

integral part of business strategy, impacts on a positive and significantly performance (QTOBIN). By opposite, in relation to our second measure of digitalization, the focus on digitalization (DIGITAL) is not significant in overall models and didn't impact on a positive way on market value performance (*H1*). In this case it can be a prediction that the digital transformation efforts will increase more needs in resources and investments to support the CDO initiatives, that will bring the more cost in the short-run (Nie et al., 2019). The digital managers play an important role in the business transformation since they act as enabler's of digital transformation and business development, exploring more and new opportunities to the firms, and consequently adding more value to the business in the future (long-run). This coordinating mechanism and benefits of accelerating digital transformation predict a positive impact of the CDO presence and consequently on firm performance (Firk et al., 2021). In this sense, these results confirm positively only our hypothesis (*H2*).

Consistent with our predictions, *prospector* business strategy has a positive and significant influence on firm performance (QTOBIN) and outperform *defender* business strategy in overall models (model 1 to model 4). In this sense, these results confirm our hypothesis (*H3*).

The results for some of the control variables (SIZE, LEV and LIQ) were statistically significant, where SIZE had a positive influence with 99% confidence, indicating that higher the SIZE, higher the earnings of listed firms. On the one hand and in relation to the controlling for intangible assets (IA), our results pointed out that there are significant but negative, which in this case may predict that the financial market does not value positively the investment on this type of assets, as a predictor of future returns (Ferdaous & Rahman, 2019), on the other hand the higher the intangibles (intangible intensity) may affect stock prices volatility (and higher risk) because of the increased of information asymmetry, as noted by recent studies (Wu & Lai, 2020).

6. Conclusions and future research

This study contributes to the existing literature in several ways. First, the empirical results of this study make a considerable and significant contribution to understand business strategy-performance relationship, in this context of digitalization. The alignment of business strategy with digital transformation, can yield a competitive advantage and may

enable a superior performance. Moreover, there is a lack of studies considering the strategy-performance relationship in this context. In this way, this research also contributed to the assessment of *Miles and Snow framework* which demonstrated to be applicable in a digital context.

Secondly, we also developed this strategy proxies (prospector strategy emphasis and defender strategy emphasis) on *Miles and Snow framework*, using textual components extracted from the annual reports of the listed companies, which allows us to have an assertive and rich information of each year operations and performance. In addition, the annual reports are also a reliable source of information, because of the high levels of disclosure obligations that these listed organizations are obliged, to investors and stakeholders in general.

The third contribution of this study is related to the role that prospector strategy can play in the digital transformation, namely in Technology companies. Our results stress that prospectors, that are characterised by a strong focus on innovation and exploring new opportunities, impact on significant and positive way the value of the companies, and this alignment with a digital trend, can translate into a superior and sustainable performance.

This study also provides brief recommendations for managers and also relevant policy implications. Managers and investors should be aware of strategic behaviour in this new digital environment, and how strategic fit will result in improved performance behaviour and adaptation to the external environment and market pressure for digitalization activities. The adoption of a digital path in the business model may need to be coordinated with a professional management, that in this case can be a digital officer (CDO). Furthermore, the fact that these types of managers are part of the management will certainly influence and integrate the company's digital strategy, increasing long-term performance.

In future research, the assessment of the digital business model and the digital maturity of the listed companies, may be another important development theme to study

7. Appendix

Table 4.6 List of Words - M&S Dimensions: *prospector and defender strategy emphasis*

PROSPECTOR	Adaptation Cycle	DEFENDER	Adaptation Cycle
advertis*	Entrepreneurial	centrali*	Administrative
brand* develop*	Entrepreneurial	competitive pric*	Administrative
creat* change*	Entrepreneurial	continuos improv*	Engineering
creativ*	Entrepreneurial	cost* effic*	Engineering
decentral*	Administrative	cost* control*	Engineering
product develop*	Entrepreneurial	cost* reduc*	Engineering
differenti*	Entrepreneurial	cost* saving*	Engineering
encourag* creat*	Administrative	customer* service*	Engineering
encourag* flex*	Administrative	efficien*	Engineering
explor*	Entrepreneurial	efficien* prod*	Engineering
explore market*	Entrepreneurial	high qualit*	Entrepreneurial
flexb*	Administrative	limited market*	Entrepreneurial
informal*	Administrative	limited Product*	Entrepreneurial
innovat*	Entrepreneurial	market penetration	Entrepreneurial
intellectual propert*	Entrepreneurial	market segment*	Entrepreneurial
invention	Engineering	niche market*	Entrepreneurial
market innov*	Engineering	norms*	Administrative
market opp*	Engineering	optimiz*	Administrative
marketing*	Engineering	planning control*	Administrative
new* market*	Entrepreneurial	internal control procedures	Administrative
new* product*	Entrepreneurial	process* improvement*	Engineering
patent*	Engineering	sales support*	Entrepreneurial
pioneer*	Entrepreneurial	stable customer*	Entrepreneurial
problem solving	Administrative	stable product*	Entrepreneurial
product engineer*	Engineering	standardi*	Administrative
product innov*	Engineering	tech* effic*	Engineering
project manag*	Administrative	vertical integration	Engineering
project plan*	Administrative	low cost	Engineering
new trademark*	Entrepreneurial	mature market	Entrepreneurial
prototype*	Engineering	functional structure	Administrative
R&D	Entrepreneurial	process control	Administrative
research and development	Entrepreneurial	stable growth	Entrepreneurial
research expert*	Administrative	incremental growth	Entrepreneurial
tech* flex*	Engineering	productivity	Engineering
technolog* dev*	Engineering	efficiency improvement*	Engineering
new patent*	Entrepreneurial	current customer*	Entrepreneurial
		capacity* utilization*	Administrative

Chapter 5. Conclusions

1. General Conclusions

The main purpose of the study presented, is to explore the relationship between business strategy and firm performance of listed companies in Europe in the STOXX index. Supporting our research on the framework developed by *Miles and Snow* (Miles et al., 1978; Snow & Hrebiniak, 1980), our analysis intends to verify if the business strategy is valid in the context of national culture, uncertainty and technology (*context of digital transformation*). Since the majority of the studies concerning the strategy and performance linkage were developed on the United States, our studies also contribute to the literature with a multi-industry analysis of European listed companies across 17 countries, in the most important stock exchange markets.

The first study explores the importance of strategic orientation and national culture in the performance of listed companies in Europe. This study contributes to the literature on the assertion of the impact of national culture on firm performance, where national culture plays a relevant role at strategy level (Kaul, 2019) and influence firms proactive behaviour and risk (Kreiser et al., 2010). In accordance with the results obtained for the period between 2012 and 2019, there is empirical evidence that strategy impacts significantly on firm performance (a market perception of firm performance measured by QTOBIN for a better understanding of the strategy and performance linkage). Consistent with our predictions, the results obtained also point out that national culture values and beliefs have an influence on firm performance, moderating the strategy-performance linkage. The clusters of national culture are significant and assume a preponderance on firm performance. Results stressed that Latin cluster and Nordic cluster moderate significantly the relation of strategy on firm value (performance).

The second study intends to analyse the main business strategy types based on Miles and Snow framework (Miles et al., 1978) behaviour over a period of time, in the context of

uncertainty and dynamism (national innovation capabilities). This study will enable a better understanding of the strategic behaviour that better fits to these contexts, where consistent with the hypothesis, we find that prospectors who are highly flexible, are better able to adapt and to fit better to the turbulent environment and consequently enable a better performance. We also introduced an econometric model with a quantile regression approach (Koenker, 2004; Koenker & Bassett, 1978), to complement our research with a better understanding strategy-performance linkage, analysing the effect of the explanatory variables at various quantiles of conditional performance distribution (Gallego-Álvarez & Ortas, 2017), at low and high levels of performance. Another important contribute of our study is that it takes in consideration the importance of countries in generation the conditions to foster innovation, that the most adaptable companies will certainly align within their business strategy. In this sense, our study points out the importance of prospectors, because of their ability to adapt and take risks, and accepting change.

Finally, the third study assess if the business strategy is still valid in the context of digital transformation, of high-technology European companies listed of STOXX600 index. In accordance with the panel data results obtained for the period between 2015 and 2019, and consistent with our predictions, our empirical findings suggest that strategy impacts significantly on firm performance. Prospector business strategy has a positive and significant influence on firm performance (QTOBIN). Findings also suggest that the focus on digitalization (DIGITAL) didn't impact on a positive way on market value performance, which can be a prediction that the digital transformation efforts will increase more needs in resources (and consequently more costs in the short-run) to support the *digital officers* (CDO) initiatives (Nie et al., 2019). Our findings also indicate that the presence CDO in the top management team, as an integral part of business strategy, impacts on a positive and significantly performance (QTOBIN), since this managers play an important role in the business transformation, acting as enabler's of digital transformation and helping in exploring new opportunities in the future (Firk et al., 2021).

Overall, these results are consistent with the main predictions, that strategy impacts on significant way firm performance.

During the research we were aware of open issues that can be an opportunity for future research. A future direction of research could be accessing the CEO goals and executive compensation in the different strategy types (*defenders, analyzers, and prospectors*), namely the planned strategy vs executed strategy over a long period of time and testing the strategy consistency. Concerning the third study (included in chapter 4), in future research, the assessment of the digital business model, may be another important development theme to study.

Briefly we can say that our research showed that, even in the case of listed companies, where the decision makers have the same level of academic training and professional experience, the national culture moderates the strategy-performance relationship.

In the same way, it was also found that the technological context (innovation dynamism) also influences the strategy-performance relationship of these companies.

Finally, we verified that the way those companies deal with digital transformation, that is, how they integrate the digitalization phenomenon in management, will also influence their performance.

From a theoretical point of view, we can therefore say that our research has shown that the Hofstede Model continues to be valid and capable of explaining how national culture influences management style and decision-making in large European companies, allowing us to identify and understand the functioning of three large clusters of companies: *Nordic, AngloGerman* and *Latin*.

It was also found that the Miles & Snow Model continues to explain the stable patterns of strategic behaviour of large European companies to deal with the perceived environmental conditions.

From the management point of view, our research alerts managers to the need to know the criteria and the decision-making process of the companies with which they relate in

terms of the three aspects that influence performance: the national culture, the technological and innovation context, and the way of dealing with digitalization in order to anticipate future decision-making.

As far as government entities are concerned, the existence of conditions that facilitate innovation, namely through research institutions and the simplification of processes, as well as mechanisms that diminish the technological, financial, and commercial risks of innovation, clearly have an influence on the performance of these companies.

References

- Agostini, L., Galati, F., & Gastaldi, L. (2019). The digitalization of the innovation process: Challenges and opportunities from a management perspective. *European Journal of Innovation Management*, 23(1), 1–12. <https://doi.org/10.1108/EJIM-11-2019-0330>
- Aleksić, A., & Rašić Jelavić, S. (2017). Testing for strategy-structure fit and its importance for performance. *Management: Journal of Contemporary Management Issues*, 22(1), 85–102. <https://doi.org/10.30924/mjcmi/2017.22.1.85>
- Aleksic, A., & Rasic, S. (2016). *Assessing characteristics and importance of organizational fit using Miles and Snow typology. 1996.*
- Antunes, I., Barandas-Karl, H., & Martins, F. V. (2013). The Impact Of National Cultures On International Marketing Strategy And Subsidiary Performance Of Portuguese Sme's. *The International Journal of Management*, 2(3), 38–45.
- Antunes, I. C. M., Barandas, H. G., & Martins, F. V. (2019). Subsidiary strategy and managers' perceptions of distance to foreign markets. *Review of International Business and Strategy*, 29(4), 347–364. <https://doi.org/10.1108/RIBS-01-2019-0007>
- Anwar, J., & Hasnu, S. (2016a). Business strategy and firm performance: a multi-industry analysis. *Journal of Strategy and Management*, 9(3), 361–382. <https://doi.org/10.1108/JSMA-09-2015-0071>
- Anwar, J., & Hasnu, S. (2016b). Strategy-performance linkage: methodological refinements and empirical analysis. *Journal of Asia Business Studies*, 10(3). <https://doi.org/10.1108/JABS-07-2015-0096>
- Anwar, J., & Hasnu, S. A. F. (2017a). Strategic patterns and firm performance: comparing consistent, flexible and reactor strategies. *Journal of Organizational Change Management*, 30(7), 1015–1029. <https://doi.org/10.1108/JOCM-03-2016-0053>
- Anwar, J., & Hasnu, S. A. F. (2017b). Strategy-performance relationships: A comparative analysis of pure, hybrid, and reactor strategies. *Journal of Advances in*

- Management Research*, 14(4), 446–465. <https://doi.org/10.1108/JAMR-07-2016-0056>
- Anwar, J., Hasnu, S. A. F., Butt, I., & Ahmed, N. (2021). Miles and Snow Typology: most influential journals, articles, authors and subject areas. *Journal of Organizational Change Management*, 34(2), 385–402. <https://doi.org/10.1108/JOCM-07-2018-0190>
- Anwar, J., Shah, S., & Hasnu, S. (2016). Business Strategy and Organizational Performance : Measures and Relationships. *Pakistan Economics and Social Review*, 54(1), 97–122.
- Aouadi, A., & Marsat, S. (2018). Do ESG Controversies Matter for Firm Value? Evidence from International Data. *Journal of Business Ethics*, 151(4), 1027–1047. <https://doi.org/10.1007/s10551-016-3213-8>
- Ariefiara, D., Utama, S., & Wardhani, R. (2017). Environmental uncertainty as a contingent factor of business strategy choice decision: Introducing an alternative measurement of uncertainty. *Australasian Accounting, Business and Finance Journal*, 11(4), 116–130. <https://doi.org/10.14453/aabfj.v11i4.9>
- Ariefiara, D., Utama, S., Wardhani, R., & Rahayu, N. (2020). Contingent fit between business strategies and environmental uncertainty: The impact on corporate tax avoidance in Indonesia. *Meditari Accountancy Research*, 28(1), 139–167. <https://doi.org/10.1108/MEDAR-05-2018-0338>
- Asdemir, O., Fernando, G. D., & Tripathy, A. (2013). Market perception of firm strategy. *Managerial Finance*, 39(2), 90–115. <https://doi.org/10.1108/03074351311293972>
- Bayraktar, C. A., Hancerliogullari, G., Cetinguc, B., & Calisir, F. (2017). Competitive strategies, innovation, and firm performance: an empirical study in a developing economy environment. *Technology Analysis and Strategic Management*, 29(1), 38–52. <https://doi.org/10.1080/09537325.2016.1194973>
- Bentley, K. A., South, N., Omer, T. C., Texas, A., & Sharp, N. Y. (2013). Business strategy, financial reporting irregularities, and audit effort. *Contemporary*

- Accounting Research*, 30(2), 780–817. <https://doi.org/10.1111/j.1911-3846.2012.01174.x>
- Bindra, S., Parameswar, N., & Dhir, S. (2019). Strategic management: The evolution of the field. *Strategic Change*, 28(6), 469–478. <https://doi.org/10.1002/jsc.2299>
- Blackmore, K., & Nesbitt, K. (2013). Verifying the Miles and Snow strategy types in Australian small- and medium-size enterprises. *Australian Journal of Management*, 38(1), 171–190. <https://doi.org/10.1177/0312896212444692>
- Borrero, S., Acosta, A., & Medina, A. F. (2020). Culture, strategy formulation, and firm performance: a meta-analysis. *Academia Revista Latinoamericana de Administracion*, 33(1), 147–176. <https://doi.org/10.1108/ARLA-01-2018-0013>
- Breuer, W., Ghufraan, B., & Salzmann, A. J. (2018). National culture, managerial preferences, and takeover performance. *International Business Review*, 27(6), 1270–1289. <https://doi.org/10.1016/j.ibusrev.2018.05.008>
- Caliński, T., & Harabasz, J. (1974). A dendrite method for cluster analysis. *Communications in Statistics*, 3(1), 1–27.
- Canay, I. A. (2011). A simple approach to quantile regression for panel data. *Econometrics Journal*, 14(3), 368–386. <https://doi.org/10.1111/j.1368-423X.2011.00349.x>
- Castellacci, F., & Natera, J. M. (2013). The dynamics of national innovation systems: A panel cointegration analysis of the coevolution between innovative capability and absorptive capacity. *Research Policy*, 42(3), 579–594. <https://doi.org/10.1016/j.respol.2012.10.006>
- Castellani, M. (2019). Does culture matter for the economic performance of countries? An overview of the literature. *Journal of Policy Modeling*, 41(4), 700–717. <https://doi.org/10.1016/j.jpolmod.2018.06.006>
- Cavaleri, S., & Shabana, K. (2018). Rethinking sustainability strategies. *Journal of Strategy and Management*, 11(1), 2–17. <https://doi.org/10.1108/JSMA-08-2016-0050>

- Chaminade, C., Lundvall, B-A., & Haneef, S. (2018). *Advanced Introduction to National Innovation Systems*. Edward Elgar.
- Chandler, A. D. (1962). *Strategy and Structure: Chapters in the History of the American Industrial Enterprise*, Cambridge, Mass.; London: The MIT Press. MIT Press.
- Chatzoglou, P., Chatzoudes, D., Sarigiannidis, L., & Theriou, G. (2018). The role of firm-specific factors in the strategy-performance relationship: Revisiting the resource-based view of the firm and the VRIO framework. *Management Research Review*, 41(1), 46–73. <https://doi.org/10.1108/MRR-10-2016-0243>
- Chernozhukov, V., & Hansen, C. (2008). Instrumental variable quantile regression: A robust inference approach. *Journal of Econometrics*, 142(1), 379–398. <https://doi.org/10.1016/j.jeconom.2007.06.005>
- Chui, A. C. W., Kwok, C. C. Y., & Stephen Zhou, G. (2016). National culture and the cost of debt. *Journal of Banking and Finance*, 69, 1–19. <https://doi.org/10.1016/j.jbankfin.2016.04.001>
- Claver-Cortés, E., Pertusa-Ortega, E. M., & Molina-Azorín, J. F. (2012). Characteristics of organizational structure relating to hybrid competitive strategy: Implications for performance. *Journal of Business Research*, 65(7), 993–1002. <https://doi.org/10.1016/j.jbusres.2011.04.012>
- Conant, J. S., Mokwa, M. P., & Varadarajan, P. R. (1990). Strategic Types , Distinctive Marketing Competencies and Organizational Performance : A Multiple Measures-Based Study Author (s): Jeffrey S . Conant , Michael P . Mokwa and P . Rajan Varadarajan Published by : Wiley Stable URL : <http://www.jstor.org/sta>. *Strategic Management Journal*, 11(5), 365–383.
- Desarbo, W. S., Di Benedetto, C. A., Song, M., & Sinha, I. (2005). Revisiting the miles and snow strategic framework: Uncovering interrelationships between strategic types, capabilities, environmental uncertainty, and firm performance. *Strategic Management Journal*, 26(1), 47–74. <https://doi.org/10.1002/smj.431>
- Dimara, E., Skuras, D., Tsekouras, K., & Goutsos, S. (2004). Strategic orientation and

- financial performance of firms implementing ISO 9000. *International Journal of Quality and Reliability Management*, 21(1), 72–89.
<https://doi.org/10.1108/02656710410511704>
- Dutta, S., Lanvin, B., & Wunsch-Vincent, S. (2018). *Global Innovation Index 2018*.
<http://creativecommons.org/licenses/by-nc-nd/3.0/igo/>.%0A<https://www.globalinnovationindex.org/gii-2018-report>
- Engelen, A., Schmidt, S., & Buchsteiner, M. (2015). The simultaneous influence of national culture and market turbulence on entrepreneurial orientation: A nine-country study. *Journal of International Management*, 21(1), 18–30.
<https://doi.org/10.1016/j.intman.2014.12.002>
- Ferdaous, J., & Rahman, M. M. (2019). The effects of intangible assets on firm performance. *American Journal of Business*, 34(3/4), 148–168.
<https://doi.org/10.1108/ajb-11-2018-0065>
- Fernandes, A. A. R., & Solimun. (2017). Moderating effects orientation and innovation strategy on the effect of uncertainty on the performance of business environment. *International Journal of Law and Management*, 59(6), 1211–1219.
<https://doi.org/10.1108/IJLMA-10-2016-0088>
- Firk, S., Hanelt, A., Oehmichen, J., & Wolff, M. (2021). Chief Digital Officers: An Analysis of the Presence of a Centralized Digital Transformation Role. *Journal of Management Studies*, 58(7), 1800–1831. <https://doi.org/10.1111/joms.12718>
- Gaganis, C., Hasan, I., Papadimitri, P., & Tasiou, M. (2019). National culture and risk-taking: Evidence from the insurance industry. *Journal of Business Research*, 97(December 2018), 104–116. <https://doi.org/10.1016/j.jbusres.2018.12.037>
- Gallego-Álvarez, P. I., & Ortas, P. E. (2017). Corporate environmental sustainability reporting in the context of national cultures: A quantile regression approach. *International Business Review*, 26(2), 337–353.
<https://doi.org/10.1016/j.ibusrev.2016.09.003>
- GII. (2022). Global Innovation Index. <https://www.globalinnovationindex.org/analysis-indicator/> (accessed 18 Feb. 2022).

- Gleason, K. C., Mathur, L. K., & Mathur, I. (2000). The interrelationship between culture, capital structure, and performance: Evidence from European retailers. *Journal of Business Research*, 50(2), 185–191. [https://doi.org/10.1016/S0148-2963\(99\)00031-4](https://doi.org/10.1016/S0148-2963(99)00031-4)
- González-Rodríguez, M. R., Jiménez-Caballero, J. L., Martín-Samper, R. C., Köseoglu, M. A., & Okumus, F. (2018). Revisiting the link between business strategy and performance: Evidence from hotels. *International Journal of Hospitality Management*, 72(November 2017), 21–31. <https://doi.org/10.1016/j.ijhm.2017.11.008>
- Gordon, L. A., Loeb, M. P., & Tseng, C. Y. (2009). Enterprise risk management and firm performance: A contingency perspective. *Journal of Accounting and Public Policy*, 28(4), 301–327. <https://doi.org/10.1016/j.jaccpubpol.2009.06.006>
- Graafland, J., & Noorderhaven, N. (2018). National culture and environmental responsibility research revisited. *International Business Review*, 27(5), 958–968. <https://doi.org/10.1016/j.ibusrev.2018.02.006>
- Habib, A., & Hasan, M. M. (2017). Business strategy, overvalued equities, and stock price crash risk. *Research in International Business and Finance*, 39, 389–405. <https://doi.org/10.1016/j.ribaf.2016.09.011>
- Habib, A., Hossain, M., & Jiang, H. (2011). Environmental uncertainty and the market pricing of earnings smoothness. *Advances in Accounting*, 27(2), 256–265. <https://doi.org/10.1016/j.adiac.2011.04.003>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7 ed). Prentice Hall.
- Hambrick, D. C. (1983). Some tests of the effectiveness and functional attributes of Miles and Snow's strategic types. *Academy of Management Journal. Academy of Management*, 26(1), 5–26. <https://doi.org/10.2307/256132>
- Hambrick, Donald C. (1983). High Profit Strategies in Mature Capital Goods Industries: A Contingency Approach. *Academy of Management Journal*, 26(4), 687–707. <https://doi.org/10.5465/255916>

- Hanelt, A., Bohnsack, R., Marz, D., & Antunes Marante, C. (2021). A Systematic Review of the Literature on Digital Transformation: Insights and Implications for Strategy and Organizational Change. *Journal of Management Studies*, 58(5), 1159–1197. <https://doi.org/10.1111/joms.12639>
- Heiens, R. A., Quttainah, M. A., & Pleshko, L. P. (2018). The Miles And Snow Typology Groups A Comparision Of Services And Manufacturing Samples. *Arab Journal of Administrative Sciences*, 25(1), 121. <https://doi.org/10.34120/0430-025-001-005>
- Hilgen, M., & Huang Kabir HC van Beusichem, X. R. (2014). *The impact of cultural clusters on capital structure decisions: Evidence from European retailers*.
- Hofstede, G. (1991). *Culture and Organizations*. McGraw Hill.
- Hofstede, G. (2001). *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations Across Nations* (2nd ed.). Sage.
- Hofstede, Geert. (2011). Dimensionalizing Cultures : The Hofstede Models in Context. *Online Readings in Psychology and Culture, Unit 2*. Retrieved from <Http://Scholarworks.Gvsu.Edu/Orpc/Vol2/Iss1/8>, 2(8), 1–26.
- Hofstede, Geert, Hofstede, G. J., & Minkov, M. (2010). *Cultures and organizations: Software of the mind*.
- House, R. J., Hanges, P. J., Javidan, M., Dorfman, P. W., & G. (2004). *Culture, leadership, and organizations: The GLOBE study of 62 societies*.
- Ingram, T., Kraśnicka, T., Wronka-Pośpiech, M., Głód, G., & Głód, W. (2016). Relationships between miles and snow strategic types and organizational performance in Polish production companies. *Journal of Management and Business Administration. Central Europe*, 24(1), 17–45. <https://doi.org/10.7206/jmba.ce.2450-7814.162>
- Janicijevic, N. (2014). The role of national culture in choosing a change strategy in organizations. *Ekonomski Horizonti*, 16(1), 3–15. <https://doi.org/10.5937/ekonhor1401003j>

- Jardón, C. F., Molodchik, M., & Paklina, S. (2018). Strategic behaviour of Russian companies with regard to intangibles. *Management Decision*, 56(11), 2373–2390. <https://doi.org/10.1108/MD-04-2017-0399>
- Jennings, D. F., Rajaratnam, D., & Lawrence, F. B. (2003). Strategy-Performance Relationships In Service Firms : A Test For Equifinality. *Journal of Managerial Issues*, 15(2), 208–220.
- Johnson, G. J. Y., Sun, L., & Zhang, J. H. (2015). Firms' Environmental Uncertainty and Excessive CEO Pay. *Accounting and Finance Research*, 4(4), 115–126. <https://doi.org/10.5430/afr.v4n4p115>
- Jusoh, R., & Parnell, J. A. (2008). Competitive strategy and performance measurement in the Malaysian context: An exploratory study. *Management Decision*, 46(1), 5–31. <https://doi.org/10.1108/00251740810846716>
- Kabanoff, B., & Brown, S. (2008). Knowledge structures of prospectors, analyzers, and defenders: Content, structure, stability, and performance. *Strategic Management Journal*, 29(2), 149–171. <https://doi.org/10.1002/smj.644>
- Kafetzopoulos, D., Psomas, E., & Skalkos, D. (2019). Innovation dimensions and business performance under environmental uncertainty. *European Journal of Innovation Management*, 2014. <https://doi.org/10.1108/EJIM-07-2019-0197>
- Kane, G. C., Palmer, D., Philips Nguyen, A., Kiron, D., & Buckley, N. (2015). Strategy, Not Technology, Drives Digital Transformation. *MIT Sloan Management Review & Deloitte*, 57181, 27. <http://sloanreview.mit.edu/projects/strategy-drives-digital-transformation/>
- Kaul, A. (2019). Culture vs strategy: which to precede, which to align? *Journal of Strategy and Management*, 12(1), 116–136. <https://doi.org/10.1108/JSMA-04-2018-0036>
- Kessel, L., & Graf-Vlachy, L. (2021). Chief digital officers: the state of the art and the road ahead. In *Management Review Quarterly* (Issue 0123456789). Springer International Publishing. <https://doi.org/10.1007/s11301-021-00227-8>
- Kile, C. O., & Phillips, M. E. (2009). Using industry classification codes to sample

- high-technology firms: Analysis and recommendations. *Journal of Accounting, Auditing and Finance*, 24(1), 35–58.
<https://doi.org/10.1177/0148558X0902400104>
- Koenker, R. (2004). Quantile regression for longitudinal data. *Journal of Multivariate Analysis*, 91(1), 74–89. <https://doi.org/10.1016/j.jmva.2004.05.006>
- Koenker, R. (2017). Quantile regression: 40 years on. *Annual Review of Economics*, 9, 155–176. <https://doi.org/10.1146/annurev-economics-063016-103651>
- Koenker, R., & Bassett, G. (1978). Regression Quantiles Author (s): Roger Koenker , Gilbert Bassett and Jr . Published by : The Econometric Society Stable URL : <https://www.jstor.org/stable/1913643> The Econometric Society is collaborating with JSTOR to digitize , preserve and extend acce. *Econometrica*, 46(1), 33–50.
- Kogut, B., & Singh, H. (1988). The Effect of National Culture on the Choice of Entry Mode. *Journal of International Business Studies*, 19(3), 411–432.
<https://doi.org/10.1057/palgrave.jibs.8490394>
- Kong, D., Yang, X., Liu, C., & Yang, W. (2020). Business strategy and firm efforts on environmental protection: Evidence from China. *Business Strategy and the Environment*, 29(2), 445–464. <https://doi.org/10.1002/bse.2376>
- Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, N., & Roig-Tierno, N. (2021). Digital Transformation: An Overview of the Current State of the Art of Research. *SAGE Open*, 11(3). <https://doi.org/10.1177/21582440211047576>
- Kreiser, P. M., Marino, L. D., Dickson, P., & Weaver, K. M. (2010). Cultural influences on entrepreneurial orientation: The impact of national culture on risk taking and proactiveness in SMEs. *Entrepreneurship: Theory and Practice*, 34(5), 959–983.
<https://doi.org/10.1111/j.1540-6520.2010.00396.x>
- Kren, L. (1992). Budgetary participation and managerial performance: The impact of information and environmental volatility. *The Accounting Review*, 67(3), 511–526.
<https://doi.org/10.5267/j.msl.2015.7.001>
- Kunisch, S., Menz, M., & Langan, R. (2020). Chief digital officers : An exploratory analysis of their emergence , nature , and determinants. *Long Range Planning*, July

- 2019, 101999. <https://doi.org/10.1016/j.lrp.2020.101999>
- Kurtz, H., Hanelt, A., & Kolbe, L. (2021). Exploring Strategic Orientations in the Age of Digital Transformation: A Longitudinal Analysis of Digital Business Model Patterns. *Wirtschaftsinformatik 2021 Proceedings*.
<https://aisel.aisnet.org/wi2021/HDigitaltransformation17/Track17/2>
- Lin, C., Tsai, H. L., & Wu, J. C. (2014). Collaboration strategy decision-making using the Miles and Snow typology. *Journal of Business Research*, 67(9), 1979–1990.
<https://doi.org/10.1016/j.jbusres.2013.10.013>
- Lopo Martinez, A., & Ferreira, B. A. (2019). Business strategy and tax aggressiveness in Brazil. *Journal of Strategy and Management*, 12(4), 522–535.
<https://doi.org/10.1108/JSMA-03-2019-0040>
- Lundvall, B. Å. (1998). Why study national systems and national styles of innovation? *Technology Analysis and Strategic Management*, 10(4), 403–422.
<https://doi.org/10.1080/09537329808524324>
- Luoma, M. A. (2015). Revisiting the strategy-performance linkage: An application of an empirically derived typology of strategy content areas. *Management Decision*, 53(5), 1083–1106. <https://doi.org/10.1108/MD-10-2014-0593>
- Maloney, W. F. (2017). *Revisiting the National Innovation System in Developing Countries*. October. <https://doi.org/10.1596/1813-9450-8219>
- Mansfield, E. R., Helms, B. P., Mansfield, E. R., Helms, B. P., Ima, J., & Vlv, C. (2016). *Detecting Multicollinearity Published by : Taylor & Francis , Ltd . on behalf of the American Statistical Association Stable URL :*
<http://www.jstor.org/stable/2683167> Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use. 36(3), 158–160.
- Matt, C., Hess, T., & Benlian, A. (2015). Digital Transformation Strategies. *Business and Information Systems Engineering*, 57(5), 339–343.
<https://doi.org/10.1007/s12599-015-0401-5>
- McDaniel, S. W., & Kolari, J. W. (1987). Marketing Strategy Implications of the Miles and Snow Strategic Typology. *Journal of Marketing*, 51(4), 19.

<https://doi.org/10.2307/1251245>

- Menna, A., R. Walsh, P., & Ekhtari, H. (2019). Identifying enablers of innovation in developed economies: A National Innovation Systems approach. *Journal of Innovation Management*, 7(1), 108–128. https://doi.org/10.24840/2183-0606_007.001_0007
- Menz, M., Kunisch, S., Birkinshaw, J., Collis, D. J., Foss, N. J., Hoskisson, R. E., & Prescott, J. E. (2021). Corporate Strategy and the Theory of the Firm in the Digital Age. *Journal of Management Studies*, 58(7), 1695–1720. <https://doi.org/10.1111/joms.12760>
- Miles, R. E., & Snow, C. C. (1978). *Organizational Strategy, Structure and Process*. McGraw- Hill.
- Miles, R. E., Snow, C. C., Meyer, A. D., & Coleman, H. J. (1978). Organizational Strategy , Structure , and Process. *The Academy of Management Review*, 3(3), 546–562.
- Mohamed Adnan, S., Hay, D., & van Staden, C. J. (2018). The influence of culture and corporate governance on corporate social responsibility disclosure: A cross country analysis. *Journal of Cleaner Production*, 198, 820–832. <https://doi.org/10.1016/j.jclepro.2018.07.057>
- Moonen, P. (2017). The impact of culture on the innovative strength of nations: A comprehensive review of the theories of Hofstede, Schwartz, Boisot and Cameron and Quinn. *Journal of Organizational Change Management*, 30(7), 1149–1183. <https://doi.org/10.1108/JOCM-08-2017-0311>
- Mourouzidou-Damtsa, S., Milidonis, A., & Stathopoulos, K. (2019). National culture and bank risk-taking. *Journal of Financial Stability*, 40, 132–143. <https://doi.org/10.1016/j.jfs.2017.08.007>
- Naghavi, N., Pahlevan Sharif, S., & Iqbal Hussain, H. Bin. (2020). The role of national culture in the impact of board gender diversity on firm performance: evidence from a multi-country study. *Equality, Diversity and Inclusion*, 40(5), 631–650. <https://doi.org/10.1108/EDI-04-2020-0092>

- Nie, Y., Talburt, J., Dagtas, S., & Feng, T. (2019). The influence of chief data officer presence on firm performance: does firm size matter? *Industrial Management and Data Systems*, 119(3), 495–520. <https://doi.org/10.1108/IMDS-03-2018-0101>
- Nishant, R., Zhan, X., Mu, Y., & Singhal, V. R. (2020). Stock Market Reaction to Chief Data or Digital Officers Appointments. *IEEE Engineering Management Review*, 48(4), 86–91. <https://doi.org/10.1109/EMR.2020.3027189>
- Olson, E. M., Slater, S. F., & Hult, G. T. M. (2005). The performance implications of fit among business strategy, marketing organization structure, and strategic behavior. *Journal of Marketing*, 69(3), 49–65. <https://doi.org/10.1509/jmkg.69.3.49.66362>
- Parnell, J. A. (2010). Strategic clarity, business strategy and performance. *Journal of Strategy and Management*, 3(4), 304–324. <https://doi.org/10.1108/17554251011092683>
- Parnell, J. A., Koseoglu, M. A., Long, Z., & Spillan, J. E. (2012). Competitive strategy, uncertainty, and performance: An exploratory assessment of China and Turkey. *Journal of Transnational Management*, 17(2), 91–117. <https://doi.org/10.1080/15475778.2012.676957>
- Parnell, J. A., Lester, D. L., Long, Z., & Köseoglu, M. A. (2012). How environmental uncertainty affects the link between business strategy and performance in SMEs: Evidence from China, Turkey, and the USA. *Management Decision*, 50(4), 546–568. <https://doi.org/10.1108/00251741211220129>
- Parnell, J. A., Lester, D. L., & Menefee, M. L. (2000). Strategy as a response to organizational uncertainty: an alternative perspective on the strategy-performance relationship. *Management Decision*, 38(8), 520–530. <https://doi.org/10.1108/00251740010352811>
- Parnell, J. A., Long, Z., & Lester, D. (2015). Competitive strategy, capabilities and uncertainty in small and medium sized enterprises (SMEs) in China and the united states. *Management Decision*, 53(2), 402–431. <https://doi.org/10.1108/MD-04-2014-0222>
- Pertusa-Ortega, E. M., Molina-Azorín, J. F., & Claver-Cortés, E. (2009). Competitive

- strategies and firm performance: A comparative analysis of pure, hybrid and “stuck-in-the-middle” strategies in Spanish firms. *British Journal of Management*, 20(4), 508–523. <https://doi.org/10.1111/j.1467-8551.2008.00597.x>
- Porter, M. E. (1980). *Competitive Strategy*. Free Press.
- Raković, L., Marić, S., Milutinović, L. Đ., Sakal, M., & Antić, S. (2022). What about the Chief Digital Officer? A Literature Review. *Sustainability (Switzerland)*, 14(8). <https://doi.org/10.3390/su14084696>
- Ruel, H., Rowlands, H., & Njoku, E. (2020). Digital business strategizing: the role of leadership and organizational learning. *Competitiveness Review*, 31(1), 145–161. <https://doi.org/10.1108/CR-11-2019-0109>
- Salavou, H. E. (2013). Hybrid strategies in Greece: A pleasant surprise. *European Business Review*, 25(3), 301–314. <https://doi.org/10.1108/09555341311314834>
- Samara, E., Georgiadis, P., & Bakouros, I. (2012). The impact of innovation policies on the performance of national innovation systems: A system dynamics analysis. *Technovation*, 32(11), 624–638. <https://doi.org/10.1016/j.technovation.2012.06.002>
- Sarac, M., Ertan, Y., & Yucel, E. (2014). How Do Business Strategies Predict Firm Performance ? An Investigation On Borsa Istanbul 100 Index. *The Journal of Accounting and Finance*, 61(1), 121–134.
- Schmid, J., & Wang, F. L. (2017). Beyond national innovation systems: Incentives and China’s innovation performance. *Journal of Contemporary China*, 26(104), 280–296. <https://doi.org/10.1080/10670564.2016.1223108>
- Shi, W., & Veenstra, K. (2021). The Moderating Effect of Cultural Values on the Relationship Between Corporate Social Performance and Firm Performance. *Journal of Business Ethics*, 174(1), 89–107. <https://doi.org/10.1007/s10551-020-04555-9>
- Shortell, S. M., & Zajac, E. J. (1990). Perceptual and Archival Measures of Miles and Snow ’ s Strategic Types : A Comprehensive Assessment of Reliability and Validity Author (s): Stephen M . Shortell and Edward J . Zajac Source : The

- Academy of Management Journal , Vol . 33 , No . 4 (Dec ., *Academy of Management Journal*, 33(4), 817–832.
- Singh, A., & Hess, T. (2017). How chief digital officers promote the digital transformation of their companies. *MIS Quarterly Executive*, 16(1), 1–17. <https://doi.org/10.4324/9780429286797-9>
- Singh, A., Klarnar, P., & Hess, T. (2020). How do chief digital officers pursue digital transformation activities? The role of organization design parameters. *Long Range Planning*, 53(3), 101890. <https://doi.org/10.1016/j.lrp.2019.07.001>
- Smith, K. G., Guthrie, J. P., & Chen, M.-J. (1986). Miles and Snow's Typology of Strategy, Organizational Size and Organizational Performance. *Academy of Management Proceedings*, 1986(1), 45–49. <https://doi.org/10.5465/ambpp.1986.4978509>
- Snow, C. C., & Hrebiniak, L. G. (1980). Strategy , Distinctive Competence , and Organizational Performance. *Administrative Science Quarterly*, 25(2), 317–336. <http://www.jstor.org/stable/2392457>
- Sohn, S. Y., Kim, D. H., & Jeon, S. Y. (2016). Re-evaluation of global innovation index based on a structural equation model. *Technology Analysis and Strategic Management*, 28(4), 492–505. <https://doi.org/10.1080/09537325.2015.1104412>
- Sollosy, M., Guidice, R. M., & Parboteeah, K. P. (2015). A Contemporary Examination Of The Miles & Snow Strategic Typology Through The Lens Of Ambidexterity. *Academy of Management Proceedings*, 2015(1), 11213–11213. <https://doi.org/10.5465/ambpp.2015.11213abstract>
- Sollosy, Marc, Guidice, R. M., & Parboteeah, K. P. (2019). Miles and Snow's strategic typology redux through the lens of ambidexterity. *International Journal of Organizational Analysis*, 27(4), 925–946. <https://doi.org/10.1108/IJOA-05-2018-1433>
- Song, F. (Sophie), Montabon, F., & Xu, Y. (2018). The impact of national culture on corporate adoption of environmental management practices and their effectiveness. *International Journal of Production Economics*, 205(September), 313–328.

<https://doi.org/10.1016/j.ijpe.2018.09.020>

- Song, L., Augustine, D., & Yang, J. Y. (2016). Environmental uncertainty, prospector strategy, and new venture performance: the moderating role of network capabilities. *International Entrepreneurship and Management Journal*, 12(4), 1103–1126. <https://doi.org/10.1007/s11365-016-0382-y>
- Sousa-Zomer, T. T., Neely, A., Martinez, V., Zomer, T., Neely, A., & Martinez, V. (2020). Digital transforming capability and performance: a microfoundational perspective. *International Journal of Operations and Production Management*, 40(7–8), 1095–1128. <https://doi.org/10.1108/IJOPM-06-2019-0444>
- Spanos, Y. E., Zaralis, G., & Lioukas, S. (2004). Strategy and industry effects on profitability: Evidence from Greece. *Strategic Management Journal*, 25(2), 139–165. <https://doi.org/10.1002/smj.369>
- Tavalaei, M. M., & Santalo, J. (2019). Pure versus hybrid competitive strategies in the airport industry. *Transportation Research Part A: Policy and Practice*, 124(January), 444–455. <https://doi.org/10.1016/j.tra.2019.04.015>
- Thanetsunthorn, N., & Wuthisatian, R. (2019). Understanding trust across cultures: an empirical investigation. *Review of International Business and Strategy*, 29(4), 286–314. <https://doi.org/10.1108/RIBS-12-2018-0103>
- Thomas, A. S., & Ramaswamy, K. (1996). Matching managers to strategy: Further tests of the miles and snow typology. *British Journal of Management*, 7(3), 247–261. <https://doi.org/10.1111/j.1467-8551.1996.tb00118.x>
- Tian, M., Deng, P., Zhang, Y., & Salmador, M. P. (2018). How does culture influence innovation? A systematic literature review. *Management Decision*, 56(5), 1088–1107. <https://doi.org/10.1108/MD-05-2017-0462>
- Velinov, E., Maly, M., Petrenko, Y., Denisov, I., & Vassilev, V. (2020). The role of top management team digitalization and firm internationalization for sustainable business. *Sustainability (Switzerland)*, 12(22), 1–11. <https://doi.org/10.3390/su12229502>
- Venkatraman, N., & Ramanujam, V. (1986). Measurement of Business Performance in

- Strategy Research : A Comparison of Approaches Published by : Academy of Management Stable URL : <http://www.jstor.org/stable/258398> Linked references are available on JSTOR for this article : Measurement of Business. *The Academy of Management Review*, 11(4), 801–814.
- Verma, P., & Sharma, R. R. K. (2019). The linkages between business strategies, culture, and compensation using Miles & Snow's and Hofstede culture framework in conglomerate firms. *Benchmarking*, 26(4), 1132–1160.
<https://doi.org/10.1108/BIJ-06-2017-0153>
- Vorhies, D. W., Morgan, R. E., & Autry, C. W. (2009). Product-market strategy and the marketing capabilities of the firm: Impact on market effectiveness and cash flow performance. *Strategic Management Journal*, 30(12), 1310–1334.
<https://doi.org/10.1002/smj.798>
- Wang, D., & Esqueda, O. A. (2014). National cultural effects on leverage decisions: Evidence from emerging-market ADRs. *Research in International Business and Finance*, 31, 152–177. <https://doi.org/10.1016/j.ribaf.2013.06.006>
- Wang, K., Pellegrini, M. M., Xue, J., & Wang, C. (2019). Environment uncertainty and a firm's strategic change the moderating role of political connection and family ownership. *Journal of Family Business Management*.
<https://doi.org/10.1108/JFBM-06-2019-0041>
- Wang, X., Wang, Z., & Jiang, Z. (2020). Configurational differences of national innovation capability: a fuzzy set qualitative comparative analysis approach. *Technology Analysis and Strategic Management*, 33(6), 599–611.
<https://doi.org/10.1080/09537325.2020.1832211>
- Watkins, A., Papaioannou, T., Mugwagwa, J., & Kale, D. (2015). National innovation systems and the intermediary role of industry associations in building institutional capacities for innovation in developing countries: A critical review of the literature. *Research Policy*, 44(8), 1407–1418.
<https://doi.org/10.1016/j.respol.2015.05.004>
- White, H. (1980). A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. *Econometrica*, 48(4), 817–838.

- Woodside, A. G., Sullivan, D. P., & Trappey, R. J. (1999). Assessing relationships among strategic types, distinctive marketing competencies, and organizational performance. *Journal of Business Research*, 45(2), 135–146.
[https://doi.org/10.1016/S0148-2963\(97\)00232-4](https://doi.org/10.1016/S0148-2963(97)00232-4)
- Wooldridge, J. M. (2002). *Econometric Analysis of Cross Section and Panel Data* (Issue The MIT Press, Cambridge, Massachusetts).
- World Bank. (2022). “*GII indicator available at*”:
https://tcdata360.worldbank.org/indicators/3aa2eb70?indicator=40712&viz=line_chart&years=2013,2020 (accessed 18 Feb. 2022)
- Wrede, M., Velamuri, V. K., & Dauth, T. (2020). Top managers in the digital age: Exploring the role and practices of top managers in firms’ digital transformation. *Managerial and Decision Economics*, 41(8), 1549–1567.
<https://doi.org/10.1002/mde.3202>
- Wu, K., & Lai, S. (2020). Intangible intensity and stock price crash risk. *Journal of Corporate Finance*, 64(December 2019), 101682.
<https://doi.org/10.1016/j.jcorpfin.2020.101682>
- Ye, X., & Sun, Y. (2018). Heteroskedasticity- and autocorrelation-robust F and t tests in stata. *Stata Journal*, 18(4), 951–980. <https://doi.org/10.1177/1536867x1801800412>
- Yeung, J. H. Y., Selen, W., Sum, C. C., & Huo, B. (2006). Linking financial performance to strategic orientation and operational priorities: An empirical study of third-party logistics providers. *International Journal of Physical Distribution and Logistics Management*, 36(3), 210–230.
<https://doi.org/10.1108/09600030610661804>
- Zainuddin, M., Mahi, M., Akter, S., & Yasin, I. M. (2020). The role of national culture in the relationship between microfinance outreach and sustainability: a correlated random effects approach. *Cross Cultural and Strategic Management*, 27(3), 447–472. <https://doi.org/10.1108/CCSM-12-2019-0219>
- Zamani, S., Parnell, J., Labbaf, H., & O’Regan, N. (2014). Strategic Change and Decision Making in an Emerging Nation: An Exploratory Assessment of Iranian

Manufacturing Firms. *Strategic Change*, 23, 63–80. <https://doi.org/10.1002/jsc>

Zheng, X., El Ghouli, S., Guedhami, O., & Kwok, C. C. Y. (2012). National culture and corporate debt maturity. *Journal of Banking and Finance*, 36(2), 468–488. <https://doi.org/10.1016/j.jbankfin.2011.08.004>