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A New Perspective on Managerial Careers:

Three Sequence Analyses of Executive Career Paths

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Abstract

Motivated by upper echelons research and career research, this doctoral thesis examines which career paths lead to different C-level positions and whether these career paths can be generalized. In doing so, it first aims to derive typical career patterns for three executive positions. Second, it aims to test the proclaimed shift from traditional to more unstable career paths (i.e., boundaryless careers). The thesis is comprised of three empirical studies, which analyze executives' careers with the help of optimal matching analysis, an innovative form of sequence analysis frequently applied in sociological research.

The first study focuses on the second most important actor at the top of the firm, the chief financial officer (CFO), and analyzes a unique dataset of 97 German CFOs from public and private firms. The results show five CFO career patterns, which differ in organizational tenure, international experience, and functional experience of the CFOs. The results further indicate that three early career choices are associated with CFO career patterns: educational level, entry organization, and entry industry.

The second study outlines unexplored paths that lead to partner positions, based on the careers of 291 American and German partners of the "Big Three" consulting firms. The results reveal four career patterns that involve multiple moves across organizational and industry boundaries and thus reflect the definition of a boundaryless career. Only one career pattern reflects the definition of a traditional organizational career. The results also demonstrate that American partners, and partners with fewer years of pre-employment education, are more likely to follow boundaryless career patterns.

The third study focuses on the careers of a relatively new functional executive: the chief digital officer (CDO). It examines a sample of 61 German CDOs, predominantly from large private firms, and explores their educational backgrounds and career paths. The results indicate

that CDOs typically hold non-technical university degrees and that the majority follow a cross-functional career pattern, covering marketing and sales, and the operations function.

In summary, these findings support and extend career theory by providing new evidence that boundaryless careers exist in different corporate functions and industries with strict hierarchies and advancement principles, such as consulting. Additionally, the results contribute to the ongoing debate on the roles of senior executives by exploring their educational background and experience. This has implications for corporate recruiting and human resource management, and for future research into top management careers.

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List of Abbreviations

CDO	Chief digital officer
CFO	Chief financial officer
MBA	Master of business administration
OMA	Optimal matching analysis

1. Introduction

1.1 Motivation and Structure of the Thesis

Consider the life stories of an Austrian and a German who held CEO positions at two of the largest public companies in the world (Forbes, 2018). The former, Peter Löscher, was born in Austria in 1957. He first studied business administration in Austria and later earned a master of business administration (MBA) degree from the Chinese University of Hong Kong. After graduating, Mr. Löscher worked for a German consulting firm for two years, stayed at the German pharmaceuticals company Hoechst (later Aventis) for 15 years, then worked for the pharmaceuticals company Amersham (later General Electric) for four years, and finally for Merck for one year. In 2007, Mr. Löscher became the CEO of Siemens, one of the largest public companies in Germany. The other executive, Dieter Zetsche, was born in 1953. He studied electrical engineering in Germany and earned a doctor of engineering from the University of Paderborn. Dr. Zetsche, also known as Dr. Z due to a marketing campaign in the United States, worked for the German automotive manufacturer Daimler for 30 years and became CEO of Daimler in 2006.

It is remarkable that both men were born in the mid-1950s and simultaneously held CEO positions at two of the largest public companies in the world between 2007 and 2013. Even their promotions to CEO occurred in consecutive years. Yet their careers evolved in a very diverging manner. Dr. Zetsche stayed at Daimler for all of his professional life; in fact, he still does as of early 2019. Mr. Löscher, on the other hand, not only changed his employer four times before becoming CEO, but also moved from consulting to the pharmaceuticals industry and finally to an engineering conglomerate. Naturally, these life stories raise a number of questions: Why did the two careers evolve in such different ways? How did the educational background of the executives shape their careers? Further, and most importantly, can their careers be generalized in any way, that is, do they reflect a certain pattern?

In this thesis, I argue that career theory and a systematic and quantitative analysis of the data contained in the life stories of executives such as Mr. Löscher and Dr. Zetsche can provide meaningful answers to these questions. With the help of innovative techniques, it is possible to model, visualize, and categorize the life stories and thereby learn which path managers typically took to get to their position.

This introductory chapter continues with the research questions and contributions of the three empirical studies that form the main body of this thesis (section 1.2). The following section (section 1.3) provides an overview of research on executives and their careers. Section 1.4 is devoted to sequence analysis, an innovative methodology frequently used to analyze careers. The final part of the introduction (section 1.5) summarizes the results of the three empirical studies. The three subsequent main chapters each present one empirical study of managerial careers: chapter 2 focuses on chief financial officers (CFOs), chapter 3 on partners in management consulting firms, and chapter 4 on chief digital officers (CDOs). Chapter 5 closes with the implications of the studies' results and an outlook on future research.

1.2 Research Questions and Contribution

Figure 1 visualizes the positioning of the three empirical studies in this thesis within the relevant streams of extant research, which I will discuss in detail in section 1.3. The three studies focus on the careers of three types of executives: CFOs, partners (i.e., the leaders in firms that are organized as partnerships), and CDOs. By doing so, the studies address recent calls from career researchers for more research on objectively observable careers (Briscoe, Hall, & Frautschy DeMuth, 2006; Vinkenburg & Weber, 2012), as well as calls from upper echelon researchers for more research on the background of functional top managers, such as CFOs or CDOs (Menz, 2011; Six, Normann, Stock, & Schiereck, 2013). Additionally, all three

studies add to the body of research on the boundaryless career and address two of the major criticisms in the literature:

- the ambiguous definition of the concept; and

- a lack of empirical evidence for it (Inkson, Gunz, Ganesh, & Roper, 2012; Rodrigues & Guest, 2010).
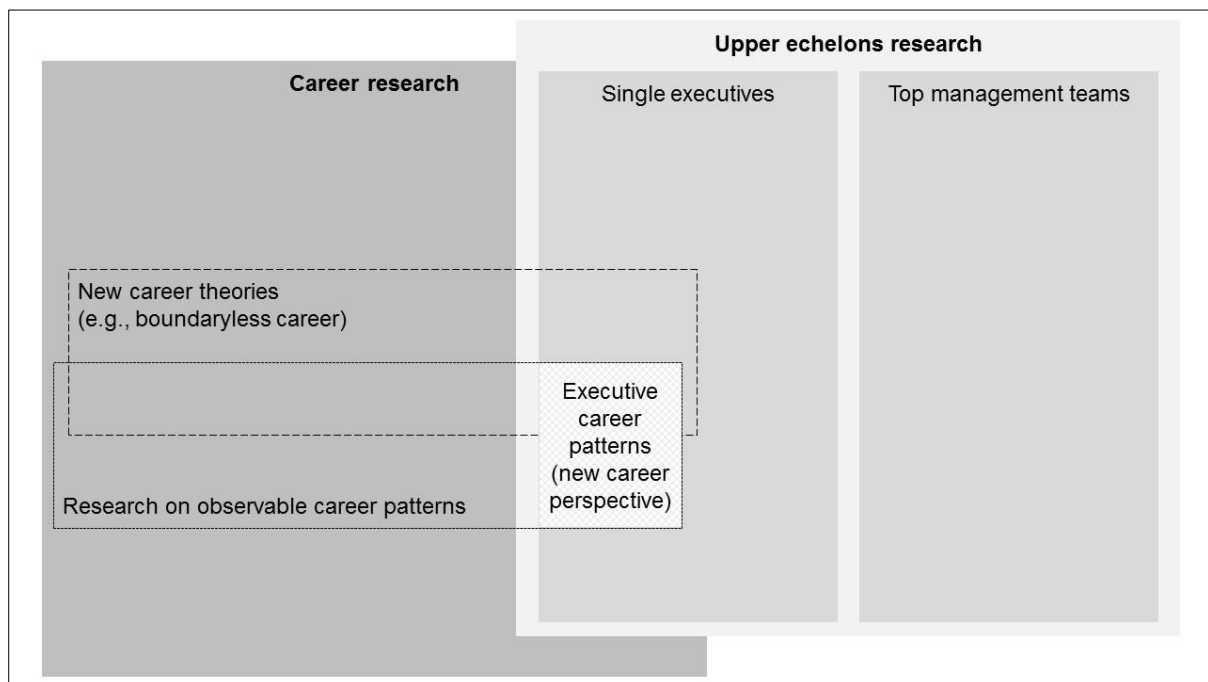
Figure 1. Literature overview and positioning of the three studies within the field.

The first study focuses on the career patterns of CFOs, and addresses the following research questions:

Research question 1: What do current CFO career patterns look like?

Research question 2: Which early career choices are associated with CFO career patterns?

By providing answers to these questions, the study contributes to both the management and the careers literature. First, this study offers a novel perspective on the CFO by illuminating CFO career patterns. Specifically, the study reveals that neither functional experience nor organizational tenure are prerequisites for becoming CFO, which may be of interest to the CFO

turnover literature (Büttner, Schäffer, Strauß, & Zander, 2013; Gietzmann, Marra, & Pettinicchio, 2015). Second, the study demonstrates that early career choices, such as the type of university degree, are associated with different CFO career patterns. This finding extends Rosenbaum's (1979) notion of path-dependence and underlines the importance of considering contextual factors in career research.

The second study focuses on the career patterns of partners in consulting firms, and addresses the following research questions:

Research question 3: Which career patterns lead to partner positions in consulting firms?

Research question 4: How boundaryless are these career patterns and which individual characteristics are associated with boundarylessness?

By providing answers to these questions, the study makes three contributions to the literature. First, it improves our understanding of boundaryless careers and their relevance by analyzing objectively observable career patterns. Second, it delivers a longitudinal perspective on partnerships, which are governed by recruitment and human resource management mechanisms that differ from traditional private or public firms (Behrends, 2007). Third, it contributes to the debate on internal versus external labor markets in such firms (Bidwell & Keller, 2014; Wholey, 1985).

The third study focuses on the career patterns of CDOs, and addresses the following research questions:

Research question 5: What are the educational backgrounds of CDOs?

Research question 6: What functional career patterns do CDOs follow and how boundaryless are they?

By providing answers to these questions, the study makes two contributions to the literature. First, it contributes to the ongoing debate on the role of the CDO (Haffke, Kalgovas, & Benlian, 2017; Horlacher & Hess, 2016; Tumbas, Berente, & vom Brocke, 2016) by exploring the career

paths that lead to this position. Specifically, the study argues that formal business education and the cross-functional career paths of CDOs indicate a generalist and strategic role, as opposed to the more technical role of the chief information officer. Second, this paper contributes to the boundaryless career theory with a functional career mobility focus. It demonstrates that frequent functional transitions may be a typical example of boundarylessness in the careers of new functional top executives, such as the CDO. This focus on functional rather than organizational mobility also addresses a recent call by Inkson et al. (2012).

1.3 Theoretical Background

With the research questions laid out in the previous section, this section turns to the existing literature and provides definitions of the most relevant concepts. Two broad streams of literature inform this thesis. The first, upper echelons research, elucidates why and how managers have an impact on the organizations that they lead. This stream of literature is rooted in psychology. The second, career research, clarifies what and how we can learn from the career analysis. This stream of literature is rooted in sociology.

In the neoclassical view of the firm, "top managers are homogenous and selfless inputs into the production process" (Bertrand & Schoar, 2003, p. 1173). Hambrick and Mason (1984) challenged this view in their seminal work by introducing the upper echelons theory, which states that organizational outcomes are the reflections of the values and cognitive bases of powerful actors in the organization. These powerful actors are referred to as the upper echelons (Hambrick & Mason, 1984). Most studies of the upper echelons have relied on Cyert and March's (1963) construct of the dominant coalition and have operationalized it as the senior executives of the firm, as identified by title and position (Carpenter, Geletkanycz, & Sanders, 2004).

Hambrick (2007) reviewed the development and impact of the upper echelons theory and illustrated its logic by explaining:

"So, when upper echelons researchers assert that executives matter, we don't mean that they only matter positively. They matter for good and for ill. They sometimes do smart things and sometimes do dumb things. They sometimes deserve our applause and sometimes deserve our scorn. Executives make decisions and engage in behaviors that affect the health, wealth, and welfare of others – but they do so as flawed human beings." (Hambrick, 2007, p. 341)

As this quotation demonstrates, the upper echelons theory rests on the premise of bounded rationality, that is, the use of simplified problem-solving processes in complex situations due to limited human rationality (Cyert & March, 1963; March & Simon, 1958). March and Simon (1958) specified that each individual has a set of givens that reflects his or her cognitive base and values. These givens include knowledge or expectations about future events, alternatives, and the consequences attached to alternatives. The upper echelons theory assumes that demographic characteristics are valid proxies for values and cognitive bases (Hambrick, 2007). These observable and thus measurable demographics include age, functional tracks, other career experiences, education, socioeconomic roots, financial position, and group characteristics (Hambrick & Mason, 1984). The upper echelons theory states that the cognitive base and values have an impact on top managers' strategic choices (Hambrick & Mason, 1984). These strategic choices include formal and informal decisions, administrative decisions, and decisions on the direction of competition (Child, 1972). Child (1972) argued that the strategic choices exercised by the upper echelons are a necessary and crucial element in the theory of the firm.

Since the publication of Hambrick and Mason's (1984) original article, the upper echelons theory has spurred a large body of research. For example, Carpenter (2002) and

Carpenter and Fredrickson (2001) found evidence for a relationship between executive team heterogeneity and organizational outcomes. Additionally, Bertrand and Schoar (2003) found manager-fixed effects on firm investment activities and firm performance. According to Hambrick (2007), the most significant extensions of the theory were the introductions of the following moderators: managerial discretion – the latitude of managerial action – (Hambrick & Finkelstein, 1987) and executive job demands – the degree to which executives find their jobs challenging – (Hambrick, Finkelstein, & Mooney, 2005). Both moderators significantly increased the upper echelons theory's predictive strength (Hambrick, 2007). Concerning managerial discretion, Hambrick and Finkelstein (1987) argued that higher discretion leads to stronger effects in terms of the upper echelons theory. Crossland and Hambrick (2007) presented evidence in support of this extension of the theory and argued that national systems can limit managerial discretion in different ways. They found that the effect of CEOs on firm performance is substantially greater in American firms compared to German and Japanese firms. Concerning executive job demands, Hambrick et al. (2005) stated that higher demands lead to stronger effects in terms of the upper echelons theory.

In a recent study, Hambrick, Humphrey, and Gupta (2015) introduced structural interdependence within the top management team as an additional moderator of the upper echelons theory. They argued that the interdependence within the top management team moderates the relationship between top management team composition and firm performance, as well as the relationship between top management team composition and executive departures. Further refinements of the upper echelons theory resulted from studies on the dynamics between the upper echelons, such as power distribution (Finkelstein, 1992) and behavioral integration (Lubatkin, Simsek, Ling, & Veiga, 2006).

Despite continuous empirical testing and theoretical refinements, the upper echelons theory is still criticized for a number of reasons (Hambrick, 2007). Some critics have raised the

glorification of elites as a potential negative side effect (Hambrick, 2007). Others have addressed the replacement of psychological characteristics by demographic variables (Priem, Lyon, & Dess, 2016) or the negligence of factors outside of a manager's control, such as environmental constraints (Lieberson & O'Connor, 1972). Additionally, the empirical evidence regarding the effect of certain upper echelon demographics is mixed. For example, McClelland, Liang, and Barker (2010) found a positive relationship between CEO tenure and firm performance, whereas Nadkarni and Herrmann (2010) found a negative relationship, and Balkin, Markman, and Gomez-Mejia (2000) found no relationship at all. However, Hambrick and Quigley (2014) indicated that adequate contextualization helps to overcome such ambiguous results. Hambrick (2007) argued that the abundance of positive evidence for the upper echelons theory justifies further studies on the positive and negative effects of executives on organizations. Carpenter et al. (2004) and Finkelstein, Hambrick, and Cannella (2008) provided comprehensive overviews of the upper echelons literature.

The second stream of research that is relevant to this thesis analyzes how careers evolve and how they have changed over time. In the context of this thesis, I define a *career* or *career path* as the sequence of an individual's work experience over time (Arthur, Hall, & Lawrence, 1989); this highlights that time is the pre-dominant dimension of a career (Vinkenburg & Weber, 2012). Unlike other career studies that focus on career attitudes (Briscoe et al., 2006; Dries, van Acker, & Verbruggen, 2012; Gubler, Arnold, & Coombs, 2014), the three studies in this thesis focus on objective careers. The term *objective career* refers to an individual's publicly observable positions and situations (Arthur, Khapova, & Wilderom, 2005). *Career patterns* are defined as empirical regularities in these observable paths (Arnold & Cohen, 2008; Vinkenburg & Weber, 2012), and consist of clusters of similar career paths (Gubler, Biemann, & Herzog, 2017).

In an early study, Wilenksy (1960) defined a career as a "succession of related jobs, arranged in a hierarchy of prestige, through which persons moved in an ordered, predictable sequence" (p. 554). This definition emphasizes that the traditional concept of a career relied on vertical success, which implies climbing the corporate pyramid and increasing the monetary rewards (Hall, 1996). Most early career research assumed a stable environment for organizational careers (Arthur, 1994). This environment was characterized by hierarchies and highly rigid organizational structures (Baruch, 2004). Within this stable environment, individuals climbed the hierarchical ladder within one or two firms, resulting in clear and mostly linear career paths (Baruch, 2004; Sullivan, 1999).

According to Rosenbaum (1979), much of the early sociological career research has dealt with explaining the underlying mechanisms of career mobility. He differentiated two basic types of mobility models: *ahistorical models*, which assume that careers are path independent, and *historical models*, which assume that careers are path dependent. Some evidence has supported the argument that future career mobility does not depend on previous career mobility (Hodge, 1966; Kelley, 1973; March & March, 1977). However, many organizational researchers have found evidence for a historical career mobility model (Dalton, 1951; Faulkner, 1974; Featherman, 1971; Jennings, 1971), thereby emphasizing the importance of career paths (Rosenbaum, 1979). Rosenbaum (1979) tested both models and argued in favor of a tournament mobility model. In this model, every career move depends on all previous career moves, and thus certain career patterns evolve.

According to Sullivan (1999), the career research paradigm has recently shifted from traditional, linear career paths to nonlinear, discontinuous career paths. Similarly, Briscoe et al. (2006) argued that the decline of the traditional career requires new perspectives on careers, which account for organizational instability. The increasingly unstable organizational environment leads to new mobility patterns, which involve lateral career moves within an

organization, as well as interorganizational moves (Eby, Butts, & Lockwood, 2003). The two most influential new concepts in career research are the *boundaryless career* and the *protean career* (Briscoe et al., 2006; Verbruggen, 2012).

An early definition of the boundaryless career describes the concept as a sequence of "job opportunities that go beyond the boundaries of single employment settings" (Defillippi & Arthur, 1994, p. 307). In his pivotal work, Arthur (1994) argued for a decrease in stable employment, and introduced the boundaryless career as an alternative concept. He identified six dimensions of the boundaryless career, which commonly do not exist in organizational careers: moving across the boundaries of separate employers, drawing validation from outside the current employer, relying on external networks of information, breaking hierarchical reporting and advancement principles, rejecting career opportunities for personal reasons, and perceiving a boundaryless future despite structural constraints. According to Arthur (1994), career theorists have usually assumed that organizations cause career effects. However, he advocated the reverse effect, namely the idea of careers influencing organizations. Arthur (1994) proposed a shift of organizational research from intraorganizational to interorganizational phenomena, which enables a focus on the interdependencies between organizational and career outcomes.

Since Arthur's (1994) proposition, numerous studies have empirically examined the concept of the boundaryless career. These studies can be classified into two sets: the first and larger set has focused on boundaryless career attitudes, whereas the second set has focused on objective boundaryless careers. Similarly, Sullivan and Arthur (2006) distinguished psychological mobility and physical mobility as different dimensions in boundaryless careers. It is important to note that boundaryless career attitudes do not necessarily translate into boundaryless career paths (Briscoe et al., 2006). In terms of career attitudes, Segers, Inceoglu, Vloeberghs, Bartram, and Henderickx (2008) found support for the boundaryless career

concept, and reported evidence for gender and country differences in boundaryless career attitudes. Hess, Jepsen, and Dries (2012) investigated boundarylessness across industry sectors in Australia, and identified a direct effect of career concerns on career and employer change intentions. Hence, from an organizational perspective, boundaryless career orientations can produce negative outcomes (Rodrigues, Guest, Oliveira, & Alfes, 2015). In terms of objective boundaryless careers, Cheramie, Sturman, and Walsh (2007) found evidence for executive careers in the United States that match the definition of boundarylessness. In another recent study, Culié, Khapova, and Arthur (2014) identified psychological constructs, for example organizational support, which influence employment mobility in regional industry clusters in France. Rodrigues, Guest, and Budjanovcanin (2016) critically investigated the boundaryless career concept and reported evidence for the coexistence of boundarylessness and embeddedness in the careers of professional pharmacists. Similar to other recent studies (Rodrigues & Guest, 2010; Yao, Thorn, & Doherty, 2014), the authors argued for a more nuanced view of the boundaryless career, which considers both the crossing of boundaries and the persisting constraints to doing so.

The protean career is related to the boundaryless career, but both are distinct phenomena (Briscoe & Hall, 2006; Hall, 2004). As for the boundaryless career, the driving force in the protean career is the person and not the organization (Hall, 1996). This idea goes back to Hall (1976), who first described freedom and growth as the values, and subjective success as the driver, of the protean career. In contrast, the value of the traditional career is advancement and the success criteria are objective, such as position and salary (Hall, 1976). In the protean career, the previous lifelong contract between an individual and one organization is replaced with a new protean career contract (Hall & Moss, 1998), which has profound implications for labor market dynamics, for example for older workers (Hall & Mirvis, 1995). The protean career contract is with the self and one's work and not with the organization, which

makes it a psychological contract (Hall & Moss, 1998). Briscoe et al. (2006) developed scales to measure both protean and boundaryless career attitudes, thereby stimulating further empirical research in this field. For example, Vos and Soens (2008) showed that a protean career attitude is linked to subjective career success, namely, career satisfaction and perceived employability.

A relatively recent sub-stream of career research has focused specifically on managerial career patterns. Grzeda (1999) argued that trends in organizational environments will cause a shift in managerial careers, and thus called for more empirical research to understand the emerging managerial career patterns. In a comprehensive review of this literature, Vinkenburg and Weber (2012) concluded that empirical evidence on managerial and professional career patterns is still limited. They argued that upward mobility is still the norm; however, inter-organizational mobility has increased. While several studies have focused on professional and middle management careers, only two of the studies cited by Vinkenburg and Weber (2012) have focused on upper echelon or executive career patterns. Hamori and Kakarika (2009) found that the career patterns of CEOs in large organizations in Europe and the United States do not match the boundaryless career concept, but rather Rosenbaum's (1979) tournament mobility model. Biemann and Wolf (2009) provided a taxonomy of the careers of various executives in Denmark, Germany, Japan, the United Kingdom, and the United States. They found six career patterns, which were predicted by the executive's country of origin and functional domain: average outside successor, fast track, international manager, average inside successor, highly experienced outside successor, and highly experienced inside successor.

Recent research that was published after Vinkenburg and Weber's (2012) review revealed that the international assignment of CEOs in large organizations can decrease the speed of their ascent to the top (Hamori & Koyuncu, 2011). Crossland, Zyung, Hiller, and Hambrick (2014) introduced career variety, a measure of the breadth of professional and

institutional experience, and found that CEO careers have become more heterogeneous with regard to these dimensions. In another study, Flöthmann and Hoberg (2017) provided a taxonomy of the careers of supply chain executives, and found a prevalence of cross-functional career paths as well as evidence for the boundaryless career concept.

As this literature overview shows, both upper echelons theory and career research are established streams of research that have gained a lot of attraction in the past few decades. However, the connection between these two fields occurred more recently. Career researchers have started to apply new career concepts – such as the boundaryless career – to management careers, while upper echelons scholars have simultaneously started to develop a more holistic perspective of management demographics.

1.4 Methodological Outline of Sequence Analysis

As Ritschard and Studer (2018) specified in their recent methodological overview, sequences enable the quantitative analysis and interpretation of categorical data and can be used as input for further investigations.

> "In fact, sequences are a convenient way of coding individual narratives into a form suitable for quantitative analysis. Briefly, sequence analysis primarily provides a comprehensible overall picture of sets of individual categorical sequences – the retained coding of the narratives – and involves using this overall picture for objectives such as discovering the characteristics of a set of sequences, identifying possible atypical or deviant individual trajectories, and comparing trajectory patterns among groups such as sexes, birth cohorts, or regions." (Ritschard & Studer, 2018, p. 1)

Sequence analysis is part of a family of methods classified as algorithmic exploratory data analysis, which are a useful addition to stochastic data modelling techniques (Breiman, 2001). The power of sequence analysis as an exploratory tool has been demonstrated through its use

in numerous studies in a variety of contexts, such as occupational careers, health trajectories, and the historical evolution of political institutions (Ritschard & Studer, 2018). For two reasons, sequence analysis is a particularly useful approach for analyzing life courses. First, from a theoretical perspective, sequence analysis is well suited because it is concerned with trajectories, one of the major concepts of life course research (Aisenbrey & Fasang, 2010). Second, from a methodological perspective, sequence analysis is an important addition to existing statistical methods, because it does not make any distributional assumptions and has an exploratory potential to identify nonstandard sequences (Aisenbrey & Fasang, 2010). In this context, Pollock, Antcliff, and Ralphs (2002) also emphasized that the most suitable way to make sense of careers is to study extended sequences of employment states, instead of single demographical variables.

Sequence analysis typically involves three steps: (1) coding the categorical data as sequences, (2) computing pairwise dissimilarities between sequences, and (3) analyzing the sequences based on the computed dissimilarities (Abbott & Tsay, 2000). The most frequently used mechanism to compute pairwise dissimilarities or distances between sequences is optimal matching, hence sequence analysis and optimal matching analysis (OMA) are often used interchangeably in the literature (Elzinga, 2003; Ritschard & Studer, 2018). Optimal matching originated in life sciences as a methodology to compare DNA strings (Lipman & Pearson, 1985; Needleman & Wunsch, 1970; Wilbur & Lipman, 1983), was first introduced to social sciences by Abbott and Forrest (1986), and was subsequently popularized by Forrest and Abbot (1990) and Abbott and Hrycak (1990).

Most applications of OMA in the social sciences have analyzed non-managerial careers, such as typical career patterns of the German population (Biemann, Zacher, & Feldman, 2012), career patterns of information technology professionals in the United States (Joseph, Boh, Ang, & Slaughter, 2012), or career patterns of Swiss teachers (Gubler et al., 2017). Recently, an

increasing number of studies has applied optimal matching in a management research context. For example, studies have investigated the career patterns of CEOs (Koch, Forgues, & Monties, 2017) and other senior executives (Biemann & Wolf, 2009; Flöthmann & Hoberg, 2017). Additionally, Biemann and Datta (2014) provided some methodological guidance on how to best apply OMA in management research.

Because OMA is particularly suited to career research for a number of reasons (Vinkenburg & Weber, 2012), the analyses in this thesis also rely on optimal matching to draw quantitative comparisons between careers. First, unlike other stochastic models for sequence analysis, OMA permits the identification of one or more typical sequences based on sequence resemblance (Abbott & Hrycak, 1990). Second, OMA is relatively robust with regard to a number of its inputs, most notably sample size and sequences with different length (Dlouhy & Biemann, 2015). Because the amount of life course data for senior executives is usually limited, OMA appears to be a particularly appropriate methodological choice in the field of executive career research. Third, sequence analysis using optimal matching takes a holistic perspective (Ritschard & Studer, 2018), thereby considering the timing and order of career moves instead of just measuring the number of moves, which is an advantage over standard regression analysis (Biemann & Wolf, 2009; Lesnard, 2010). In particular, when tested in simulations, OMA performs better than cluster analysis based on aggregate measures, because it captures the timing and pace of change in sequences (Biemann & Datta, 2014; Biemann & Wolf, 2009).

It is equally important to acknowledge some of the criticisms of optimal matching, such as the lack of benchmarks to assess its results (Hollister, 2009), the lack of connection to social contexts (Wu, 2000), or the arbitrary cost setting (Biemann & Datta, 2014). However, despite the variety of alternative methods to calculate sequence similarity (Studer & Ritschard, 2016), such as nonalignment techniques (Dijkstra & Taris, 1995), optimal matching has been the most popular mechanism for sequence analysis in a wide variety of contexts (Abbott & Tsay, 2000).

Even critics of optimal matching have agreed that it has proven useful, especially due to its ability to consider sequences with variable lengths, such as occupational trajectories (Hollister, 2009). Optimal matching is thus particularly suited for the context of my three empirical studies, since the samples consist of careers with varying lengths and are small enough to demand a robust method for calculating sequence similarity. For the remainder of this thesis, I will refer to sequence analysis using the optimal matching algorithm as OMA.

In order to illustrate the approach of OMA, as well as its advantages and challenges, I will employ a very basic example[1]. The example follows the three steps of sequence analysis identified by Abbott and Tsay (2000): coding the sequences, computing pairwise dissimilarities between sequences, and analyzing the dissimilarities. For demonstrative purposes, the example uses the fictional and simplified life course data of three CEOs, called X, Y, and Z. CEO X had a career span of 10 years before becoming CEO, while that of CEO Y and Z were 11 years each. This example will cover the analysis of the careers until the year before the promotion to CEO.

First, the careers of the three executives were coded as sequences. The coding in this example follows the one used by Biemann and Wolf (2009). The unit of analysis in career applications of OMA is usually years (Biemann & Datta, 2014). In principle, OMA can handle any number of states for a given year; however, it is preferable to use the least number of states required to study the issue at hand (Biemann & Datta, 2014). For the sake of this example, I am interested in two dimensions of the executives' careers: organizational tenure and international experience. The simplest way to encode these dimensions are by means of two dichotomous variables. Organizational tenure is coded (E) for external if the individual worked outside the company where he or she became CEO, and (I) for internal if the individual worked

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[1] For a more detailed explanation of OMA, refer to Abbott and Tsay (2000), Aisenbrey and Fasang (2010), and Dlouhy and Biemann (2015).

in the company where he or she became CEO. International experience is coded (A) for abroad if the individual worked outside the home country of the company where he or she became CEO, and (H) for home if the individual worked in the home country of the company where he or she became CEO. These two dimensions result in four possible states for each year in the careers of the executives: EA, EH, IA, and IH. Figure 2 displays the complete coded sequences for the three fictional careers. Note that the sequences do not have the same length, because the time spans to become CEO differ across individuals.

Figure 2. Three exemplary career sequences after coding for optimal matching.

Second, the distances between the three sequences were calculated. The optimal matching algorithm performs pairwise comparisons of all elements in the sequences and uses the minimum number of operations (insertions, deletions, and substitutions) to turn one sequence into the other (Biemann & Wolf, 2009). Insertion and deletion operations capture the occurrence of states, irrespective of timing (Aisenbrey & Fasang, 2010). In contrast,

substitution operations focus on whether an element occurs at the same position in two sequences – the timing of states (Aisenbrey & Fasang, 2010). In alignment techniques such as optimal matching, the researcher needs to assign one cost to insertions and deletions and another cost to substitutions. This cost setting defines the relationship between the types of operations, thus the absolute cost figures are not relevant (Aisenbrey & Fasang, 2010). The researcher can derive the costs in various ways, either theoretically or empirically (Abbott & Tsay, 2000; Biemann & Datta, 2014). For this example, I rely on the simplest form of cost setting, which is uniform substitution costs of 2.0 and insertion and deletion costs of 1.0 (Biemann & Datta, 2014). Setting the costs for insertion and deletion to half the substitution costs means that it is mathematically equivalent (i.e., equally costly) to replace one element with another, and to delete one element and insert another element.

With the help of the costs, dissimilarities can be calculated. The solution for CEO X and CEO Y is as follows: insert two EA elements at the start of sequence X at a cost of 1.0 each, delete one IH element at the end of sequence X at a cost of 1.0, and substitute the IA element in sequence X by an IH element at a cost of 2.0. This results in a dissimilarity of 5.0 between the two sequences. The solution for CEO X and CEO Z is as follows: delete one IH element at the end of sequence X at a cost of 1.0, which results in a dissimilarity of 1.0. The solution for CEO Y and CEO Z is as follows: insert two EA elements at the start of sequence Z at a cost of 1.0 each, delete two IH elements at the end of sequence Z at a cost of 1.0, and substitute the IA element in sequence Z by an IH element at a cost of 2.0. This results in a dissimilarity of 6.0. Table 1 summarizes the results of the pairwise comparisons of the three CEO career sequences in a distance matrix. The distance matrix in an OMA is always symmetric, because the optimal matching algorithm cannot differentiate the direction of alignment, for example the substitution of IA for IH vs. IH for IA (Aisenbrey & Fasang, 2010).

Table 1. *Distance Matrix of Three CEO Sequences After Optimal Matching*

	CEO X	CEO Y	CEO Z
CEO X	-		
CEO Y	5.0	-	
CEO Z	1.0	6.0	-

As this example shows, a variation of the cost setting can result in different sequence distances, and possibly also in different conclusions regarding the evolving sequence patterns. Abbott and Tsay (2000) stated that appropriate cost setting is one of the major challenges in OMA. In their review, they revealed that researchers have used a variety of ways to derive costs. For example, it is possible to use substitution costs that vary depending on the different states, which leads to a substitution cost matrix instead of uniform substitution costs. Aisenbrey and Fasang (2010) suggested reliance on a data-driven approach based on transition frequencies between states to derive substitution costs. This approach helps to counter the criticism that cost setting in OMA is arbitrary and not rooted in theory (Levine, 2000). However, as empirical evidence and Monte Carlo simulations have shown, OMA is relatively robust to different cost settings, that is, patterns in the data are relatively stable when using different cost settings (Blair-Loy, 1999; Dlouhy & Biemann, 2015).

Third, I analyzed the dissimilarities. In this example, it is easy to tell that the career paths of CEO X and CEO Z are very similar, whereas the career path of CEO Y is quite different. Although it is possible to interpret the dissimilarity matrix itself, most applications use cluster analysis to group similar sequences and thereby derive patterns (Biemann & Datta, 2014). The rationale is that similar career sequences are inductively grouped (i.e., clustered) and differentiated from other groups of similar sequences (Aisenbrey & Fasang, 2010). Most research has used Ward's (1963) agglomerative hierarchical clustering, because it typically creates clusters of similar size (Aisenbrey & Fasang, 2010) and because it has provided the most accurate results in simulations using career sequences (Dlouhy & Biemann, 2015). The

career patterns created by cluster analysis can be used as explanatory or response variables in further analyses to identify causes for, and consequences of, career patterns (Abbott, 1990). For example, Biemann and Wolf (2009) used career patterns as response variable and found evidence that managers' career patterns vary significantly across countries.

In summary, sequence analysis, and in particular OMA, has proven to be highly suitable for analyzing life trajectories, such as management careers (Aisenbrey & Fasang, 2010; Pollock et al., 2002; Vinkenburg & Weber, 2012). Despite some early criticism, OMA is now widely accepted and extensively used in sociology, and increasingly applied in management research.

1.5 Outlook on the Three Empirical Studies

The first of the three studies focuses on the second most important actor at the top of the firm: the CFO. Despite the importance of this role, we still know very little about CFO careers. The purpose of this paper is to improve our understanding of typical CFO career paths and how early career decisions shape them. The analyses rely on a unique dataset of 97 German CFOs from public as well as private firms from various industries. The results of the OMA show five CFO career patterns: international expert, expert outsider, cross-functional outsider, transitioning insider, and expert insider. These patterns differ in terms of organizational tenure, international experience, and functional experience of the CFOs. Furthermore, the results indicate that three early career choices are associated with the CFO career patterns: the level of education, the entry organization, and the entry industry. This has implications for recruiting and human resource management in the finance function, and for future research on top management careers.

The second study analyzes the careers of 291 American and German partners of the "Big Three" consulting firms, and provides insights into the paths that lead to partner positions

within these firms. Empirical research on firms organized as partnerships is scarce, especially regarding the careers of their senior leaders, the partners. The results of the OMA indicate four career patterns that involve multiple moves across organizational and industry boundaries and thus match the definition of a boundaryless career, while only one career pattern conforms to the definition of a traditional organizational career. The results further demonstrate that American partners and partners with fewer years of education before their first job are more likely to follow one of the boundaryless career patterns. These findings provide new evidence of the existence of boundaryless careers in industries with strict hierarchies and advancement principles, and are relevant to organizational inquiries into partnerships.

Finally, the third study focuses on the careers of a relatively new functional executive: the CDO. Recently, an increasing number of firms has responded to the challenges of digital transformation by introducing a CDO to their top management team. The newness of this functional top executive implies that only limited knowledge exists about the individuals in this position. This paper investigates a sample of 61 German CDOs, predominantly from large private firms, and explores their educational backgrounds and career paths. The results of the OMA indicate four CDO career patterns: cross-functional manager, strategy expert, information technology expert, and operations expert. CDOs are typically equipped with a non-technical university degree and the majority follows the cross-functional career pattern, covering marketing and sales, was well as the operations function. These results support and extend boundaryless career theory, and have implications for the ongoing debate on the role of the CDO.

2. Study 1: What Does the Path to Chief Financial Officer Look Like? – An Optimal Matching Analysis Approach[2]

2.1 Introduction

"The promotion of the former treasurer to the rank of a 'chief financial officer' – often second only to the chief executive officer (CEO) – (…) signaled a fundamental redistribution of managerial roles, with greater relevance of financial considerations built into the executive structure and the decision-making process." (Zorn, 2004, p. 347)

The rise of the CFO to the second most important actor in the top management team documented by Zorn (2004) has spurred considerable research attention, which is also reflected in recent literature reviews (Menz, 2011; Uhde, Klarner, & Tuschke, 2017). Research has found that CFO characteristics have an effect on firm performance. CFO financial expertise, measured as MBA and certified public accountant degrees, is inversely related to the likelihood of companies to restate their earnings (Aier, Comprix, Gunlock, & Lee, 2005). Additionally, firms with CFOs who formerly worked as auditors of their later employer face a higher level of earnings management (Dowdell & Krishnan, 2004). All of this research is explicitly or implicitly based on the premise of the upper echelons theory, which states that senior executives, also known as upper echelons, are not "homogenous and selfless inputs into the production process" (Bertrand & Schoar, 2003, p. 1173). Research has also focused on CFO succession, which is relevant for firms in terms of recruiting and talent management. For example, Nicholson and Cannon (2000) found that internal promotions and external hires are equally common for CFO positions in British public companies.

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[2] This chapter is based on a working paper co-authored by Alwine Mohnen. Please note the use of plural instead of singular throughout this chapter to refer to both authors. For the authors' contributions, please refer to the Appendix.

While upper echelons research has analyzed the effects of manager characteristics on firm-level outcomes and has been tested and confirmed in many contexts (Hambrick, 2007), it has neglected some of the tenets of career research (Gunz & Jalland, 1996). Although we know that top managers in support functions such as finance follow distinct career patterns, which represent empirical regularities in careers (Biemann & Wolf, 2009; Vinkenburg & Weber, 2012), research still knows very little about the specifics of CFO careers (Six et al., 2013). Based on the evidence that CEO career variety has an impact on firm outcomes (Crossland et al., 2014), a better understanding of CFO careers is highly relevant. This calls for a more integrated view that considers various kinds of demographics, such as functional experience, firm-specific experience, and international experience simultaneously. Career research has postulated that careers are path-dependent (Rosenbaum, 1979) and best understood when analyzed as a sequence of work experiences rather than through single variables (Pollock et al., 2002). Rosenbaum (1979) promoted the idea that early career mobility has an effect on promotions and demotions in later career stages. Studies with a focus on senior managers' experience and decisions can thus benefit from an additional focus on how the careers of these executives evolved. In this study, we focus on early career choices, such as the type of university degree or the firm where later CFOs started their career.

Career scholars have suggested since the 1990s that there is a shift from the traditional career with life-long employment at one firm to a new, boundaryless career (Arthur, 1994; Arthur & Rousseau, 1996; Defillippi & Arthur, 1994). The boundaryless career is mainly characterized by moves across the boundaries of separate employers (Arthur, 1994). The analysis of individual executives can incorporate such theoretical lenses to interpret their careers. In a recent attempt to bridge upper echelons theory and career theory, Koch et al. (2017) provided a taxonomy of CEO careers and found that these careers still follow a traditional pattern that involves steady progression and little inter-firm mobility. We add to this

conversation by drawing a more complete picture of the CFO, the "second-in-command" (Zorn, 2004, p. 360). By analyzing the whole career path that leads to the CFO position, we are able to develop a more comprehensive measure of CFO experience than in previous upper echelons studies that have focused on single characteristics. A career path is defined as the "unfolding sequence of a person's work experience over time" (Arthur et al., 2005, p. 178). With the help of clustering, we aim to establish CFO career patterns, which are defined as empirical regularities in career paths (Vinkenburg & Weber, 2012).

This study thus has two purposes: establishing current CFO career patterns and analyzing which early career choices are associated with these career patterns. We apply optimal matching analysis (OMA), a method that compares and clusters career sequences, to a sample of 97 German CFOs of medium-sized and large firms. Given the CFO's responsibility for managing the financial system of a firm (Mian, 2001), one could expect the predominance of a stable career pattern that involves steady progress through the finance function in one firm until CFO promotion. Similarly, Koch et al. (2017) found traditional career paths with little inter-firm mobility to be predominant for Fortune 100 CEOs. However, we discovered five distinct CFO career patterns: international expert, expert outsider, cross-functional outsider, transitioning insider, and expert insider. Two of these career patterns only include limited functional experience in finance and three only limited organizational tenure prior to becoming CFO, thereby showing an important characteristic of a boundaryless career. Three early career choices are associated with the patterns: level of education, entry organization (family firm), and entry industry (manufacturing) of the CFO. These findings are of particular relevance to graduates starting a career in the finance function.

This paper contributes both to the management and to the careers literature. For both strands, the focus on individuals' experience across industries, firms, and positions is highly relevant (Crossland et al., 2014). First, this study enhances the perspective on the CFO by

illustrating which career patterns typically lead to this position. Specifically, OMA shows that functional finance experience and organizational tenure are not prerequisites for the CFO position, which should also be of interest to the CFO turnover literature (Büttner et al., 2013; Gietzmann et al., 2015). Second, this paper reveals that three early career choices can lead to different CFO career patterns. This highlights the need for considering contextual factors in the analysis of career patterns and is not only relevant for future research on senior executives, but also extends the notion of path-dependence in career research.

2.2 Theory

Two major research strands inform this study: the upper echelons theory, which focuses on manager effects on firm-level outcomes, and career research, which focuses on the way a career, the sequences of an individual's work experience over time (Arthur et al., 1989), unfolds and how the individual perceives it.

The upper echelons literature goes back to the seminal work by Hambrick and Mason (1984), which stated that organizational outcomes are reflections of the values and beliefs of the upper echelons, the most powerful actors in the organization. Since then, studies drawing on upper echelons theory have used various observable characteristics, such as education or age, as proxies for the upper echelons' values and beliefs and have found a variety of firm-level outcomes to be influenced by these proxies (Carpenter et al., 2004). For example, Bertrand and Schoar (2003) found that top manager style affects firm-level policies and Hambrick and Quigley (2014) showed a large effect of CEOs on firm performance. The two most relevant moderators for the relationship predicted by the upper echelons theory are managerial discretion, the degrees of freedom available to top management, and managerial job demands (Hambrick, 2007). The predictions of the upper echelons theory hold best when

there is a high degree of managerial discretion (Hambrick & Finkelstein, 1987) and high executive job demands (Hambrick et al., 2005).

Within upper echelons research, studies have traditionally analyzed the whole top management team or the CEO as the single most important actor leading the firm (Carpenter et al., 2004). However, over the past 40 years, the CFO has evolved to be the second most influential executive besides the CEO (Zorn, 2004). Consequently, upper echelons literature has recently also taken an increased interest in this position. Studies have examined the CFO's impact on firm financial performance and policies (Bertrand & Schoar, 2003; Dowdell & Krishnan, 2004; Six et al., 2013) as well as the impact of CFO accounting expertise on accounting restatements (Aier et al., 2005; Loyeung, Matolcsy, & Cahan, 2015). For example, CFO-fixed effects on interest coverage, a financial indicator, are stronger than CEO-fixed effects on this indicator (Bertrand & Schoar, 2003).

Some upper echelons studies have explicitly tested the effects of specific aspects of executive careers. In an analysis of the CEOs of the largest organizations in Europe and in the United States, Hamori and Kakarika (2009) found that external labor market strategies lead to a slower promotion to CEO. This finding holds for both Europe and the United States and is independent of the labor market institutions in the 22 sampled countries. A study based on a similar sample of CEOs revealed that international experience is also negatively related to the time to the top (Hamori & Koyuncu, 2011). Specifically, more and longer international assignments and those at earlier career stages and at organizations other than the current employer increase the time to CEO promotion (Hamori & Koyuncu, 2011). Hamori and Koyuncu (2015) revealed that hiring a CEO with prior CEO experience is negatively related to firm financial performance, which they attributed to the theory of learning transfer. They found that this effect is stronger for CEOs who directly move from one to the next CEO position and for CEOs who have previously worked in a similar context in terms of industry and company

size. Conversely, Crossland et al. (2014) found a positive effect of CEO career variety, a measure of the breadth of professional and institutional experience, on firm-level strategic novelty. CEO career variety generally reflects that CEO careers have become more heterogeneous and specifically captures the variation in firms, industries and functional areas within a CEO career (Crossland et al., 2014).

Some studies have also aimed for a better understanding of top management careers per se. Most of this research has used single demographical variables in order to measure the experience and careers of the upper echelons. For example, Cappelli and Hamori (2004) compared senior executives of Fortune 100 companies in 1980 and 2001 and revealed that the 2001 executives took less time and fewer jobs to make it to the top management team. The 2001 executives were more often female and less often Ivy League educated. Davoine and Ravasi (2013) analyzed careers in the context of globalization and found evidence that national institutions still have a major effect in shaping top management career patterns.

Regarding CFO careers, Collier and Wilson (1994) found that American CFOs typically start in the accounting function and only later move to the finance function. More precisely, American CFOs often start as accountants, move into general management, then become controllers, and finally treasurers before moving into the CFO position after an average of 13 years of professional experience (Baker & Phillips, 1999). In terms of education, the majority of American CFOs hold a business degree and a certified public accountant degree (Baker & Phillips, 1999).

A suitable way to make sense of careers is to study extended sequences of employment states instead of single demographical variables (Pollock et al., 2002). Hence, two studies of the upper echelons have recently established taxonomies of executive careers based on career patterns from sequences. Biemann and Wolf (2009) used OMA to study top management team members from Denmark, Germany, Japan, the United Kingdom, and the United States. They

included the entire top management team and modeled the careers along two dimensions: international experience and organizational tenure. With the help of a cluster analysis, they established six distinct career patterns: average outside successor, fast track, international manager, average inside successor, highly experienced outside successor, and highly experienced inside successor. Biemann and Wolf (2009) revealed that the manager's field of activity and country of origin are both strong predictors of the type of career pattern. In particular, top managers from support functions, such as CFOs, are more likely to follow the fast track pattern, whereas heads of divisions follow longer career patterns with significant organizational tenure (Biemann & Wolf, 2009).

Flöthmann and Hoberg (2017) took a similar approach and employed OMA to analyze the career patterns of supply chain executives in Germany, Austria, and Switzerland. Their findings suggest that supply chain executives have various functional backgrounds, which contradicts the common notion of supply chain management as a field limited to functional experts. Using functional experience as the single dimension in their analysis, Flöthmann and Hoberg (2017) identified six career patterns of supply chain executives, which vary significantly in their speed of career advancement: demand-siders, homegrowns, logisticians, sourcing specialists, operations experts, and outsiders.

Career research has long argued that careers are path dependent and thus job mobility depends on previous career histories (Rosenbaum, 1979). Specifically, Rosenbaum (1979) suggested that the degree of early career mobility is associated with certain characteristics of later career stages, such as career ceilings and floors and the probabilities of promotion and demotion. A recent study provided evidence for this path dependence and found that both exogenous shocks and endogenous choices at one's career start affect individual career paths, long run career outcomes, and management styles (Schoar & Zuo, 2017). CEOs who start during recessions become CEOs faster and in smaller firms and they are more likely to pursue

a career path within a given organization (Schoar & Zuo, 2017). This effect is largely driven by the CEO's first job: CEOs who started their career during recession more often start in smaller, private firms (Schoar & Zuo, 2017). These differences in the first job could produce a different human capital mix and thus affect later selection processes (Schoar & Zuo, 2017).

One of the most influential career theories of the past decades is the boundaryless career theory (Briscoe et al., 2006; Verbruggen, 2012), a concept that Arthur (1994) introduced as the antonym of the traditional organizational career. A boundaryless career can be defined as a sequence of "job opportunities that go beyond the boundaries of single employment settings" (Defillippi & Arthur, 1994, p. 307). Research has used a variety of conceptualizations for the types of boundaries that are transcended (Arthur, 2014; Sullivan & Baruch, 2009), however, the most prominent meaning is that of career moves between separate employers (Arthur, 1994). The boundaryless career theory has been tested in various contexts and recently, scholars have started to apply it to management careers. Koch et al. (2017) showed that the careers of the Fortune 100 CEOs mostly do not confirm the boundaryless career concept. CEOs typically follow traditional careers, which are characterized by little mobility between firms and industries and a functional focus on general management positions (Koch et al., 2017). This study tests whether the same is true for CFOs, or whether their careers show different patterns.

In summary, research has acknowledged the importance of the CFO position and has found evidence for the effect of CFO characteristics on firm-level outcomes. However, management research has so far largely neglected a detailed analysis of CFO careers, which incorporates career theories, such as the boundaryless career.

2.3 Hypotheses

This study investigates four hypotheses, which predict an association between early career choices and the type of career pattern that a CFO follows. In line with extant literature on career patterns (Biemann et al., 2012; Biemann & Wolf, 2009), the career choices include different levels of analysis: the educational level (Hypotheses 1a and 1b), the firm level (Hypothesis 2), and the industry level (Hypothesis 3). All of the hypotheses are based on the notion of path dependence (Rosenbaum, 1979), meaning that steps taken early in a career will put a future CFO on a specific career path.

Outside the finance function, there is ample evidence that the *level* of formal education has an impact on career patterns (Anderson, Milkovich, & Tsui, 1981). For example, there is a positive relationship between formal education and the pursuit of a traditional career pattern, that is, long-term employment at one organization (Biemann et al., 2012). Reitzle, Körner, and Vondracek (2009) also found a positive relationship between higher education and upward-oriented career patterns. The level of education of supply chain executives is associated with different functional career patterns for these top managers (Flöthmann & Hoberg, 2017). Empirical evidence also suggests that large American firms have a higher share of CFOs with an MBA, whereas medium-sized American firms have a higher share of CFOs with a certified public accountant or master of accounting degree (Chahyadi & Abusalim, 2011). This shows that CFOs who started their career with a general management degree end up in different firms than CFOs who started with a specialized accounting degree. In other words, the *field* of formal education can have an effect on how careers in the finance function are shaped. We thus hypothesize:

Hypothesis 1a: The level of formal education is associated with the career patterns of CFOs.

Hypothesis 1b: The field of formal education is associated with the career patterns of CFOs.

For several reasons, it is important to consider the organizational environment when analyzing career patterns (Grzeda, 1999). Schoar and Zuo (2017) found that the first job of a CEO has a significant impact on his or her career path to the top. Their findings suggest that the CEOs who started in smaller, privately held firms became CEO more quickly and in smaller firms. When comparing family and non-family firms, there are significant differences in terms of structure and processes: Family firms are, on average, significantly smaller and younger and have fewer formal internal control procedures in place (Daily & Dollinger, 1992). Several studies have shown that such organizational differences have an impact on career patterns. For example, intra-organizational mobility depends on the organization's structure and workforce (Anderson et al., 1981). Based on these findings, we expect the career patterns of CFOs who start in family firms to differ from those who start in public firms. We thus hypothesize:

Hypothesis 2: The entry organization (family/public firm) is associated with the career patterns of CFOs.

Empirical evidence from non-managerial studies has shown that the industry also shapes an individual's career. Hachen (1992) analyzed the effect of industrial characteristics, such as wage rates, labor intensity, and concentration levels, on job mobility. He found that job mobility is lower in high wage industries and in labor-intensive industries, except for involuntary exits, which are more frequent in labor-intensive industries. Further evidence suggests that starting in a public sector firm in Germany is positively associated with a more stable, traditional career pattern (Biemann et al., 2012). Additionally, there is a positive relationship between industries with low or high growth and career complexity for early work careers in Germany (Biemann, Fasang, & Grunow, 2011). In one of the rare managerial studies, Rajagopalan and Datta (1996) found a limited impact of industry conditions, such as industry

concentration, on variations in CEO firm tenure and functional heterogeneity. Based on this evidence, we hypothesize:

Hypothesis 3: The entry industry is associated with the career patterns of CFOs.

2.4 Method

2.4.1 Sample

For our analyses, we used a unique and comprehensive set of data, which we acquired through an international executive search firm. It consists of the anonymized resumes of 207 finance professionals who had interviews with the executive search firm between 2009 and 2013. Due to our focus on CFOs, we used a subsample of the dataset, which consists of the 97 individuals who have held a CFO position.

The 97 individuals held CFO positions in Germany or in foreign subsidiaries of companies headquartered in Germany. These companies represent a diverse set of industries, mainly manufacturing (61.86%), information and communication (10.31%), and wholesale and retail trade (6.19%). In terms of organizational background, the majority had a CFO position at a public firm or subsidiary of a public firm (53.61%); some had a position at a family firm (24.74%) and the remainder at private, non-family firms, including a few start-up companies. A major advantage of this heterogeneous sample is that it consists of CFOs whose complete career paths are not readily available to research, since these CFOs are often not public figures. Out of 97 CFOs, 94 are male and three are female (3.09%). This compares to a 10% share of females among the CFOs of the 30 largest German public companies. The mean year of the first full-time position, which we considered the start of the CFOs' careers, is 1992 ($SD = 6$).

2.4.2 Measures

Career patterns (dependent variable)

The holistic analysis of top management careers is possible with the help of analytic techniques that model the career as a sequence (Biemann & Wolf, 2009). Usually, career sequences are coded with years as the unit of analysis (Biemann & Datta, 2014). We defined the first year of full-time employment as the start of the career sequence and the year before assuming the first CFO position as the end of the career sequence. An individual had reached a CFO position when his or her job title was CFO or the German equivalent.

To model CFO careers, we categorized each year in each sequence along three dimensions: *organizational tenure*, *international experience*, and *functional experience*. Obviously, this is a simplification of complex career paths; however, it is a sensible one as it relies on a combination of the dimensions in previous studies of top management career patterns (Biemann & Wolf, 2009; Flöthmann & Hoberg, 2017). Prior studies with a focus other than management have often analyzed employment status as one dimension or even as the single dimension (Biemann et al., 2012; Zacher, Biemann, Gielnik, & Frese, 2012). However, a review of the CFO careers in this sample revealed that those professionals who made it to CFO were employed full-time throughout their work life, so we did not include employment status as an additional dimension.

The number of dimensions and the possible values per dimension defines the number of states per year. We followed Biemann and Datta's (2014) advice to limit the number of states and coded all three dimensions as dichotomous variables. This limits the complexity and facilitates the interpretation of resulting career patterns. First, we coded organizational tenure as (I) for internal if the person worked for his or her current organization (i.e., the company where the person was first promoted to CFO) or as (E) for external if the person worked for a different company. Second, we coded international experience as (A) if the person worked abroad (i.e., outside the home country) or as (H) if the person worked in his or her home country, which is Germany for nearly all CFOs in the sample. Third, we coded functional

experience as (F) if the person worked in the finance function or as (O) if the person worked in any other function. The finance function is defined as all of the sub-functions a CFO is usually responsible for, which are: financial reporting, treasury and tax management, investment management, cost management, budgeting, capital raising, and financial strategy (Mian, 2001).

Due to the three dimensions, each coded as a dichotomous variable, eight possible states for each year arise. We labeled these states by means of a simple combination of the three individual letters and then combined the states to sequences covering the career until reaching the CFO position. For example, the career sequence for a person who worked in his or her home country and in the finance function for 10 years before becoming CFO, but changed from another company to the current company after 5 years of employment, would be EHF EHF EHF EHF EHF IHF IHF IHF IHF IHF. The length of each sequence implicitly entails the total professional experience, measured in years, before becoming CFO.

Table 2. *Overview of Yearly Career States*

Code	Meaning	Absolute frequency	Relative frequency (%)
EAF	External, abroad, finance	56	4.27
EAO	External, abroad, other	26	1.98
EHF	External, home, finance	378	28.81
EHO	External, home, other	234	17.84
IAF	Internal, abroad, finance	93	7.09
IAO	Internal, abroad, other	26	1.98
IHF	Internal, home, finance	387	29.50
IHO	Internal, home, other	112	8.54
Sum		1,312	100.00

As depicted in Table 2, we encoded a total of 1,312 years for the 97 CFOs, which results in an average sequence length of 13.5 years. The career states EHF and IHF, meaning an employment in the finance function in the home country either at a different organization (E) or at the current organization (I), are the most frequent career states. These two career states

combined comprise 58.31% of all coded states; the career state EHO, representing a non-finance employment (O), contributes another 17.84%.

Drivers of career patterns (independent variables)

We used three dichotomous variables to represent level of formal education. This measurement is a simplified version of Wiersema and Bantel's (1992) system, which we adapted to the German context.

Apprenticeship was coded (1) if the CFO had completed an apprenticeship and (0) if otherwise. Apprenticeships are very common in the German educational system and consist of three-year programs that combine working in a company and vocational training (Flöthmann & Hoberg, 2017). *PhD/MBA* was coded (1) if the CFO had earned a doctoral or MBA degree or both and (0) if otherwise. In contrast to the Anglosphere, it is common for individuals in German-speaking countries to earn a doctoral degree and then move into industry instead of pursuing an academic career (Flöthmann & Hoberg, 2017). The treatment of the MBA as a distinct advanced degree is in line with prior research (Geletkanycz & Black, 2001). All but four CFOs had completed some form of undergraduate or graduate university studies (other than MBA), so we did not include a separate variable for a generic university degree. *Professional qualification* was coded (1) if the CFO had completed a professional qualification such as certified public accountant, certified tax accountant, or certified financial analyst (or their German equivalents) and (0) if the CFO had acquired no such qualification.

For field of study, we used the dichotomous variable *business degree*, which was coded (1) if the CFO had a major in business or economics and (0) for all other kind of majors. This also represents a simplified version of Wiersema and Bantel's (1992) measurement, which fits the given sample.

For the type of organization the CFOs started their career in, we used two dichotomous variables. *Public company* was coded (1) if the CFO had started the career in a public company and (0) if otherwise. *Family firm* was coded (1) if the CFO had started the career in a family firm and (0) if otherwise.

For the type of industry the CFO started the career in, we first classified all entry organizations as one of the 21 industry sections of the Statistical Classification of Economic Activities in the European Community. These first level sections are identical to the International Standard Industrial Classification of All Economic Activities by the United Nations Statistics Division and do not deviate substantially from the North American Industry Classification System. We used two dichotomous variables to represent the two most common entry industries: manufacturing (42.27%) and professional services (26.80%). *Manufacturing* was coded (1) if the CFO had started in the manufacturing industry and (0) if otherwise. *Professional services* was coded (1) if the CFO had started in the professional, scientific, and technical activities industry and (0) if otherwise.

Controls

Prior research has found that career patterns change over time, caused by legal, social and economic changes (Biemann et al., 2011; Blair-Loy, 1999; Cappelli & Hamori, 2004). This is relevant because the CFOs in our study did not start their careers in the same year. We control for this by using the dichotomous variable *cohort,* which was coded (1) if the CFO started the career before 1990 and (0) if the CFO started in or later than 1990. We chose this measurement to represent the fall of the Berlin Wall in 1989 and the German unification in 1990, which is one of the most significant political and economic events of recent times (Frijters, Haisken-DeNew, & Shields, 2004). This event should present a critical seizure for the careers in this sample, because it was directly followed by a sharp decline in output and employment in East

Germany (Siebert, Burda, & Obstfeld, 1991), but led to an increase of real household incomes by 60% one decade later (Frijters et al., 2004).

2.4.3   Data Analytic Strategy

We used OMA, a method originally developed in life sciences to analyze DNA strings (Lipman & Pearson, 1985; Needleman & Wunsch, 1970; Wilbur & Lipman, 1983), to identify CFO career patterns. This analytic technique has frequently been used to analyze careers (Biemann et al., 2011; Biemann et al., 2012; Blair-Loy, 1999; Stovel, Savage, & Bearman, 1996; Zacher et al., 2012) since its introduction to the social sciences by Abbott (Abbott & Hrycak, 1990; Forrest & Abbot, 1990). Lately, the use of OMA in management research has also gained momentum. Scholars have applied OMA to senior executives' careers (Biemann & Wolf, 2009; Flöthmann & Hoberg, 2017) and introduced methodological advancements for the management research context (Biemann & Datta, 2014).

For a number of reasons, OMA is well suited to the analysis of careers. First, unlike other stochastic models for sequence analysis, OMA allows to identify one or more typical sequences based on sequence resemblance (Abbott & Hrycak, 1990). Second, OMA is relatively robust with regard to a number of its inputs, most notably sample size and sequences with different length (Dlouhy & Biemann, 2015). Since the sample in this paper is relatively small and comprised of CFO career sequences with different length, OMA appears to be a particularly appropriate methodological choice. Third, OMA analyzes careers as sequences of employment states, thereby considering the order of individual career moves as well as the total length of a career (Biemann & Wolf, 2009; Pollock et al., 2002). For example, it distinguishes between a CFO who gained one year of international experience as an accountant early in the career and a CFO who gained it as a managing director of a foreign subsidiary later in the career. Biemann and Wolf (2009) demonstrated empirically that OMA is an improvement over

aggregated measures by showing that it increases the explained variance and the hit rate (i.e., correct classification) in their regression model.

OMA consists of four analytical steps (Abbott & Tsay, 2000; Aisenbrey & Fasang, 2010; Biemann & Datta, 2014):

1. Coding each career year;

2. Defining the costs for the operations of the matching algorithm;

3. Calculating sequence similarity;

4. Clustering the results.

First, each year in a career sequence needs to be coded (see Section 2.4.2).

Second, the costs for the different operations of the matching algorithm need to be set. OMA relies on the Levenshtein distance (Levenshtein, 1966) to measure similarity between two sequences. This means that the similarity between two sequences is determined by the minimum number of operations required to turn one of a pair of sequences into the other (Abbott & Tsay, 2000; Biemann et al., 2012). The algorithm performs substitutions, insertions, and deletions of elements; the latter two are commonly referred to as indel. We used a data-driven approach to specify substitution costs and relied on the transition probabilities between individual career states. This is based on the assumption that the frequency of transitions between career states determines the similarity of the states. Aisenbrey and Fasang (2010) argued that a cost derivation which purely relies on the available data is especially suitable for exploratory studies.

Table 3 displays the derived costs for substituting one career state with another. For example, imagine that in a given year, two CFOs worked in their home country in their current company, one of them in the finance function (career state IHF) and the other in a non-finance function (career state IHO). Substituting the IHF in the career sequence of the first CFO with

the IHO in the career sequence of the second CFO will cost 1.98 (and vice versa). We set indel costs to half the largest substitution cost, which allows for alignment of sequences with different length (Biemann & Datta, 2014; Blair-Loy, 1999). Accordingly, the algorithm will use substitutions for aligning two different elements, as one substitution (cost of maximum 2.00) is at least as cheap as one deletion followed by an insertion (cost of 2.00). It will only use insertions to adjust for differences in the number of elements in each sequence.

Table 3. *Substitution Cost Matrix for Yearly Career States*

	EAF	EAO	EHF	EHO	IAF	IAO	IHF	IHO
EAF	–							
EAO	2.00	–						
EHF	1.98	2.00	–					
EHO	2.00	1.99	1.98	–				
IAF	2.00	2.00	2.00	2.00	–			
IAO	2.00	2.00	2.00	2.00	2.00	–		
IHF	2.00	2.00	1.98	1.99	1.99	2.00	–	
IHO	2.00	2.00	2.00	1.99	2.00	2.00	1.98	–

Note. E = external, I = internal, A = abroad, H = home, F = finance, O = other. Costs are inputs for pairwise comparison of career sequences.

Third, optimal matching uses the Needleman-Wunsch algorithm (Needleman & Wunsch, 1970) to calculate the minimum cost for transforming each sequence into every other sequence, using both substitution and indel operations and the corresponding costs (Biemann et al., 2012). Since the CFOs in the sample joined the workforce at different points in time and became CFOs in different years, the problem of right truncation arises (Blair-Loy, 1999). Following the approach by Abbott and Hrycak (1990), we dealt with the differences in sequence length by dividing the total transformation cost of every pair of sequences by the length of the longer sequence. The result of the OMA is a 97 x 97 dissimilarity matrix, which contains pairwise transformation costs for all sequences.

Fourth, cluster analysis is employed to explore the dissimilarity matrix. As suggested by Aisenbrey and Fasang (2010), we checked for tied distances before clustering, but found only three pairs of identical sequences, which should not substantially affect the cluster analysis results. We used Ward's clustering (Ward, 1963), which is the most frequently applied method in OMA (Aisenbrey & Fasang, 2010) and which has been tested to be the most stable mechanism in this research context (Dlouhy & Biemann, 2015).

Hierarchical clustering methods, such as Ward's, raise the issue of selecting the right number of clusters (Everitt, Landau, Leese, & Stahl, 2011). In previous applications of OMA, researchers have mostly used their substantive knowledge of the data and an inspection of the cluster dendrograms to determine the appropriate number of clusters (Abbott & Hrycak, 1990; Biemann et al., 2011; Biemann et al., 2012; Biemann & Wolf, 2009). Studies employing OMA on similar sized samples have typically selected four (Andresen & Biemann, 2013), five (Biemann & Datta, 2014; Blair-Loy, 1999), or six (Biemann & Wolf, 2009; Flöthmann & Hoberg, 2017) clusters. After careful examination, we determined that less than five clusters would diminish the interpretability of the results and selected a five-cluster solution. We conducted all analyses with the statistical software Stata, which includes the SQ-Ados program for sequence analysis (Brzinsky-Fay, Luniak, & Kohler, 2006). The Stata code is available from the first author upon request.

2.5 Results

2.5.1   Career Patterns

Table 4 displays the five career patterns resulting from OMA with a subsequent cluster analysis. As suggested by Aisenbrey and Fasang (2010), we tested for construct validity with the help of an ANOVA. The results show that organizational tenure, functional experience, and international experience differ significantly ($p < .001$) between the five clusters. For example,

the average organizational tenure of the CFOs in cluster 2 is 2.15 years, whereas it is 12.00 years for the CFOs in cluster 5. Since the CFOs in each cluster have similar careers in terms of organizational tenure, functional experience, and international experience, we interpret the five clusters as distinct CFO career patterns (Biemann & Wolf, 2009).

Table 4. *Mean Values and ANOVA Results for OMA Five-Cluster Solution*

	1 International expert	2 Expert outsider	3 Cross-functional outsider	4 Transitioning insider	5 Expert insider	Average	F-value ANOVA
Cluster size	18	20	25	11	23		
Mean values of career pattern variables							
Professional	13.39	14.65	12.60	13.55	13.70	13.54	0.41
experience	(5.76)	(4.79)	(5.11)	(7.46)	(4.65)	(5.31)	
Organizational	4.28	2.15	3.92	11.73	12.00	6.42	19.54***
tenure	(5.99)	(2.25)	(3.52)	(6.63)	(4.64)	(6.08)	
Functional	11.22	13.80	3.72	5.73	12.35	9.46	17.65***
experience	(5.71)	(4.58)	(3.37)	(5.80)	(4.88)	(6.20)	
International	6.22	0.45	2.40	0.36	0.91	2.12	10.17***
experience	(5.48)	(1.10)	(3.85)	(0.92)	(1.78)	(3.81)	

Note. $N = 97$. All variables in years prior to becoming CFO. Standard deviation in parentheses. *** $p < .01$ (ANOVA, $df = 4/92$).

We based the labeling of the patterns on upper echelons research and Biemann and Wolf's (2009) OMA of top managers. Upper echelon studies typically differentiate between insider and outsider CEOs (Gunz & Jalland, 1996) and insider and outsider CFOs (Datta & Iskandar-Datta, 2014). Additionally, Datta and Iskandar-Datta (2014) distinguish between specialist and generalist CFOs. These notions in upper echelon research are very similar to Biemann and Wolf's (2009) labels, who described two of their six career patterns as outsiders, two as insiders, and refer to another one simply as international. They characterized the managers in one of their outsider patterns as "the experts who are called upon in critical situations" (Biemann & Wolf, 2009, p. 987). We also used insider and outsider as key labels. Additionally, we used the term expert for CFOs with a lot of functional finance experience and

cross-functional for CFOs with little functional finance experience. This leads to five labels: international expert, expert outsider, cross-functional outsider, transitioning insider, and expert insider.

Pattern 1, *international expert,* consists of professionals who had by far the most international exposure before becoming CFO. They also gained significant experience in the finance function before becoming CFO. In contrast, pattern 2 consists of *expert outsiders.* These individuals also gained substantial finance experience but hardly any international experience. Additionally, expert outsiders had a very short tenure in the organization where they became CFO. Figure 3 visualizes this characteristic of pattern 2 with long green sequences, which are not interrupted by blue segments (i.e., international assignments), unlike the sequences of pattern 1. When looking at Figure 3, it is important to consider both the frequency and the sequencing of colors.

In comparison to the first two patterns, the CFOs in pattern 3 and in pattern 4 had very little finance exposure before becoming CFOs. We labeled pattern 3 *cross-functional outsider*, because these individuals spent most of their career outside their current organization and worked in a different function. As depicted in Figure 3, quite a few of them transitioned from external non-finance (orange) to internal finance roles (purple) at some point in their career. Pattern 4, on the other hand, consists of CFOs with a lot of organizational tenure in their current company. Many of these CFOs stayed with one company throughout their career, but moved from a non-finance function into the finance function, hence the label *transitioning insider*.

Figure 3. Five-cluster optimal matching results (N = 97). Every horizontal bar represents one CFO career sequence.

Finally, pattern 5 is the pattern with the highest average organizational tenure. These insiders also gained a lot of finance experience before becoming CFO, thus we labeled the pattern *expert insider*. A few individuals had an exceptionally short career path to CFO. As depicted in Figure 3, these individuals occur in all clusters, meaning that different career patterns allowed them to become CFO so quickly.

Overall, pattern 3 (cross-functional outsider) and pattern 5 (expert insider) are the most dominant patterns in the sample, each representing roughly one fourth of the CFOs (25.77% and 23.71%, respectively). Patterns 1 (international expert) and 2 (expert outsider) are less frequent, representing 18.56% and 20.62%, respectively. Pattern 4 (transitioning insider) is the rarest one, representing only 11.34% of the CFOs.

2.5.2   Drivers of Career Patterns

The next analytical step is the explanation of career patterns, that is, testing whether level and field of formal education, entry organization, and entry industry (independent variables) explain some of the variance in CFO career patterns (dependent variable). In order to do so, we followed the approach by Biemann et al. (2012) and estimated a multinomial logistic regression. This also serves as a test for the external validity of the identified career patterns (Biemann & Wolf, 2009). Table 5 displays the results of the regression analysis. Overall, the relationship between the independent variables and the dependent variable is significant, with a chi-square value of 68.70 ($p < .001$). More specifically, several of the independent variables are significantly associated with one of the career patterns. The columns for the career patterns all report the difference relative to the reference pattern 3, the *cross-functional outsider*.

Table 5. *Multinomial Logistic Regression Results for Five-Cluster Solution Relative to Career Pattern 3 (Cross-Functional Outsider)*

Independent variables	1 International expert	2 Expert outsider	4 Transitioning insider	5 Expert insider	Chi² for model excluding respective variable	Chi² delta full and reduced model
Intercept	1.93	1.41	0.42	0.31		
	(1.32)	(1.37)	(1.65)	(1.34)		
Level of formal education						
Apprenticeship	-0.81	-1.60*	-0.62	-1.05	64.82	3.88
	(0.84)	(0.89)	(1.07)	(0.80)		
PhD/MBA	-1.45*	-2.02**	-0.40	-1.52*	59.82	8.89*
	(0.82)	(0.87)	(0.94)	(0.79)		
Professional qualification	1.22	2.30*	1.74	-13.42	61.39	7.31
	(1.42)	(1.32)	(1.75)	(1,131.34)		
Field of education						
Business degree	-1.25	-0.04	-0.89	0.45	64.58	4.13
	(0.99)	(1.02)	(1.14)	(1.00)		
Entry organization						
Public company	-1.42	-1.03	-2.88**	-0.45	63.13	5.57
	(1.08)	(1.05)	(1.35)	(0.93)		
Family firm	-16.16	-0.16	-3.02*	0.28	55.80	12.91**
	(752.15)	(1.27)	(1.63)	(1.09)		
Entry industry						
Manufacturing	3.17***	1.91*	5.04***	2.21**	48.14	20.56***
	(1.08)	(1.00)	(1.54)	(0.88)		
Professional services	0.23	0.06	-0.70	-1.05	67.28	1.42
	(1.08)	(1.12)	(1.65)	(1.17)		
Control						
Cohort	-0.90	-1.25	-1.02	-0.39	66.16	2.54
	(0.96)	(0.93)	(1.04)	(0.90)		

Note. $N = 97$. The reference category is the *cross-functional outsider* career pattern. Unstandardized coefficients, standard errors in parentheses. Chi² (full model) = 68.70 ($p < .001$); Nagelkerke-Pseudo-R^2 = .53; McFadden-Pseudo-R^2 = .23.
* $p < .10$; ** $p < .05$; *** $p < .01$.

First, significantly fewer *expert outsider* CFOs ($p = .072$) did an apprenticeship than cross-functional outsider CFOs. Second, significantly fewer *international experts (p = .077)*, *expert outsiders (p = .021)*, and *expert insiders (p = .055)* got a PhD or MBA than cross-functional outsiders. Third, significantly more *expert outsiders* completed a professional qualification than cross-functional outsiders *(p = .081)*. Fourth, significantly fewer

transitioning insiders started in a public company *(p = .033)* or in a family firm *(p = .064)* compared to cross-functional outsiders. Fifth, significantly more *international experts (p = .003), expert outsiders (p = .056), transitioning insiders (p = .001)*, and *expert insiders (p = .012)* started their career in the manufacturing industry than cross-functional outsiders.

In order to test our four initial hypotheses, we ran additional multinomial logistic regressions and conducted likelihood-ratio tests. In each of the regressions, we omitted one of the independent variables. We then assessed whether the difference in the chi-square value of the full model and the chi-square value of the reduced model was significant with the help of a likelihood-ratio test. A significant difference in chi-square values means that adding the respective variable to the model enhances the explanatory power of the model. In this case, the variable explains a significant amount of variance in the CFO career patterns.

Hypothesis 1a predicts an association between the level of formal education and the CFO career patterns. The difference in chi-square values between full model and reduced model is significant for *PhD/MBA* ($p = .064$); thus, hypothesis 1a is supported. Hypothesis 1b, which predicts an association between the field of formal education and the CFO career patterns, is not supported. Hypothesis 2 predicts an association between the entry organization and the CFO career patterns. The difference in chi-square values between full and reduced model is significant for *family firm* ($p = .012$); thus, hypothesis 2 is supported. Hypothesis 3 predicts an association between the entry industry and the CFO career patterns. The difference in chi-square values between full and reduced model is significant for *manufacturing* ($p < .001$); thus, hypothesis 3 is also supported. The control variable *cohort* did not show a significant difference in chi-square values.

2.6 Discussion

2.6.1   Career Patterns

The first purpose of this study is to establish CFO career patterns. Our analyses yielded five CFO career patterns: international expert, expert outsider, cross-functional outsider, transitioning insider, and expert insider. These five patterns differ significantly across three dimensions: organizational tenure, functional experience, and international experience. Cross-functional outsider and expert insider are the most common patterns, whereas the transitioning insider pattern is less than half as frequent.

Overall, our findings suggest that CFO career paths are rather diverse and often transcend organizational, functional, and national boundaries. In contrast, accounting careers in the corporate sector in Australia typically follow a sequential path – progressing through roles in one organization (Smith-Ruig, 2008). Similarly, Koch et al. (2017) found predominantly traditional career patterns for Fortune 100 CEOs. Some of the CFO career patterns in our study confirm much more to the notion of the boundaryless career (Defillippi & Arthur, 1994). The difference between CEO career patterns and CFO career patterns is in line with Biemann and Wolf (2009), who found that the functional field explains a lot of career variety. Differences to the study by Smith-Ruig (2008) could be due to timing, country or the hierarchical level.

Two of the five CFO career patterns (*cross-functional outsider* and *transitioning insider*) entail substantial experience outside the finance function, which contrasts with the common belief that CFOs require extensive specialized finance skills. An in-depth analysis of the data shows that cross-functional outsider CFOs started their careers in other firms' general management functions, such as business development or mergers & acquisitions. Some of them also switched between finance and general management in their later career, typically assuming general management roles such as managing director of a foreign subsidiary. Similar to the

findings of Flöthmann and Hoberg (2017) for supply chain management, we found a significant share of CFOs who followed cross-functional careers before reaching C-level. In both functions, one could argue, there is room for executives who are competent managers with a broad skillset.

Two of the CFO career patterns (*expert outsider* and *cross-functional outsider*) entail substantial experience outside the current organization. Biemann and Wolf (2009) also found two outsider career patterns in their study of top management team members. In one of the two, the *average outside successor*, there is a considerable share of executives from support functions, such as finance. Our paper substantiates the findings by Biemann and Wolf (2009). *Expert outsider* CFOs might compensate for the lack of organizational experience with extensive finance experience. *Cross-functional outsider* CFOs seem to rely on their general management background combined with some international experience.

Only one of the CFO career patterns (*international expert)* entails substantial experience outside the home country. Thus, international experience does not seem to be a prerequisite for becoming CFO, but it may be beneficial in certain contexts. Our analysis of CFOs does not confirm the findings that international experience slows the ascent to the top (Hamori & Koyuncu, 2011). Biemann and Wolf (2009) found that executives from support activities are more likely to have gained international experience than executives from primary activities. While this finding may generally hold, our analysis of CFOs reveals that some CFOs have gained significant international experience, while others have purely domestic careers. The difference to previous findings might be a result of the German sample, which does not only include CFOs of large listed companies, but also a number of medium-sized family firms. These firms might be less exposed to internationalization (at least in their finance departments) than the typical firm in the sample of Biemann and Wolf (2009).

Possibly, certain firms prefer CFOs with boundaryless careers (Arthur, 1994) and the experience and skills that come with such paths. We ran additional tests on the dataset and found that the number of CFOs of family firms varies significantly between the five career patterns (ANOVA; $F(4, 92) = 2.55$, $p = .044$). Although the results of a pairwise comparison between clusters with a Bonferroni test were not statistically significant, one trend in the data is noteworthy. *Expert insider* CFOs seem to be more likely to become CFO in a family firm than *international expert* CFOs or *cross-functional outsider* CFOs. This result has two implications. First, it may explain why CFO careers are less uniform than expected. Second, it further solidifies the five identified CFO career patterns by showing that different patterns lead to CFO positions in different kinds of organizations.

Finally, we conducted another analysis to test the external validity of the career patterns. In the OMA, we did not include industry affiliations when modeling the career sequences due to manageability and the small sample size. However, a separate analysis showed that the number of industry transitions (i.e., changes from one industry to another industry) varies significantly between the five career patterns (ANOVA; $F(4, 92) = 5.22$, $p < .001$). The results of a Bonferroni post-hoc test revealed that *expert insiders* change industries significantly less often than *expert outsiders* ($p = .013$) and *cross-functional outsiders* (p = .003). It is not surprising that expert insiders typically do not change the industry during their career. However, it is interesting to note that the two outsider patterns also make, on average, more than one industry change aside from their change in employer or function. This finding supports the view that CFOs follow fundamentally different career patterns. It seems that in some cases, the required CFO skillset is not only transferable across firm boundaries, but also across industry boundaries.

2.6.2 Drivers of Career Patterns

The second purpose of this study is to analyze whether early career choices are associated with the CFO career patterns. We found support for the hypotheses that level of formal education, entry organization, and entry industry are associated with the type of career pattern that a CFO follows. The former two findings are in line with Flöthmann and Hoberg's (2017) application of OMA. They found that level of formal education and industry affiliation, among others, are related to different career patterns of supply chain executives. Specifically, supply chain executives with higher formal education have a faster career advancement and supply chain executives in the technology and food and beverages industry have a faster career advancement than those in automotive and parts.

The latter finding, the effect of the entry industry, echoes the analysis of CEOs by Rajagopalan and Datta (1996). Generally, they found that firm-specific factors are stronger in explaining variations in CEO characteristics than industry factors. However, they discovered a U-shaped relationship between industry concentration and CEO organizational tenure and an inverted U-shaped relationship between industry concentration and CEO functional heterogeneity. Additionally, Rajagopalan and Datta (1996) found that industry capital intensity is negatively and industry growth is positively associated with CEO functional heterogeneity. Similarly, we found evidence for the impact of industry factors on CFO careers. Specifically, starting in the manufacturing industry typically leads to a CFO career with more organizational tenure and less functional heterogeneity, that is, more functional finance experience.

Our findings show that CFOs with a PhD or MBA degree are significantly less likely to follow one of the expert career patterns (*international expert*, *expert outsider* and *expert insider)* than to follow the *cross-functional outsider* career pattern. However, CFOs with a professional qualification are significantly more likely to follow the *expert outsider* career pattern than to follow the *cross-functional outsider* career pattern. In other words, those

professionals with a PhD or MBA degree typically follow an international career that is partially outside the finance function. However, those professionals with a professional qualification typically stay in the finance function throughout their career. Remarkably, PhD and MBA degrees are most frequent for *cross-functional outsiders* and professional qualifications are most frequent for *expert outsiders*. Possibly, CFOs are able to compensate for relatively low organizational tenure with the help of these degrees. These findings are highly relevant for graduates who aim for a career in the finance function. They may have to choose early on which kind of CFO career pattern they would like to follow.

Our findings also show that regarding the entry industry, only manufacturing has a significant impact on the CFO career pattern. If a CFO started in the manufacturing industry, the career patterns 1, 2, 4, and 5 are all more likely than the reference career pattern 3 (cross-functional outsider). This highlights two aspects: First, CFO career patterns seem to be less pronounced when starting in professional services as compared to manufacturing. Accordingly, a start in a professional services firm leaves more flexibility to aspiring CFOs when defining their career path. Second, cross-functional career opportunities for CFOs are less likely to occur in a career that started in a traditional industry such as manufacturing.

2.6.3   Limitations and Suggestions for Future Research

This paper has a number of limitations. First, there is always a trade-off between using a unique sample such as the one employed in this paper and using scientific sampling techniques to build a sample from scratch. This paper uses a sample that represents a variety of industries and organizations; however, it is limited to a single country. Previous research suggested that the country of origin has a significant influence on the type of career patterns that top managers follow (Biemann & Wolf, 2009). Strictly speaking, the results are only applicable to CFOs in medium-sized and large firms in Germany. However, the large share of

public firms (53.61%), which are subject to global capital market principles, suggests some representativeness beyond Germany. Another aspect of the single country study pertains to education: the share of CFOs with an apprenticeship or a PhD (23.71%, respectively) is high, whereas the share of CFOs with an MBA (7.22%) is quite low. The CFO career patterns in countries that rely less on doctoral programs and more on practical training through MBA programs, such as the United States, may look different. Nevertheless, the main characteristics, such as insider versus outsider careers, should be persistent. Future research can test this by expanding the regional focus and by analyzing the effect of different educational systems.

Second, the nature of the CFO sample also gives rise to issues of selection bias. However, our contacts at the executive search firm, which provided the data, have assured us that the selection process of the resumes was solely based on the availability and timeliness of data, but otherwise random. Due to legal issues, we were not able to oversee the selection process ourselves. It is conceivable that the data gathering through the executive search firm has biased the sample towards CFOs who changed jobs frequently. Possibly, the database of the executive search firm consists of many individuals who were placed repeatedly after initial contact with the executive search firm. However, this would only cause a bias in the relative size of the career patterns in the sample (i.e., an overrepresentation of outsiders vs. insiders) and not put into question the existence of the career patterns.

Third, a limitation pertains to the cluster analysis. As with all hierarchical cluster analyses, the selection of the appropriate number of clusters is problematic. The main criticism is that cluster analysis leaves too much room for the subjectivity of the researcher. Scholars have developed a number of methods to overcome this subjectivity in determining the appropriate number of clusters (Calinski & Harabasz, 1974; Kim & Ramakrishna, 2005). The most appropriate global criterion for hierarchical clustering is the Calinski-Harabasz stopping index (Everitt et al., 2011). We applied this method to validate our number of clusters. The

stopping index suggested that only two clusters would be the statistically most distinct solution; however, this solution would have failed to reflect the variety in CFO career patterns and would have made interpretation of the patterns cumbersome.

Three avenues seem particularly promising for future research. First, researchers can expand this paper by applying OMA to CFOs in other countries, especially those with large differences in the industry structure or labor market, and test whether other patterns arise. In such an application, it might also be beneficial to extend the contextual factors, for example by including firm size both at entry and at CFO level. Such an extension could help research to challenge and extend new career theories, such as the boundaryless career. Likewise, it could help CFO candidates to understand the mechanisms in different labor markets. Second, researchers may apply OMA to other functional top management team members, such as the chief marketing officer or the chief information officer. So far, we know that members of the top management team follow different career patterns (Biemann & Wolf, 2009). However, we know very little about the specifics of these individual career patterns and its implications for candidates and firms. To the best of our knowledge, there have been no applications of OMA to functional top management team members besides the study of supply chain executives by Flöthmann and Hoberg (2017). An increased transparency would help firms to differentiate their human resource management approach in building future executives. Third, researchers with an upper echelons perspective may test the relationship between the career patterns of top managers and their individual or firm success. Since the call by Gunz and Jalland (1996), few managerial studies have followed this approach.

2.7 Conclusion

This paper is the first study with a focus on CFO career sequences. Using OMA, we found five CFO career patterns, which differ significantly in terms of organizational tenure,

international experience, and functional experience. Cross-functional outsider and expert insider are the most common patterns, each representing roughly one fourth of the CFO careers. International expert and expert outsider are slightly less frequent, followed by transitioning insider, which only accounts for one tenth of the CFO careers. Our findings suggest that CFO career paths are very diverse and, in line with the boundaryless career theory, often transcend organizational boundaries. Some CFO positions do not require extensive functional finance experience. We externally validated the career patterns and found three early career choices associated with the type of career pattern a CFO follows: level of formal education, entry organization (family firm), and entry industry (manufacturing). These findings are relevant for future research on functional members of the top management team and for practitioners in the finance departments and on the board of management.

3. Study 2: How Boundaryless are Careers in Management Consulting Firms? – A Two-Country Optimal Matching Analysis[3]

Empirical research on firms organized as partnerships is scarce, especially regarding the careers of their senior leaders, the partners. In the context of career theory, this study analyzes the careers of 291 American and German partners of the "Big Three" consulting firms and provides insights into the paths that lead to partner positions within these firms. Using optimal matching, an innovative method particularly appropriate for career analysis, I find four career patterns that involve multiple moves across organizational and industry boundaries and thus match the definition of a boundaryless career. My results indicate that American partners and partners with fewer years of pre-employment education are more likely to follow one of the boundaryless career patterns. These findings provide new evidence of the existence of boundaryless careers in industries with strict hierarchies and advancement principles, and are relevant to organizational inquiries into partnerships.

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[3] This chapter is based on a single-authored working paper that was accepted for publication in the *The International Journal of Human Resource Management* (DOI: 10.1080/09585192.2019.1681493) after the submission of this dissertation. The full chapter is included in the examiners' copies of this dissertation. In order to avoid plagiarism or dual publication, it is not included in the freely accessible version of this dissertation.

4. Study 3: Another Chief in the Room – Evidence on the Functional Career Patterns of Chief Digital Officers in Germany[4]

Recently, numerous firms have responded to the challenges of digital transformation by introducing a CDO to their top management team. The newness of this position implies that limited knowledge exists about the individuals in this position, which causes ambiguity regarding their role as part of the top management team. Motivated by upper echelons theory and career theory, this paper examines a sample of 61 German CDOs. We find that CDOs are typically equipped with a non-technical university degree. Using sequence analysis, an innovative methodology to model careers, we identify four CDO career patterns: cross-functional manager, strategy expert, information technology expert, and operations expert. The cross-functional pattern dominates and includes marketing and sales, as well as the operations function. These results support and extend boundaryless career theory and have implications for the ongoing debate on the role of the CDO.

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[4] This chapter is based on a working paper co-authored by Theresa Lohmayer and Oscar Salvador Morillo Victoria that is currently under review at *Information & Management*. The full chapter is included in the examiners' copies of this dissertation. In order to avoid plagiarism or dual publication, it is not included in the freely accessible version of this dissertation. Please note the use of plural instead of singular throughout this chapter to refer to all three authors. For the authors' contributions, please refer to the Appendix.

5. Conclusion and Outlook

This chapter starts with a brief summary of the motivation, research questions, and results of the doctoral thesis and then provides an outlook on both practical and theoretical implications of these results.

The present doctoral thesis draws on upper echelons theory and career theory and contributes to this literature by analyzing the previously unexplored career paths of executives in a novel manner. The thesis is comprised of three empirical studies, each focusing on a different type of executive: The first study analyzes the careers of CFOs, the second study examines the careers of partners, the senior leaders in partnership firms, and the third study explores the careers of CDOs. All three studies employ OMA, an innovative form of sequence analysis frequently applied in life course research, to analyze the executive career paths and to identify objectively observable career patterns.

The first study addresses the following two research questions:

Research question 1: What do current CFO career patterns look like?

Research question 2: Which early career choices are associated with CFO career patterns?

The results of the study show five CFO career patterns: international expert, expert outsider, cross-functional outsider, transitioning insider, and expert insider. These patterns vary significantly regarding organizational tenure, international experience, and functional experience of the CFOs. Two of the patterns (expert outsider and cross-functional outsider) involve very limited organizational tenure prior to the CFO promotion, while only one pattern, the international expert, displays significant international exposure. Furthermore, the results indicate that three early career choices are associated with the CFO career patterns: the level of education, the entry organization, and the entry industry.

The second study addresses the following two research questions:

Research question 3: Which career patterns lead to partner positions in consulting firms?

Research question 4: How boundaryless are these career patterns and which individual characteristics are associated with boundarylessness?

The study finds four partner career patterns that involve multiple moves across organizational and industry boundaries and thus match the definition of a boundaryless career: reorientation career, early transition career, outside industry career, and professional service career. The fifth career pattern, however, conforms to the definition of a traditional organizational career. The results further demonstrate that American partners and partners with fewer years of education before their first job are more likely to follow one of the boundaryless career patterns.

The third study addresses the following two research questions:

Research question 5: What are the educational backgrounds of CDOs?

Research question 6: What functional career patterns do CDOs follow and how boundaryless are they?

The results indicate that CDOs are typically equipped with a non-technical academic degree. Regarding the CDO careers, the study finds four patterns: cross-functional manager, strategy expert, information technology expert, and operations expert. These patterns differ significantly in terms of the functional experience of the CDOs. The majority of the CDOs followed the cross-functional career pattern, covering marketing and sales, as well as the operations function. This functional mobility is yet another example of boundarylessness in executive careers.

In summary, these results have several implications for future research. First, research on career patterns is still in its infancy, even though career researchers have recently increased their attention to the analysis of observable patterns (Chudzikowski, 2012). Consequently, this doctoral thesis presents a first step in the right direction by demonstrating how quantitative career research methods can improve our understanding of senior executives. For example, the succession literature (Shen & Cannella, 2002) and the literature on managerial roles (Chun &

Mooney, 2009; Tumbas et al., 2016) can benefit from a quantitative and sequential focus on managerial careers.

Second, in terms of the boundaryless career theory, my results demonstrate that contextualization of careers is of special importance (Biemann et al., 2011), especially in management research. Boundarylessness is now relevant in traditional corporate functions, such as finance, and even in industries with non-traditional organizational forms, such as partnerships. The stable and easily identifiable job classifications (McDonald, Brown, & Bradley, 2005) as well as options-based career mobility (Malos & Campion, 1995, 2000) in these industries present an exciting opportunity for future career research.

Third, this thesis works towards a more comprehensive definition of boundarylessness. Previous boundaryless career research has often focused exclusively on organizational boundaries (Inkson et al., 2012). However, this thesis demonstrates that besides interorganizational mobility, several other forms of mobility offer promising insights into executive careers. These mobility dimensions could prove to be useful extensions to the definition of boundaryless careers: functional mobility, interindustry mobility, and international mobility. Future career theorists should aim for a boundaryless career definition that incorporates these additional dimensions, which will facilitate the classification of career patterns in empirical studies.

Aside from theoretical implications, both graduates and organizations will also find the results of this thesis helpful. Generally, the results are relevant to graduates because they demonstrate that the search for a stable career path may be futile. Instead, graduates need to be prepared for a high degree of boundarylessness throughout their work life, which also has implications for the type of human capital they acquire. General human capital that is transferable across organizations (Becker, 1962), such as the skills taught in MBA programs, may become ever more important. Additionally, graduates seeking careers in the finance or

digitalization functions or in management consulting might find it helpful to study the typical career patterns of CFOs, CDOs, and partners to develop a better understanding of the required qualifications and to make informed decisions when it comes to career opportunities, such as job offers, international assignments, or internal transfers. In the new career climate (Verbruggen, 2012), graduates face a situation in which multiple career paths can lead them to the same career outcome.

Finally, based on the results presented here, organizations need to rethink their strategies in recruiting and human resource management. In terms of recruiting, organizations have to re-evaluate the cost-benefit ratio under the assumption that the majority of applicants will only stay with the organization for a couple of years under the new career contract (Hall & Mirvis, 1995). In this context, digital technologies may provide a way to identify suitable candidates in a cost-efficient manner. For human resource or talent management, the dominance of boundaryless careers poses both risks and opportunities. On the one hand, employee turnover might further increase in some industries. On the other, organizations might be able to leverage internal labor markets in novel ways. For example, just because an employee is not fit to work in the finance department, he or she could be a good addition to another functional team. As the importance of interorganizational boundaries has decreased, so has the meaning of intraorganizational boundaries, such as the ones between different functions or national legal entities within the same organization. If organizations put the right mechanisms in place, they may be able to use this momentum and increase the relevance of firm internal labor markets. At the same time, they need to pay attention to the development and career needs of their high potentials and provide adequate career opportunities to them, as lifelong employment is not a given anymore.

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Statements of Authorship

Statement of Authorship for Study 1 (Chapter 2)

I was responsible for the development of the research questions and the data analytic strategy. I prepared and coded the data, planned and conducted the data analysis, and wrote the most part of the article.

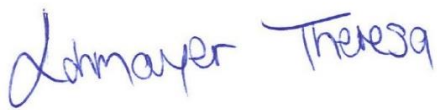Jan-Niklas Bartel (lead author)

Alwine Mohnen (co-author)

Statement of Authorship for Study 3 (Chapter 4)

I was responsible for the development of the research questions and the data analytic strategy. I sampled the dataset, conceived and conducted a significant part of the data analysis, and wrote the most part of the article.

Jan-Niklas Bartel (lead author)

Theresa Lohmayer (co-author)

Oscar Salvador Morillo Victoria (co-author)