THE WAY TO THE TOP: CAREER PATTERNS OF *FORTUNE 100* CEOS

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ABSTRACT

How have the CEOs of *Fortune 100* companies worked their way to the top position? Are there several paths to the top or have most present-day CEOs moved up the ranks in a similar fashion? We examine the employment trajectories of all of the current *Fortune 100* CEOs across their entire working careers in order to answer these questions. The analysis developed in this paper is carried out in two steps. We first use sequence analysis to find the patterns that are characteristic of the career paths of these CEOs. We then apply clustering techniques to identify distinct groups of career paths that have led individuals to the uppermost management level. Our results show that the careers of the *Fortune 100* CEOs have largely followed traditional careers paths that are symbolized by steady progression towards more responsibility, little mobility between firms and industries and a strong focus on general management functions.

KEYWORDS

CEO careers, career patterns, boundaryless careers, sequence analysis

INTRODUCTION

CEOs arouse strong interest for many reasons. They make decisions impacting the whole society and personify organizations. Beyond regular business press coverage, CEOs have received ample attention from researchers, for example regarding how they are selected (Westphal & Fredrickson, 2001), their compensation (Fong, Misangyi & Tosi, 2010), or succession (Datta & Rajagopalan, 1998). Indeed, CEOs are perhaps the most studied group of individuals in business organizations (Bertrand, 2009). This fascination reflects the importance of CEOs, with the most powerful ones reigning over companies worth more than the economies of many large countries. For instance, Michael Duke's career took him to the head of Wal-Mart, a company whose revenues are higher than the GDP of Belgium, Switzerland and Singapore. Having successfully climbed the career ladder, put together the CEOs of the top 500 US firms control 78% of the country's economic activity. CEOs are also frequently held up of examples of highly successful individuals whose career should be emulated by ambitious managers and MBA students.

It is commonly claimed that careers have changed over the last two decades (e.g., Crossland, Zyung, Hiller & Hambrick, 2014; Greenhaus, Callanan & DiRenzo, 2008; O'Mahony & Bechky, 2006). Dramatic changes in the economic environment such as globalization and corporate restructuring, combined with changing personal aspirations such as work-life balancing, have had a major impact on how people experience their career (Sullivan & Baruch, 2009). This has led to a growing instability in employment relationships (Dokko, Wilk & Rothbard, 2009; Greenhaus & Callanan, 2012) and greater mobility across organizational and occupational boundaries in the United States and elsewhere (e.g., Ahmadjian & Robinson, 2001; Biemann, Zacher & Feldman, 2012). For instance, a recent study of job transitions by German employees found that between 1984 and 2011, the rate of intraorganizational job transitions declined, while interorganizational transitions became

more frequent (Kattenbach et al., 2014). Research has documented such changes using new concepts to describe these new types of career. Hall's (1976) "protean career" emphasized how individuals taking charge of their career enjoyed more psychological wellbeing through a whole-life perspective. In doing so, employees downplayed the career development that was frequently proposed by their employers, resulting in greater mobility across organizations. Arthur and Rousseau's (1996) "boundaryless career" insisted on "independence from, rather than dependence on, traditional organizational career arrangements" (p. 6). "Boundarylessness" referred to frequent moves across organizations, the importance of validation by the external job market, external networks or information, the receding of hierarchical advancement principles, and work-life balance (Arthur & Rousseau, 1996). More generally, career scholars have developed a significant body of research on the factors that lead individuals to change occupations, jobs or employers and the outcomes associated with different degrees of job mobility (Feldman & Ng, 2007). "Job mobility" is defined as "patterns of intra- and inter-organizational transitions over the course of a person's work life" (Ng, Sorensen, Eby & Feldman, 2007: 363). Career research has not only examined antecedents and outcomes of job mobility, but also how individuals actively move across different kinds of organizations to build their careers (Bidwell & Briscoe, 2010).

Investigating CEO careers and mobility brings to the fore interesting questions and challenges. One of the questions we aim to address in this article is whether recently-observed career phenomena such as boundarylessness also apply to CEOs. Although present-day CEOs spend less time within one company than their counterparts did in the 1980s (Cappelli & Hamori, 2005), a greater proportion of their career is spent in the same company compared to other employees below the executive level. The market for CEOs can be seen as having other distinctive traits. For instance, it is a small market, where reputation plays a key role and previous performance is particularly closely scrutinized (e.g., Fee & Hadlock, 2003).

In addition, individuals for whom work is central have been shown to be more likely to receive promotions (Ng *et al.,* 2005), suggesting that the career attainment of CEOs has been on the basis of less concern about work-life balance. However despite the specific nature of CEO careers, little research has examined the actual career patterns of CEOs (Biemann & Wolf, 2009). Another issue that has yet to be examined is how an individual career can results from a series of transitions across many career dimensions, which are often conflated or disregarded in empirical studies. Such dimensions include functional areas, levels of responsibility, or moves across organizations and industries (Nicholson & West, 1988). Our goal is to analyze these dimensions separately in order to gain deeper and more detailed insight into the development of CEO careers.

By addressing these two topics (i.e., whether the current trend towards boundaryless careers apply to CEOs, and deciphering career moves across different dimensions of job mobility), this article makes the following contributions:

First, we examine three different types of job mobility: *status* (moves across jobs with different degrees of responsibility), *function* (moves across functions such as marketing, etc.), and *employer* (moves across and within organizations and industries). We thereby extend previous research on career patterns which has mostly examined single indicators of mobility separately, such as moves across organizations (for an overview, see Vinkenburg & Weber, 2012). This is important because, for example, our indicator *function* also sheds light on moves across functional areas undertaken by *Fortune 100* CEOs. While upper echelons research has found evidence that a CEO's functional background predicts commitment to certain firm strategies (e.g., Geletkanycz & Black, 2001), no research has, to the best of our knowledge, examined to what extent this is the case and how CEOs have actually moved across functions throughout their career. Through an investigation of different types of mobility, this study contributes to the current literature by elucidating the prevalence of

different types of job mobility, their development over time and their relationship to one another for the entire population of *Fortune 100* CEOs. This provides a finer grained look at mobility which has been deemed necessary to increase our understanding of this phenomenon (Feldman & Ng, 2007). By revealing common patterns of mobility, not only with respect to *function* and *employer,* but also according to advancement in terms of *status*, the results of this study also provides for a better link between research on job mobility and the literature on career success (Ng, Eby, Sorensen & Feldman, 2005).

Second, we also contribute to the literature on career patterns of CEOs. Research on managerial career patterns is fairly limited in size and research on the career patterns of top executives or CEOs is even more scant: according to a recent review by Vinkenburg and Weber (2012), only three articles, namely Biemann and Wolf (2009), Hamori and Kakarika, (2009) and Wessel and Keim (1994), are concerned with these populations, with the majority of related studies only providing "anecdotal evidence […] without a focus on actual career patterns" (Vinkenburg & Weber, 2012: 599). Most previous research on CEO careers (e.g., Cappelli & Hamori, 2004, 2005), examines moves across employers or jobs, but not whole career patterns. Here, our study provides more evidence on actual career patterns of CEOs and the relative importance of particular career patterns, adding a dynamic perspective and filling a gap between work on career patterns in non-CEO contexts (e.g., Biemann & Wolf, 2009; Biemann, Zacher & Feldman, 2012; Kattenbach et al., 2014) and work on CEO careers which has examined job mobility, but disregarded entire career patterns (e.g., Cappelli & Hamori, 2004, 2005; Hamori & Koyuncu, 2011). In conjunction with upper echelons research on CEOs, we expect to contribute to a better understanding of organizational outcomes such as strategic choices and firm performance. Studying actual career patterns also adds to our understanding of physical mobility, which is to date inadequate (Inkson, Gunz, Ganesh &

Roper, 2012), especially when compared to our knowledge of willingness to move (Feldman & Ng, 2007).

Third, building on previous research (e.g., Hamori & Kakarika, 2009), our results provide new evidence that CEO careers are largely traditional, with little support pointing to boundarylessness. This contributes to the larger debate on the prevalence of boundaryless careers (Inkson et al., 2012). Research on boundarylessness has often examined boundary-crossing between organizations while neglecting other boundaries (Rodrigues & Guest, 2010). By examining several types of mobility in addition to moves across or within organizations, we are able to examine the degree of boundarylessness more comprehensively.

The remainder of the paper is organized as follows. The next two sections briefly review the relevant literature on CEO careers, new forms of careers and job mobility. The two subsequent sections set out the methodology and results of the sequence and cluster analyses used to examine the career trajectories of a population that includes all CEOs of *Fortune 100* companies in the United States. Finally, a discussion of our results highlights our contribution to the literature.

BOUNDARYLESS CAREERS AND THE MARKET FOR CEOS

Ever since the publication of Arthur and Rousseau's (1996) book *The Boundaryless Career*, the focus of career research has gradually moved away from the notion of linear and stable careers to a more flexible and disparate concept of career patterns deemed as better aligned with today's work context. While traditional career concepts emphasized permanent and full-time working relationships that took place in a steady environment and in given organizational structures, more recent approaches to career research – such as boundaryless careers – assume that employees actively build their careers in a nonlinear fashion that encompasses multiple organizations (Sullivan & Baruch, 2009). Such a welcome addition of how individuals actively shape their career should however be taken with caution. Indeed, the

boundaryless career concept has encountered criticism. Besides problems such as appropriate conceptualization and measurement (Pringle & Mallon, 2003; Sullivan & Baruch, 2009), the prevalence of boundaryless careers is also being called into question. Although the phenomenon of boundaryless careers exists, it appears to be less widespread than previously thought. For instance, Rodrigues and Guest (2010) analyzed aggregate employee-level data for job tenure and found little support for diminishing employment stability in several countries. However, their data refers to the general population of workers and does not include measures of boundarylessness other than job tenure. With respect to the US, Rodrigues and Guest acknowledge that there is no consensus about the job stability of core organizational workers. In a large-scale life history study, Biemann, Fasang and Grunow (2011) analyzed the career complexity, defined as variability within individual sequences over time, of individuals' moves across employers. They found only small, gradual amounts of increase in complexity for older cohorts of individuals (born before 1955), but no support for increasing career complexity of younger cohorts. However, that study did not rely on US data, examined the careers of the general population rather than CEOs and principally referred to moves across employers, but not to boundaries such as functions or status. Relying on a survival analysis of the career histories of 760 American employees, Chen, Veiga and Powell (2011) found that crossing functional, organizational, and geographic boundaries is more often related to an increased likelihood of career advancement and salary growth. Vice versa, this implies that CEOs are individuals who exhibit more boundaryless in their careers than others. Some variations have been observed across countries, as Dany (2003) found for France, and Chudzikowski (2012) for Austria. Research has also documented differences in work-life balance aspirations across gender and across seniority (e.g., Sturges & Guest, 2004; Tomlinson & Durbin, 2010). In addition, and closer to our research question, some differences are also found across hierarchical levels. Hassard, Morris and McCann (2012)

interviewed 142 managers from 26 organizations in Japan, the UK and the US, finding little evidence for boundaryless in the careers of managers. Indeed, in a recent, comprehensive review of 33 published studies, Vinkenburg and Weber (2012) found that managerial career patterns are still strongly contained by employers. In light of these results, calls have been made to bring back boundaries into career studies and examine why boundaries are crossed and the consequences which result (Inkson et al., 2012).

The question in focus here is how many present-day CEOs reached the top position following a boundaryless career trajectory as opposed to a more stable and linear career progression? On the one hand, some studies hint at a decrease of firm-specific skills in recruited CEOs (Frydman, 2006), at a rise of externally recruited CEOs (Murphy & Zabojnik, 2006), and at decline in CEO tenure (Cappelli & Hamori, 2005). On the other hand, firms want to avoid hiring CEOs externally since they have to pay a premium and risk experience lower performance (Bidwell, 2011). Furthermore, managers appear to be less affected than other employees by instability in the labor market (Rodrigues & Guest, 2010). As a result of mixed evidence for boundaryless careers and conflicting arguments for executives, we believe that CEOs might exhibit career patterns different from other employees, even more so in the biggest firms which have the most sophisticated internal labor markets (Cappelli & Hamori, 2005). This assumption drives our decision to focus on *Fortune 100* CEOs. In addition, one of the tenets of boundaryless careers is mobility across a variety of boundaries (Inkson et al., 2012); we believe that previous research on executive careers might have overlooked the dimensions composing career sequences by conflating them within mobility.

In summary, our first research question is:

Research Question 1: Are boundaryless career sequences prevalent among CEOs of Fortune 100 *companies?*

CAREER TRAJECTORIES OF CEOS AND THEIR DIMENSIONS

In the wake of new types of careers, career research has shifted its attention onto analyzing career transitions instead of career stability (Feldman & Ng, 2007). Job mobility occurs when employees are dissatisfied with their current situation and have better options, or when they lose their job and find another one. Ng et al. (2007) propose three groups of determinants of job mobility. First, structural factors such as economic conditions and industry differences impact on the availability of mobility options. Second, individual differences like personality traits and career interests shape preferences for mobility options. Third, decisional factors like subjective norms and readiness for change determine the intention to actually move. Beyond job mobility, a small group of researchers have focused on entire career histories and looked for patterns. This body of literature is limited, as shown by Vinkenburg and Weber (2012), who found only 33 articles dealing with this topic in their recent review. Among those, only three focus on CEOs and other top executives. Wessel and Keim (1994) found two career patterns for US university presidents, with 69% of them following an academic pattern whereas 31% followed an administrative path. The two other studies are less industry-specific. Hamori and Kakarika (2009) compared the career histories of the CEOs of the 500 largest companies in Europe and the 500 largest in the United States. They found that, in both continents, CEOs that switched employers more frequently and had shorter tenures with their current organization had taken longer to get to the top position. With the external labor market strategy apparently negatively related to career success, they concluded that the boundaryless career might not apply to CEOs. Biemann and Wolf (2009) analyzed the career patterns of 166 top managers from 42 organizations in 5 countries. Using sequence analysis, they developed a taxonomy of career patterns based on organizational tenure and international experience. They found six patterns, with significant differences across fields of activity and across countries. The most frequent pattern is the highly experienced insider, a manager who has acquired almost his/her entire professional

experience within one company (Biemann & Wolf, 2009). Besides looking at a sample of top management team members, rather than CEOs, Biemann and Wolf examined career patterns with a single indicator that combines organizational tenure and international experience, but disregarded functional experience, hierarchical level (status) and inter-industry experience (Biemann & Wolf, 2009).

In work related to CEO careers which does not examine actual career patterns, Cappelli and Hamori (2004, 2005) analyzed the career histories and personal characteristics of *Fortune 100* CEOs and other top executives in 1980 and 2001. They found that, compared to their counterparts in 1980, CEOs and top executives from *Fortune 100* companies in 2001 had shorter tenures within the organization, rose to the top more quickly, were younger and were more likely to have graduated from public institutions (Cappelli & Hamori, 2004, 2005). The results of these studies notwithstanding, the examination of actual CEO career patterns with regard to the most relevant dimensions of job mobility is yet to be addressed.

In all of the three studies on mentioned above (i.e., Biemann & Wolf, 2009; Hamori & Kakarika, 2009; and Wessel & Keim, 1994), career patterns have been coded in a way that captures all occurrences of job mobility, regardless of whether this occurs across jobs, organizations or industries. Although such a strategy provides a simpler unified view of career histories, it may overlook the multi-level nature of job mobility (Ng et al., 2007). More precisely, the main drawback associated with using a single indicator is that "by lumping all kinds of mobility together, […] we may draw overstated inferences about the degree of mobility in the population" (Feldman & Ng, 2007: 369). In the context of assessing boundarylessness of career patterns, a similar commonly heard criticism is that most studies focus on boundaries around organizations while neglecting other dimensions of boundary-crossing (Inkson et al., 2012). Still, job mobility can be measured in a number of ways and there is no strong consensus regarding its operationalization (Feldman & Ng, 2007; Stumpf,

2014). For example, job mobility might include measures of mobility across and within organizational boundaries (e.g., Kattenbach et al., 2014; Kondratuk, Hausdorf, Korabik & Rosin, 2004; Sammarra, Profili & Innocenti, 2013), mobility across hierarchies (e.g., Blair-Loy, 1999; Stovel, Savage & Bearman, 1996), or a combination of frequency of job changes, employer changes, and hierarchical advancement (Stumpf, 2014). When assessing mobility, Feldman and Ng (2007: 352) recommended that one should "focus on specific differences among job change, organizational change, and occupational change." Our second research question addresses this issue by opening the black box of mobility and sheds light on the three mobility dimensions suggested by Nicholson and West (1988), namely status, function and employer:

Research Question 2: What do patterns of mobility of Fortune 100 *CEOs across statuses, functions, and employers look like?*

METHODOLOGY

Research design and data collection

Given our interest in the career patterns of top CEOs, our research design involves three main features that guide our data collection. First, the objective of our study is to examine only the careers of *Fortune 100* CEOs, not the careers of CEOs or other top executives in general. We deliberately chose to study *Fortune 100* CEOs for three reasons. First, tracing the entire career history of any CEO requires lots of data. Focusing on the most prominent CEOs allows us to draw upon an increased range of publicly available data. Second, the CEO labor market is specific (Bertrand, 2009), and *Fortune 100* boards only have a limited number of possible external candidates to choose from when searching for a CEO (Khurana, 2002), while smaller firms have more options. As a consequence, *Fortune 100* firms have a more balanced mix of internal and external candidates to choose from for staffing the CEO position, making it a better empirical setting for our study. Third, the CEOs of these

companies are regarded as having achieved career success by nature of their roles. We thus decided to work with the full population of *Fortune 100* CEOs rather than drawing on a sample from some other population of CEOs. The second main feature of our design deals with how to describe job mobility. Drawing from previous research, we categorized job mobility according to three dimensions: status (upward, lateral or downward movements), employer (external and internal movements), and function (Nicholson & West, 1988: 48; see also Ng, Sorensen, Eby & Feldman, 2007). Our measure thus represents a comprehensive operationalization of physical job mobility and, at the same time, allows us to differentiate between several types of (physical) boundaries. An examination of this threefold measure of job mobility results in a more complete and detailed understanding of the "what" and "how" of boundarylessness of CEO careers. In addition, our measure captures the whole range of CEO career variety, a measure which has been used in research on top management teams and which consists of "the sum of distinct industry sectors, distinct firms, and distinct functional areas the individual had worked in prior to becoming CEO" (Crossland et al., 2014: 659). In this way, our measure also provides a bridge to the literature on top management teams.

We collected data on executive résumés from BoardEx and Bloomberg databases and systematically crosschecked and complemented them with biographical data available from *Business Week,* company websites, filings with the U.S. Securities and Exchange Commission and other publicly available outlets. For each *Fortune 100* CEO, a dataset was constructed that contained the following basic information: name of the *Fortune 100* employer, CEO name, year of graduation, degree type and field of degree. For each subsequent job that was held by the CEO, we entered the company name, starting date, end date, job title, and wherever available, details on job contents and responsibilities. This was performed for all jobs held over a CEO's entire working career, from the time of graduation

until the point in time when the position of CEO for a *Fortune 100* company was reached. In other words, the last element of each sequence is the year where the individual in question became CEO of a *Fortune 100* company.

Third, data were then reshaped into long format such that one line of data corresponds to one year in a CEO's career, a year being a commonly used basic time interval in research on career sequences (Biemann, Zacher, & Feldman, 2012; Pollock, 2007). Following previous research, CEOs who held multiple jobs within a year were coded for the highest position (in terms of status) in that year (e.g., Joseph, Boh, Ang & Slaughter, 2012). Periods of full-time study, military service and intervals of inactivity such as temporary retirement were excluded from the analysis. These periods of inactivity only pertained to nine individuals from the sample and the average number of years of inactivity that were excluded from the analysis was 2.2 years per relevant person. In some occurrences, biographical information regarding job spells was incomplete and specifications about start and end dates of, particularly, early career jobs were missing. In order to determine distinct job spells for those cases, we divided the number of years by the number of positions held during this period, assuming that the corresponding job spells were of equal length[1]. Our final dataset consists of 2,786 career years for all CEOs.

Table 1 depicts some characteristics of the examined CEO careers. Compared to previous research that examined *Fortune 100* CEO characteristics as of 2001 (Cappelli & Hamori, 2004, 2005), the average number of jobs spells in our study is higher (9.3 vs. 5), the average time taken to become a CEO is longer (27.9 vs. 24.1 years), and average duration per job spell is shorter (3 vs. 4 years).

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[1] For example, Allstate's CEO Thomas Wilson started working in 1980, holding "various financial positions" at Amoco. He moved in 1986 to Dean Witter Reynolds where he was a managing director (a level 2 position in our coding). Since we couldn't check what Mr. Wilson did precisely at Amoco, we assume he had one lateral status move that we arbitrarily set at mid-interval in 1983. Note that we know he experienced neither employer move, nor function move, so the incidence on our sequence analysis is restricted to status.

Coding

Before presenting the variables used in the coding, it is important to note that all of data coding was done by two coders working independently. We checked the reliability of our coded data by calculating Cohen's Kappa for interrater reliability and found a value of Kappa of 0.9587 (standard error of 0.01 for a z-score of 86.48, significant at the $p < 0.00001$ level). Kappa values of more than 0.81 correspond to an "almost perfect" agreement between raters (Landis & Koch, 1977). In our case, Kappa is much higher probably because the coding scheme is fairly simple and leaves little room for subjectivity.

As previously explained, we assessed job mobility across three dimensions, namely status, employer, and function. *Status* was assessed by assigning each job held by a CEO a rank number that corresponds to its responsibilities, content, and complexity, from 1 (entry level) to 6 (CEO), as shown in Table 2. Note that even though we stopped data collection once someone reached the CEO position in a Fortune 100 company, we still required level 6 (CEO) for cases where people held CEO positions in other companies over their career. The ranks of the grading scheme represent ideal-types of jobs. Job titles were used as the primary source of information for grading each job. Job titles have been shown to be suitable proxies for positions, and differences in job titles can reflect actual differences in job roles (Cohen & Broschak, 2013). In addition to job titles, other publicly available qualitative information (from official biographies, proxy statements, etc.) that allowed us to classify a job was also taken into account for the grading as well. A separate code was assigned to job spells that consisted of self-employment (entrepreneurship).

Employer mobility was coded by assigning a value from 1 (no employer change) to 2 (intrafirm change; i.e., new job with the same employer), 3 (interfirm change; i.e., new job

for another employer in the same industry), and 4 (industry change; i.e., new job for another employer in a different industry). This measure not only captures employer mobility, but also the frequency of job change and industry mobility. In all cases, job changes that took place within subsidiaries or dependent companies were counted as intrafirm change (code 2).

Function was coded based on job titles. Following extant measures (Helfat, Harris & Wolfson, 2006; Koyuncu, Firfiray, Claes & Hamori, 2010), we used the following codes for assessing functional areas of responsibility: Operations and General Management, Consulting, Logistics, Engineering, Finance, Marketing and Sales, Legal, and Other for all of the remaining functions.

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Insert Table 2 about here
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In combined form, our three measures allow us to provide a comprehensive picture of job change defined as "any substantial changes in work responsibilities, hierarchical levels, or titles within an organization" (Feldman & Ng, 2007: 352) and organizational change, defined as "any change in the employing firm" (ibid).

Table 3 shows strings of code for a typical sequence where the first episode consists of a level-1 job that was held from year 1 to year 6. In year 7, a job change within the same firm occurred that promoted the individual to a level-2 job, associated also with a change in the functional area from Legal to Finance. For each of the 100 CEOs contained in our sample, a comparable sequence was constructed and then used as input for a sequence analysis.

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Sequence analysis and clustering

Sequence analysis (Abbott & Tsay, 2000; Brzinsky-Fay & Kohler, 2010) is a widely established tool in the domain of life-course (Aisenbrey & Fasang, 2010; Halpin, 2010) and

career research (Biemann & Wolf, 2009; Blair-Loy, 1999; Joseph et al., 2012). It is generally regarded "as an appropriate method for measuring entire careers 'as they are'" (Vinkenburg & Weber, 2012: 601-602). In particular, sequence analysis allows us to fully describe job functions as well as the succession and length of job spells in order to compare job mobility across CEOs. We followed the procedure outlined by Brzinsky-Fay, Kohler and Luniak (2006) in order to obtain clusters of CEOs with different degrees of mobility. In a preliminary step, a sequence analysis was carried out for all career sequences contained in our dataset.

For all three mobility measures, an Optimal Matching analysis was conducted using the SQ-Ado program which is available as an add-on for the Stata statistical package (Brzinsky-Fay, Kohler & Luniak, 2006). Technically, Optimal Matching determines "the resemblance between two sequences of elements by analyzing the 'costs' of transforming one sequence into another" (Biemann & Wolf, 2009: 980). Transformation requires the insertion, deletion or substitution of sequence elements in order to decrease the distance between sequences. The more transformation steps required to make sequences equal, the more dissimilar they are.

Sequence analysis involves the specification of costs for both substitution and insertion/deletion ("indel") operations. Substitution costs can be assigned in three different ways (Martin & Wiggins, 2011): a) a unitary substitution cost matrix, where all transitions between all states are assigned the same cost, b) a theoretically derived substitution cost matrix, where the researcher defines substitution costs for each pair of states based on some theoretical rationale and c) a transition-based cost matrix, where variable substitution costs are assigned based on empirical probabilities of transition between states. We considered each method in turn. Transition-based cost matrices require an accurate estimation of transition probabilities, which is dependent on a sufficiently large sample size (Biemann, 2009). Given the relatively small size of our population, we decided to exclude the use of a transition cost matrix for determining substitution costs.

Theoretically derived cost settings, on the other hand, require a priori knowledge about the similarity of different states (Lesnard & Kan, 2011). Given the very limited number of articles on career sequences of top executives, we do not dispose of sufficient knowledge about transitions between different career states which is necessary to assign theoretical substitution costs. In addition, these cost settings have been criticized because "theory rarely provides a precise indication of how these costs should be set, and so the process is often viewed as subjective and arbitrary." (Hollister, 2009: 239). As a consequence, we opted for a unitary substitution cost matrix, which has been deemed advisable when there is no strong rationale for a theoretically derived specification of costs (Biemann & Datta, 2014).

As recommended by Biemann and Datta (2014), we set indel cost (1) at half of the substitution costs (2). The resulting Levenshtein distance measure emphasizes similarity in the order of events but not their timing and has been recommended for sequences of unequal length (Biemann & Datta, 2014; Lesnard, 2010; Lesnard & Kan, 2011). These cost settings have also been used in previous research on career patterns (e.g., Joseph et al., 2012; Piccaretta & Lior, 2010; Simonson, Gordo & Titova, 2011; Zagel, 2014). All possible pairs of sequences were compared to each other using the Needleman-Wunsch algorithm, which computes and chooses the transformation with the minimum distance based on substitution, deletion and insertion costs (Needleman & Wunsch, 1970). Since the length of work histories differ from one CEO to another, sequences of CEOs with longer career histories need relatively more transformations in the optimal matching process. Following convention, we standardized each sequence by dividing the number of transformations by the length of the longer sequence in order to account for differences in sequence length (e.g., Shi & Prescott, 2011).

As a result of the Sequence Analysis, a dissimilarity matrix was obtained that served as the input for a cluster analysis. The cluster analysis aims at identifying and bundling career

sequences which are similar. For the purpose of analyzing the career sequence dissimilarity

matrix obtained in the previous step, hierarchical cluster analysis with Wards Linkage

(Everitt, Landau, Leese & Stahl, 2011) was employed. This clustering method does not

include a definition of the number of clusters prior to the analysis. The number of clusters of

CEOs with similar sequences for all three mobility measures was determined by using the

Calinski-Harabasz and Duda-Hart cluster stop rules (Calinski & Harabasz, 1974; Duda &

Hart, 1973) and by inspecting cluster dendrograms.

On a final note, the above steps of sequence analysis and clustering were conducted

separately for the three dimensions of job mobility. We opted for separate analyses because

our goal is to examine job mobility and decipher among those three dimensions. Running

analyses separately provides the opportunity to highlight specific mobility sequence in ways

that previous research hasn't tackled yet[2].

RESULTS

Status: Job mobility across hierarchical levels

We start our analyses by focusing on status, the job mobility dimension that relates to

moves across hierarchical levels. CEO career transitions are thus moves from one of our 6

levels to another[3] (see Table 2). In an interim step, we obtain sequences and pairwise

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[2] In addition to the theoretical reason, bundling all three dimensions into a single analysis
would present a technical challenge. We have 224 possible different states (7 status moves x
4 employer moves x 8 function moves) for 100 sequences. Such a sequence-to-ratio risks
yielding unstable results, so the only robust solution would have been to simplify drastically
our coding scheme to reduce the number of possible states to a manageable number of around
12 or 16. This could for example have been achieved by assigning 4 states instead of 7 to
status (Entry, Management, Founder, and CEO), 2 states instead of 4 to employer (No job
change, and Change), and 2 states instead of 8 to function (Generalist, and Other). We ran the
analysis but found that the important loss of detail deprived us of the possibility to contribute
meaningful results.

[3] As explained above, we need a code for the CEO level even though we stopped data
collection when individuals in our census had reached their CEO position in the
corresponding *Fortune 100* company for cases where they served as CEO in a non-*Fortune
100* company at some point earlier in their career.

distances between them. The appendix illustrates sequences obtained for Status. Cluster analysis of the dissimilarity matrix using Ward's linkage arrived at a 3-cluster solution as the best fit for the data. Since CEOs within a given cluster had similar careers, "each cluster can be interpreted as a career pattern" (Biemann & Wolf, 2009: 982). Table 4 displays the main characteristics of each cluster solution as well as the career sequence of one member of the particular cluster.

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Insert Table 4 about here
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Cluster 1 – Traditional Careers. With 61 cases, cluster 1 covers the majority of CEOs from our population, including executives such as James Dimon of J.P. Morgan Chase & Co. or A.G. Lafley of Procter & Gamble. It exemplifies a linear career pattern of progress over a number of job levels (see Table 4 for a description of the cluster and for a prototypical sequence). For CEOs in this cluster, each job level in early career years was held for a significant number of years before progress was made onto the next level. In later career years, job status appears to change more frequently, still following a pattern of progressively increased responsibility. This traditional and steady career path is the dominant career trajectory for our population of CEOs.

Cluster 2 – Founder Careers and Previous CEOs. The second cluster – the smallest out of three – contains 16 individuals and, although statistically similar, can be regarded as containing two subgroups. The first subgroup contains individuals that have spent significant parts of their career founding and managing their own companies. The second subgroup consists of individuals who have accumulated previous experience as CEOs in other companies (see Table 4 for a prototypical sequence). The first subgroup for instance, includes executives who, as their first job, founded companies that later became *Fortune 100* companies and served as CEO from inception (e.g., Michael Dell, Dell). Their career

sequence only consists of a single job spell. It also includes those individuals who had a brief career elsewhere before founding a company that would eventually become a *Fortune 100* company. Examples include Jeffrey P. Bezos, who worked in the Financial Services industry for several years before founding Amazon.com, and Larry Ellison, who mainly worked as a programmer before founding Oracle. Other individuals in this subgroup founded and managed their own investment funds before formally taking on a CEO role in a *Fortune 100* company (e.g., Edward Lampert of Sears Holdings and Steven A. Kandarian of MetLife, Inc.). Although founding a company is one of the shortest routes towards becoming CEO of a *Fortune 100* company, it is also obviously an uncommon one and seemingly restricted to the Information Technology sector.

The second subgroup of people with extensive experience as CEOs in other companies is structurally similar to executives with an entrepreneurial background. It includes executives such as Meg Whitman, who, prior to her role as CEO of Hewlett-Packard, served as CEO of eBay for several years. Other examples are Daniel F. Akerson, who held CEO positions in several Telecommunications companies before becoming CEO of General Motors, or Joseph R. Swedish, the CEO of WellPoint who had previous experience as CEO of several health care providers.

What is common to career patterns in cluster 2 is that the number of job spells and the time needed to become CEO, is on average shorter than found in the two other clusters (see Table 4). We examined differences between cluster 1 and 2 in more detail and found significant differences for the average time before becoming a CEO (t=4.1447, degrees of freedom=75, p=0.0001) and the average number of job spells (t=5.8843, degrees of freedom=75, p=0.00001), but no significant difference for the average duration of job spells (t= -1.9419, degrees of freedom=75, p= 0.0559).

Cluster 3 – Upper Management Careers. Just like the first cluster, cluster 3 (n=23) is characterized by mostly traditional careers, except that the executives belonging to this cluster spent longer in upper management positions before becoming CEOs (Table 4). Some particular cases of executives with lengthy spells in upper management are worth mentioning. First, many future CEOs in this cluster have also tried their hand at upper management jobs in smaller firms before moving to a *Fortune 100* company. Exemplary cases are Michael T. Duke of Wal-Mart, who had previously occupied upper management positions at May Department Stores and Venture Stores,or and John T. Chambers of Cisco. Second, there are several individuals who occupied upper management positions in subsidiary organizations of *Fortune 100* firms before moving on to the parent company. Consider the example of Jeffrey R. Immelt, who completed job spells in upper management roles for GE Appliances, GE Plastics and GE Medical Systems prior to becoming CEO of General Electric. Third, the amount of "lifers", i.e., individuals who spent their entire career in a single firm, is remarkable with11 of the 23 CEOs in cluster 3 belonging to this category. The phenomenon of lifers with significant upper management experience might be related to the fact that the number of higher status, senior management positions in any given firm is very limited. As a result, people intending to move up, but who are unwilling to switch employers, have to remain in upper management for longer, while individuals who switch employers are able to spend less time in upper management jobs[4]. This probably explains why this cluster gathers a disproportionately high number of CEOs of the very biggest companies (6 from the top-ten: #1 Wal-Mart's Michael Duke; #2 Exxon's Rex Tillerson; #3 Chevron's John Watson; #4 Phillips 66's Greg Garland; #8 GE's Jeffrey Immelt and #9 Valero's William Klesse).

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[4] This might reflect a self-selection bias in that top managers favoring short-term strategies seize upward opportunities in other, usually smaller, companies and are no longer part of our studied population. Conversely, top managers favoring long-term strategies remain for longer spells in their *Fortune 100* company and may end up running it. These "lifers" appear in our Cluster 3. We thank one of our anonymous reviewers for bringing this issue to our attention.

Again, we compared the major properties of cluster 3 to those of baseline cluster 1 (Table 4). No significant differences were found for the averages time to become CEO (t=-0.5274, degrees of freedom=82, p= 0.5993), number of job spells (t= -1.6123, degrees of freedom=82, p= 0.1107), and duration of job spells (t= 1.4563, degrees of freedom=82, p= 0.1491). However, one intriguing observation is that manufacturing companies (SIC Division "D") are overrepresented in this cluster: they represent 65% of the cluster (n=15), but are only 38% (n=38) of the full studied population.

As observed above, the most common career paths follow a traditional linear progression. Sequences deviating from such progression include those where the CEO skipped a status level, with job spells as CEO of a non-*Fortune 100* company, and with job spells as a founder. In additional analyses, we focused on companies where CEOs did not follow one of the ten most common career paths for status and found that this was most pronounced in the Information Technology industry (9 out of 15 companies), Petroleum industry (6 out of 9) and to a lesser extent, also in the Health Care industry (7 of 13). As for Information Technology firms, those in the *Fortune 100* list are atypical in that they often have CEOs who also founded the company, such as Google's Larry Page and Dell's Michael Dell. In the case of Petroleum and Health Care, we observed more frequent downward movements and job spells as CEO of smaller companies. This might be related to the fact that in the last couple of years, both industries went through major consolidation and restructuring phases (Gaynor, 2011; Kovacic, 2006) that affected many managerial careers.

Function: Job mobility across functional areas

We turn the focus of our analyses to function, the job mobility dimension referring to moves across functional areas. CEO career transitions are thus moves across jobs related to Operations and General Management, Consulting, Logistics, Engineering, Finance, Marketing and Sales, Legal, and Other remaining functions. As with previous analyses of

status, we first obtain sequences and pairwise distances between them. The same kind of cluster analysis of the dissimilarity matrix using Ward's linkage arrives at a 2-cluster solution. The two resulting career patterns split the studied population into two roughly equivalent parts of general managers and specialists (Table 5).

Although all CEOs are ultimately tapped for general management roles, other functional areas are also well represented, especially during early stages. Among these diverse functional responsibilities, finance is by and the large the most prevalent for budding CEOs.

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Insert Table 5 about here
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Cluster 1 – General Managers. This cluster with 48 cases covers executives that have started their career in *Operations and General Management* and who have also spent the majority of their career in this area. In particular, one notices that almost one out of five executives have spent their entire career in this functional area. United Technology's CEO Louis R. Chênevert is a case in point, having spent his entire career in general management, apart from a short 2-year spell in logistics (Table 5).

Cluster 2 – Specialists. Cluster 2 consists of 52 employees who started out in a front office or central service function before switching to *Operations and General Management*. Table 5 shows the career sequence of GE's CEO Jeffrey Immelt, who started out in consulting, then spent 9 years in marketing, before switching to general management. Intriguingly, the only significant difference across industries is with Finance, Insurance, and Real Estate (SIC Division H, representing 25% of our studied population), but not in the expected direction: CEOs within this division represent 29% of cluster 1 and 21% of cluster 2.

In terms of sequence, employees specialized in *Finance* and *Legal* were able to hold on to their functional area for comparably longer timespans, while *Consultants* and *Engineers*

switched rather early in their career. Also notable is the fact that people rarely switched back from *Operations and General* Management to another function.

Employer

Optimal Matching and cluster analysis did not result in a meaningful cluster solution for movements between and within employers and industries. Consequently, we can only provide tentative observations for this dimension. A visual inspection of the sequence index plot shows that a pattern of change alternating between "no job change" and "intra-firm change" is dominant for many of the individuals in our sample. This suggests that industry changes are comparatively rare. Table 6 groups sequences based on the elements they are composed of. From this Table, we observe that 62 CEOs from the population never worked in more than one industry. Furthermore, 38 individuals had spent their entire career in one single organization. Only 9% of all career moves for this indicator were moves to a different industry, with the vast majority of moves occurring within a firm (80%), or within an industry (11%).

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Insert Table 6 about here
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The average number of moves across industries per CEO is 0.8, but the median number of moves is zero. This observation is consistent with previous research that analyzed CEO careers from a contingency perspective, finding that incumbent CEOs largely followed industry-specific career tracks (Datta, Guthrie & Rajagopalan, 2002). For those CEOs who had moves across industries (n=38), a move to a different industry occurred, on average, halfway through their career sequence.

DISCUSSION AND CONCLUSION

We started this study with two research questions, namely whether the careers of *Fortune 100* CEOs were boundaryless, and whether a closer look at career sequences could reveal more about job mobility. Focusing on the "extreme case" of the full population of CEOs of *Fortune 100* companies and using sequence analysis allowed us to make three contributions.

Our first contribution sheds light on the question of whether CEO careers have become more boundaryless or not. By analyzing the degree of career mobility displayed by CEOs, this paper contributes to the debate on the prevalence of different forms of careers, strengthens the empirical underpinning of CEO career research, and contributes to the literature on objective career success and mobility. Investigating actual career mobility rather than willingness to move, and by using different measures of career mobility, our study also provides robust results (Feldman & Ng, 2007). Our results precisely show that more traditional careers are still the most likely type of career for top executives. A large number of CEOs reached the top position by gradually climbing up level by level, and did so mostly by changing jobs (status) within a company. Some individuals skip levels in the hierarchy, especially when they have already reached jobs with significant responsibility, but most careers unfold traditionally and step by step. Since CEO careers have strong firm and industry boundaries which become even less permeable the higher one moves up the corporate hierarchy, boundaryless careers are difficult to realize for individuals whose career goal is to become a CEO of a *Fortune 100* company. It appears that future CEOs need to build up a very substantial amount of firm-specific human capital and that external labor market strategies do not pay off for many high-level executives (Hamori & Kakarika, 2009). Indeed, many firms prefer to appoint CEOs who have been socialized within their firm and who already have well-established internal networks and large amounts of firm-specific

experience on various levels. This practice is facilitated by the fact that *Fortune 100*

organizations typically have large pools of internal talent they can draw on.

To further investigate whether firm specific human capital and skills could be ruled out

as possible explanations for the prevalence of traditional career patterns, we investigated the

influence of two education-related indicators of human capital, namely Ivy League education

and level of education (Judge, Cable, Boudreau & Bretz, 1995; Miller, Xu & Mehrotra, in

press). To do so, we supplemented our database with data on the education of CEOs,

including information on type and number of degrees and the awarding institution. We found

that CEOs with an Ivy League degree (n = 36) did not differ significantly from CEOs without

an Ivy League degree in the number of career years they had before becoming a CEO (t = -

1.5795, degrees of freedom = 98, p = 0.1175). Likewise, in terms of years needed to become

a CEO, individuals with a master's or doctoral degree (n = 61) did not differ significantly

from individuals without such a degree (t = 0.0040, degrees of freedom = 98, p = 0.9968).

Next, we examined the link between our status indicator and education. Specifically, we

examined whether there is a relationship between having one of the ten most common,

"traditional" career patterns for status and our two education-based indicators of human

capital. We found no statistically significant relationship between having or not having an Ivy

League education, and having or not having one of the ten most common, traditional career

patterns for status (chi-square with one degree of freedom = 0.0003, p = 0.986). There is also

no significant relationship between the level of education and exhibiting one of the ten most

common, traditional career patterns for status (chi-square with one degree of freedom =

0.1103, p = 0.740). These additional analyses reinforce our first contribution showing that,

far from following boundaryless careers, top CEOs tend to have traditional careers.

Our second contribution consists in unpacking job mobility to investigate its three

dimensions separately. Whereas previous research has mostly equated job mobility with

moves across organizations, we also investigated moves across statuses and across functions. Status is discussed above as reflecting traditional vs. boundaryless patterns. Simultaneously, the degree of boundarylessness can also be examined with regard to functions (Arthur & Rousseau, 1996; Rodrigues & Guest, 2010). Analyzing moves across functions, we found two career patterns of roughly equal size: generalists make 48% of our population, whereas 52% started as specialists. Interestingly, specialists moved to generalist positions early in their career, except for some specialized in finance or law. This mirrors Cappelli and Hamori's (2005) research showing the importance of a finance specialization as a pathway towards a CEO position. In this context, our results show that people rarely switched back from Operations and General Management to another function. This might be attributable to the fact that career progression and increasing responsibilities make individuals gradually move away from specialized functions towards areas with more general management duties. This does not necessarily mean that chances for progression are better for individuals working in Operations and General Management, but it might simply be that the higher a position is in the hierarchy of a firm, the more likely it is to entail general management duties rather than specialized work. In addition, our results show that the careers of *Fortune 100* CEOs are not only traditional in terms of cross-employer moves (Cappelli & Hamori, 2005; Hamori & Kakarika, 2009), but also in terms of mobility between different functional specializations. In fact, it appears that boundaries between functions become less permeable at later stages in the careers of CEOs of our population. The lack of permeability between functions in later career stages might be attributable to embeddedness (Feldman & Ng, 2012): For example, an employee changing function late in her career would bear a great sacrifice in terms of human capital investment and such unwanted outcomes would increase functional embeddedness. In fact, it has been shown that when individuals enter middle age, embeddedness becomes stronger (Feldman & Ng, 2007). One intriguing observation calls for

further research: our results show that CEOs of companies in the Finance, Insurance, and Real Estate industry (SIC Division "H", representing 25% of *Fortune 100* firms) are more often generalists (n=14) than specialists (n=11).

As for moves across the Employer dimension, our analyses did not result in a meaningful cluster solution. Nonetheless, two observations warrant mentioning. First, more than a third of CEOs of our sample are "lifers" who have spent their entire career in one single company. The reason why outside hires are comparably rare is illustrated by a quote in a *Forbes* article on the search process for the CEO position at retailing company Wal-Mart: "The directors did look at candidates from outside the company, but bringing in an outsider to run an operation as big as Wal-Mart is almost impractical. 'When you're a $400 billion company and you look at people from outside, they typically either have the retail background but don't have experience with the size and complexity of Wal-Mart, […] or they don't have the international scale of Wal-Mart. Or they're in a totally different kind of business.'" (O'Keefe, 2010). Prior experience from different firms, even within the same industry, is not necessarily portable (Dokko, Wilk & Rothbard, 2009) and increased interorganizational mobility can even have negative consequences on career success (Hamori & Kakarika, 2009). However, lifer careers of CEOs, which are common in large and complex organizations such as *Fortune 100* firms, might be less important in smaller firms where skills and experience might be more easily transferable. On the other hand, lifer careers might be less common in smaller firms because individuals who start their career in these firms might want to join larger firms later in their career in order to attain better positions with higher pay. The second insight we provide deals with mobility across industries, a topic overlooked by previous research, even outside of the CEO level. In our study, 62 CEOs spent their entire career within a single industry. Mobility across industries is rare in our population: we observed only 82 such moves out of 2,785, or 2.94%. The 38 CEOs who did experience mobility across industries

did so on average 2.16 times in their career and those moves occurred in any year throughout the career. Since this is beyond the scope of our research, we can only speculate that two competing mechanisms are at work here. On the one hand, with the market for top CEOs being so small, some *Fortune 100* companies might favor those with experience of running other big companies, even in other industries. On the other hand, given the importance of firm specific skills, mobility across industries can be seen as very risky. Both tentative explanations would be consistent with findings from literature on "occupational mobility" in economics. For instance, in an analysis of large-scale panel data, rather than specifically top executives, Kambourov and Manovskii (2008) found a substantial increase in industry mobility in the US over the period 1968-97. Further research is needed to make sense of this observation.

Our third and final contribution is to add to the small stream of research on career patterns. We investigated CEO careers, an area which has received little research attention (Vinkenburg & Weber, 2012) compared to other areas of research on CEOs and this is perhaps surprising considering the strategic importance of CEOs. We chose to describe career patterns for the very specific population of *Fortune 100* CEOs, thus highlighting an extreme case. Still, the benefit of using sequence analysis here is important. Most of observed sequences are relatively long, spanning almost 28 years on average. With indicators comprising four to eight different states, even a short career of ten years would have more than one million possible career paths. Sequence and cluster analysis reduce this information to meaningful and interpretable data, allowing the uncovering of the most salient, typical career trajectories and to identify clusters of structurally similar trajectories. The main advantage of our analysis is that we obtain "ideal-types of trajectories that can be interpreted and analyzed in a meaningful way both in terms of theoretical perspectives and policy implications." (Aassve, Billari & Piccarreta, 2007: 371). This analysis of holistic trajectories

provides broader and more general insights than the analysis of isolated, discrete transitions (Aisenbrey & Fasang, 2010; Pollock, 2007). We believe that additional studies can help to map the career terrain, with the use of different populations serving as reference points.

In addition to the three main contributions, one more observation is worth mentioning. Job mobility within firms can be very common, especially during the later stages of future CEOs' careers. Almost immediately prior to reaching the CEO position, many individuals seem to have gone through more frequent job changes. The shorter duration and acceleration of job spells before becoming CEO, often involving rapid promotions, is striking and can have a variety of reasons that we can only hypothesize on. One explanation might be that people who are deemed to be CEO material are given quick exposure to a wide range of business responsibilities for two reasons: First, a rapid progression of high-level jobs provides a test of the future CEO's capacities and the ability to achieve success in diverse business areas. Second, these assignments also have a developmental aspect. Soon-to-be CEOs that did not have the chance yet to familiarize themselves with certain businesses or regions of their company get the opportunity to build networks and develop better knowledge of these areas. Further research is needed to corroborate this observation and provide better explanations.

Although this study lacks a reference group of non-CEOs to compare *Fortune 100* CEOs to, some tentative managerial implications can be derived from our research for would-be CEOs. Guidance for potential CEOs might include the following: 1) *Specialization in one industry is essential.* This is suggested by the relatively small amount of moves across industries. Moving across industries is likely to prevent individuals from building industry networks and accumulating the industry- and firm-specific human capital required for executive positions. 2) *Internal promotion needs to be steady.* Steady internal promotion means that budding CEOs obtain a new position with enlarged responsibilities on a regular

basis. This not only refers to status, but also involves an increase in visibility and exposure to different business areas and geographies. 3) *Significant changes of direction (change of occupation, industry) need to be accomplished in early*. More than 30 out of the 82 moves across industries occurred as early-career changes from jobs in consultancies or law firms to industry jobs. Therefore, an early-career stint in a professional service firm, followed by a move to an industry position, seems to be an important route towards a CEO position that involves crossing industry boundaries. These types of early jobs are possibly also a suitable preparation for taking up responsibilities in Operations and General Management functions. 4) *Job changes within the organization need to occur more often as the career evolves*. This also implies that candidates for the CEO position have to be ready to have their performance scrutinized more often and more closely as they climb the career ladder, meaning that there is less time to prove oneself in a particular position.

Future research is also needed in other areas to complement our results. First, methodologically, varying cost parameters for the Optimal Matching analysis might be helpful to corroborate our results. Second, we discussed individuals whose careers mostly have been in large firms. Many of the distinctive aspects of CEO careers in *Fortune 100* firms may well be driven by a context shaped by the extraordinary size and complexity of the organizations. Future studies should examine CEO careers in the context of other firms. Besides organizational size, the culture of a particular country is related to the prevalence of different kinds of CEO careers (Biemann & Wolf 2009) and this calls for an examination of CEO careers in diverse cultural as well as institutional contexts. One also has to bear in mind that most of today's CEOs started their careers in the late 1960s and 70s, in a period that was much more characterized by linear careers and virtual lifetime employment. In addition, the 1970s was characterized by an energy crisis, followed by economic stagnation and recession in the United States. Schoar (2007) has shown that CEOs who start their career in times of

recession are more likely to move up the ranks within a given firm as opposed to moving across firms and industries, which also might explain why careers from CEOs of our sample have exhibited limited degrees of mobility. A broader sample examining differences across generations could yield significant advances. Finally, the number of women in *Fortune 100* CEO positions has risen from two in 2007 to eight in 2013, suggesting that women have become less of a rarity in the top jobs. Gender has been shown to influence career development (Fouad, 2007) and future research should investigate whether career paths of women and men who have became CEOs differ with respect to mobility indicators and career paths.

Acknowledgments

REFERENCES

Aassve, A., Billari, F. C., & Piccarreta, R. (2007). Strings of adulthood: A sequence analysis of young British women's work-family trajectories. *European Journal of Population*, *23*(3-4), 369–388.

Abbott, A., & Tsay, A. (2000). Sequence analysis and optimal matching methods in sociology review and prospect. *Sociological Methods & Research*, *29*(1), 3–33.

Ahmadjian, C. L., & Robinson, P. (2001). Safety in numbers: Downsizing and the deinstitutionalization of permanent employment in Japan. *Administrative Science Quarterly*, *46*(4), 622–654.

Aisenbrey, S., & Fasang, A.E. (2010). New life for old ideas: The "second wave" of sequence analysis: Bringing the "course" back into the life course. *Sociological Methods & Research*, 38(3), 420–462.

Arthur, M. M. B., & Rousseau, D. M. (1996). *The boundaryless career: A new employment principle for a new organizational era*. Oxford: Oxford University Press.

Bertrand, M. (2009). CEOs. *Annual Review of Economics*, 1: 121–150.

Bidwell, M. (2011). Paying more to get less: The effects of external hiring versus internal mobility. *Administrative Science Quarterly*, *56*(3): 369–407.

Bidwell, M., & Briscoe, F. (2010). The dynamics of interorganizational careers. *Organization Science*, *21*(5), 1034–1053.

Biemann, T. (2009). Sequenzdatenanalyse. In: Albers, S., Klapper, D., Konradt, U., Walter, A., & Wolf, J. (Eds). *Methodik der empirischen Forschung* (3rd edition). Wiesbaden: Gabler Verlag, 191–204.

Biemann, T., & Datta, D. K. (2014). Analyzing sequence data: Optimal matching in management research. *Organizational Research Methods*, *17*(1), 51–76.

Biemann, T., Fasang, A. E., & Grunow, D. (2011). Do economic globalization and industry growth destabilize careers? An analysis of career complexity and career patterns over time. *Organization Studies*, *32*(12), 1639–1663.

Biemann, T., & Wolf, J. (2009). Career patterns of top management team members in five countries: an optimal matching analysis. *The International Journal of Human Resource Management*, *20*(5), 975–991.

Biemann, T., Zacher, H., & Feldman, D. C. (2012). Career patterns: A twenty-year panel study. *Journal of Vocational Behavior*, *81*(2), 159–170.

Blair-Loy, M. (1999). Career patterns of executive women in finance: An optimal matching analysis. *American Journal of Sociology*, *104*(5), 1346–1397.

Brzinsky-Fay, C., & Kohler, U. (2010). New developments in sequence analysis. *Sociological Methods & Research*, *38*(3), 359–364.

Brzinsky-Fay, C., Kohler, U., & Luniak, M. (2006). Sequence analysis with Stata. *Stata Journal*, *6*(4), 435–460.

Caliński, T., & Harabasz, J. (1974). A dendrite method for cluster analysis. *Communications in Statistics-theory and Methods*, *3*(1), 1–27.

Cappelli, P., & Hamori, M. (2004). The path to the top: Changes in the attributes and careers of corporate executives, 1980-2001. National Bureau of Economic Research working paper 10507. Retrieved from http://www.nber.org/papers/w10507

Cappelli, P., & Hamori, M. (2005). The new road to the top. *Harvard Business Review*, *83*(1), 25–32.

Chen, Z., Veiga, J. F., & Powell, G. N. (2011). A survival analysis of the impact of boundary crossings on managerial career advancement up to midcareer. *Journal of Vocational Behavior*, *79*(1), 230–240.

Chudzikowski, K. (2012). Career transitions and career success in the 'new' career era. *Journal of Vocational Behavior*, *81*(2), 298–306.

Cohen, L.E. & Broschak, J.P. (2013). Whose jobs are these? The impact of the proportion of female managers on the number of new management jobs filled by women versus men. *Administrative Science Quarterly*, *58*(4), 509–541.

Crossland, C., Zyung, J., Hiller, N., & Hambrick, D. (2014). CEO career variety: Effects on firm-level strategic and social novelty. *The Academy of Management Journal*, *57*(3), 652–674.

Dany, F. (2003). "Free actors" and organizations: critical remarks about the new career literature, based on French insights. *International Journal of Human Resource Management*, *14*(5), 821–838.

Datta, D. K., & Rajagopalan, N. (1998). Industry structure and CEO characteristics: An empirical study of succession events. *Strategic Management Journal*, *19*(9), 833–852.

Datta, D. K., Guthrie, J. P., & Rajagopalan, N. (2002). Different industries, different CEOs? A study of CEO career specialization. *Human Resource Planning*, *25*(2), 14–25.

Dokko, G., Wilk, S.L., & Rothbard, N. P. (2009). Unpacking prior experience: How career history affects job performance. *Organization Science*, *20*(1), 51–68.

Duda, R. O., & Hart, P. E. (1973). *Pattern recognition and scene analysis*. New York: Wiley.

Everitt, B. S., Landau, D. S., Leese, D. M., & Stahl, D. D. (2011). *Cluster Analysis* (5th ed.). New York: Wiley.

Fee, C. E., & Hadlock, C. J. (2003). Raids, rewards, and reputations in the market for managerial talent. *Review of Financial Studies, 16*(4), 1315–1357.

Feldman, D. C., & Ng, T. W. (2007). Careers: Mobility, embeddedness, and success. *Journal of Management*, *33*(3), 350–377.

Feldman, D. C., & Ng, T. W. (2012). Theoretical approaches to the study of job transitions. In: Weiner, I. B., Schmitt, N. W., & Highhouse, S. (Eds). *Handbook of psychology, Volume 12: Industrial and organizational psychology* (2nd edition). Hoboken: Wiley, 292–306.

Fong, E. A., Misangyi, V. F., & Tosi, H. L. (2010). The effect of CEO pay deviations on CEO withdrawal, firm size, and firm profits. *Strategic Management Journal*, *31*(6), 629–651.

Fouad, N. A. (2007). Work and vocational psychology: Theory, research, and applications. *Annual Review of Psychology. 58*, 543–564.

Frydman, C. (2006). Rising through the ranks: The evolution of the market for corporate executives, 1936–2003. Boston: MIT Sloan School of Management Working Paper.

Gaynor, M. (2011). Health care industry consolidation. Statement Before the Committee on Ways and Means, Health Subcommittee, U.S. House of Representatives. Retrieved from: http://www.contrib.andrew.cmu.edu/~mgaynor/Assets/Gaynor_Consolidation_Statement_1.pdf

Geletkanycz, M. A., & Black, S. S. (2001). Bound by the past? Experience-based effects on commitment to the strategic status quo. *Journal of Management*, 27(1), 3–21.

Greenhaus, J., & Callanan, G. (2012). Career dynamics. In: Weiner, I. B., Schmitt, N. W., & Highhouse, S. (Eds.). *Handbook of psychology, Volume 12: Industrial and organizational psychology* (2nd edition). Hoboken: Wiley, 593–614.

Greenhaus, J., Callanan, G., & DiRenzo, M. (2008). A boundaryless perspective on careers. In: Barling, J., & Cooper, C. (Eds.). *The SAGE handbook of organizational behavior: Volume I: Micro approaches*. London: Sage, 277–300.

Hall, D. T. (1976). *Careers in organizations*. Santa Monica: Goodyear.

Halpin, B. (2010). Optimal matching analysis and life-course data: the importance of duration. *Sociological Methods & Research*, *38*(3), 365–388.

Hamori, M., & Kakarika, M. (2009). External labor market strategy and career success: CEO careers in Europe and the United States. *Human Resource Management*, *48*(3), 355–378.

Hamori, M., & Koyuncu, B. (2011). Career advancement in large organizations in Europe and the United States: do international assignments add value? *The International Journal of Human Resource Management,* 22(4), 843–862.

Hassard, J., Morris, J., & McCann, L. (2012). 'My brilliant career'? New organizational forms and changing managerial careers in Japan, the UK, and USA. *Journal of Management Studies*, *49*(3), 571–599.

Helfat, C. E., Harris, D., & Wolfson, P. J. (2006). The pipeline to the top: Women and men in the top executive ranks of US corporations. *The Academy of Management Perspectives*, *20*(4), 42–64.

Hollister, M. (2009). Is optimal matching suboptimal? *Sociological Methods & Research*, *38*(2), 235–264.

Inkson, K., Gunz, H., Ganesh, S., & Roper, J. (2012). Boundaryless careers: Bringing back boundaries. *Organization Studies*, *33*(3), 323–340.

Joseph, D., Boh, W. F., Ang, S., & Slaughter, S. (2012). The career paths less (or more) traveled: A sequence analysis of IT career histories, mobility patterns, and career success. *MIS Quarterly*, *36*(2), 427–452.

Judge, T. A., Cable, D. M., Boudreau, J. W., & Bretz, R. D. (1995). An empirical investigation of the predictors of executive career success. *Personnel Psychology*, *48*(3), 485–519.

Kambourov, G., & Manovskii, I. (2008). Rising occupational and industry mobility in the United States: 1968-97. *International Economic Review*, *49*(1), 41–79.

Kattenbach, R., Schneidhofer, T. M., Lücke, J., Latzke, M., Loacker, B., Schramm, F., & Mayrhofer, W. (2014). A quarter of a century of job transitions in Germany. *Journal of Vocational Behavior*, *84*(1), 49–58.

Kondratuk, T. B., Hausdorf, P. A., Korabik, K., & Rosin, H. M. (2004). Linking career mobility with corporate loyalty: How does job change relate to organizational commitment? *Journal of Vocational Behavior*, *65*(2), 332–349.

Kovacic, W.E. (2006). Petroleum industry consolidation. Prepared Statement of the Federal Trade Commission Before the Committee on the Judiciary, United States Senate. Retrieved from http://www.ftc.gov/public-statements/2006/02/prepared-statement-federal-trade-commission-committee-judiciary-united

Koyuncu, B., Firfiray, S., Claes, B., & Hamori, M. (2010). CEOs with a functional background in operations: Reviewing their performance and prevalence in the top post. *Human Resource Management*, *49*(5), 869–882.

Khurana, R. (2002). *Searching for a corporate savior: The irrational quest for charismatic CEOs.* Princeton: Princeton University Press.

Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics, 33*(1), 159–174.

Lesnard, L. (2010). Setting cost in optimal matching to uncover contemporaneous socio-temporal patterns. *Sociological Methods & Research*, *38*(3), 389–419.

Lesnard, L., & Kan, M. Y. (2011). Investigating scheduling of work: A two-stage optimal matching analysis of workdays and workweeks. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, *174*(2), 349–368.

Martin, P. & Wiggins, R. D. (2011). Optimal matching analysis. In: Williams, M., & Vogt, W. P. (Eds.). *The SAGE handbook of innovation in social research methods*. London: Sage, 385–408.

Miller, D., Xu, X., & Mehrotra, V. (in press). When is human capital a valuable resource? The performance effects of Ivy League selection among celebrated CEOs, *Strategic Management Journal*, doi:10.1002/smj.2251

Murphy, K. J., & Zabojnik, J. (2006). Managerial capital and the market for CEOs. Queen's Economics Department, Working Paper No. 1110. Retrieved from: http://qed.econ.queensu.ca/working_papers/papers/qed_wp_1110.pdf

Needleman, S.B. & Wunsch, C.D. (1970). Algorithm for sequence similarity searches. *Journal of Molecular Biology*, *48*, 443–453.

Ng, T. W. H., Eby, L. T., Sorensen, K. L., & Feldman, D. C. (2005). Predictors of objective and subjective career success: A meta-analysis. *Personnel Psychology*, *58*(2), 367–408.

Ng, T. W., Sorensen, K. L., Eby, L. T., & Feldman, D. C. (2007). Determinants of job mobility: A theoretical integration and extension. *Journal of Occupational and Organizational Psychology*, *80*(3), 363–386.

Nicholson, N., & West, M. A. (1988). *Managerial Job Change: Men and Women in Transition.* Cambridge: Cambridge University Press.

O'Keefe, B. (2010). Meet the CEO of the biggest company on earth. *Fortune.* Retrieved from: http://money.cnn.com/2010/09/07/news/companies/mike_duke_walmart_full.fortune/index.htm

O'Mahony, S., & Bechky, B. A. (2006). Stretchwork: Managing the career progression paradox in external labor markets. *Academy of Management Journal*, *49*(5), 918–941.

Piccarreta, R., & Lior, O. (2010). Exploring sequences: a graphical tool based on multi-dimensional scaling. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, *173*(1), 165–184.

Pollock, G. (2007). Holistic trajectories: a study of combined employment, housing and family careers by using multiple-sequence analysis. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, *170*(1), 167–183.

Pringle, J., & Mallon, M. (2003). Challenges for the boundaryless career odyssey. *International Journal of Human Resource Management*, *14*(5), 839–853.

Rodrigues, R. A., & Guest, D. (2010). Have careers become boundaryless? *Human Relations*, *63*(8), 1157–1175.

Sammarra, A., Profili, S., & Innocenti, L. (2013). Do external careers pay-off for both managers and professionals? The effect of inter-organizational mobility on objective career success. *International Journal of Human Resource Management*, *24*(13), 2490–2511.

Scherer, S. (2001). Early career patterns: A comparison of Great Britain and West Germany, *European Sociological Review, 17*(2), 119–144.

Schoar, A. (2007). CEO careers and style. MIT Working Paper. Retrieved from http://web.mit.edu/~aschoar/www/ CEOCareersStyle_v2.pdf

Shi, W. S., & Prescott, J. E. (2011). Sequence patterns of firms' acquisition and alliance behaviour and their performance implications. *Journal of Management Studies*, *48*(5), 1044–1070.

Simonson, J., Gordo, L. R., & Titova, N. (2011). Changing employment patterns of women in Germany: How do baby boomers differ from older cohorts? A comparison using sequence analysis. *Advances in Life Course Research*, *16*(2), 65–82.

Stovel, K., Savage, M., & Bearman, P. (1996). Ascription into achievement: Models of career systems at Lloyds Bank, 1890-1970. *American Journal of Sociology*, *102*(2), 358–399.

Stumpf, S. A. (2014). A longitudinal study of career success, embeddedness, and mobility of early career professionals. *Journal of Vocational Behavior*, *85*(2), 180–190.

Sturges, J., & Guest, D. (2004). Working to live or living to work? Work/life balance early in the career. *Human Resource Management Journal*, *14*(4), 5-20.

Sullivan, S. E., & Baruch, Y. (2009). Advances in career theory and research: a critical review and agenda for future exploration. *Journal of Management*, *35*(6), 1542–1571.

Tomlinson, J., & Durbin, S. (2010). Female part-time managers: work-life balance, aspirations and career mobility. *Equality, Diversity and Inclusion: An International Journal*, *29*(3), 255–270.

Vinkenburg, C. J., & Weber, T. (2012). Managerial career patterns: A review of the empirical evidence. *Journal of Vocational Behavior*, *80*(3), 592–607.

Wessel, R. D., & Keim, M. C. (1994). Career patterns of private four-year college and university presidents in the United States. *Journal of Higher Education*, *65*(2), 211–225.

Westphal, J. D., & Fredrickson, J. W. (2001). Who directs strategic change? Director experience, the selection of new CEOs, and change in corporate strategy. *Strategic Management Journal*, *22*(12), 1113–1137.

Zagel, H. (2014). Are all single mothers the same? Evidence from British and West German women's employment trajectories. *European Sociological Review*, *30*(1), 49–63.

TABLE 1
Descriptive Statistics

Gender distribution	Avg. time from first job to CEO position	Avg. number of job spells	Avg. duration per job spell	Percentage of CEOs with entire career in one company	Avg. number of employers	Avg. number of functions	Avg. number of industries	Avg. number of years in a function	Avg. number of years in one industry
92% Male, 8 % Female	27.9 years	9.3	3 years	37%	2.66	2.14	1.6	15.15	22.23

TABLE 2
Grading Scheme for Indicator *Status*

Rank	Label	Description	Example position titles
6	Chief Executive Officer	• highest-ranking corporate officer	
5	Board Member	• member of the board of directors (excluding outside directors)	President
4	Senior Management	• manages profit centers, division or several functions • typically has multi-country or regional responsibility • has high impact on strategy • manages other managers	Division Head, Head of […], Chief […] Officer, (Senior) Executive Vice President, Executive Director, Profit Center Head, Region Head, Managing Director
3	Upper Management	• typically responsible for a department or several smaller units • has mostly single country or single site responsibility • has limited impact on strategy • manages lower-level managers and specialists	Vice President, Assistant/Associate Vice President, Director, Country Manager, Department Head
2	Lower and Middle Management	• manages teams or small departments, operational focus • no or limited Profit/Loss responsibility • actions determined by higher level plans and strategies • manages specialists	Manager, Operating Manager, Team Head, Branch Manager, Supervisory Manager
1	Entry-level/ Specialist	• has no managerial responsibilities • may be a trainee, functional specialist • typically first position after graduation	Specialist, Trainee, Assistant, Advisor, Associate, Engineer

TABLE 3
Typical Career Sequence

Career Year	1	2	3	4	5	6	7	8
Job Scope	1	1	1	1	1	1	2	2
Organization	/	1	1	1	1	1	2	1
Functional Area	Legal	Legal	Legal	Legal	Legal	Legal	Finance	Finance

TABLE 4

Status: **Overview of Cluster Solution and Prototypical Sequences**

Cluster #	Description	Size	Avg. time to CEO (years)	Avg. number of job spells	Avg. years per job spell
1	Traditional Careers	61	29.1	10.8	2.8
Example*	*1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 4 4 5 6* (Gregory D. Wasson, Walgreen)				
2	Founder Careers & Previous CEOs	16	20.4	6.3	3.4
Example*	*1 1 1 1 3 3 3 3 3 3 9 9 9 9 9 9 9 9 9 9 9 4 4 4 4 4 4 4 4 6* (Steven A. Kandarian, Metlife)				
3	Upper Management Careers	23	29.8	11.7	2.6
Example*	*1 1 1 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 4 6* (William R. Klesse, Valero Energy)				

*: 1=Entry-level/Specialist, 2=Lower and Middle Management, 3=Upper Management, 4=Senior Management, 5=Board Member, 6=CEO, 9=Founder

TABLE 5
Function: Overview of Cluster Solution and Prototypical Sequences

Cluster #	Description	Size	Avg. time to CEO (years)	Avg. number of job spells	Avg. years per job spell
1	General Managers	48	29.4	10.1	3.0
Example*	*G G G G G G G G G G G G G G G G G L L G G G G G G G G G G* *(Louis R. Chênevert, United Technologies)*				
2	Specialists	52	26.4	10.4	2.6
Example*	*C M M M M M M M M M G G G GG G G G G G G G G G G* *(Jeffrey R. Immelt, General Electric)*				

*: G=General Management, M=Marketing, L=Logistics, C=Consulting

TABLE 6
Employer: **Sequence Elements**

Sequence composed of:	% of CEOs
No job change, intrafirm change	36
No job change, intrafirm change, interfirm change	23
No job change	2
No job change, interfirm change	1
No job change, intrafirm change, industry change	20
No job change, intrafirm change, interfirm change, industry change	17
No job change, interfirm change, industry change	1

APPENDIX

Sequence analysis in Stata provides "sequence index plots" displaying career steps over the work history of individuals (Scherer, 2001). A sequence index plot that shows sequences of our first mobility indicator *status* for all CEOs is depicted in the figure below. Each line in the graph corresponds to one CEO career sequence; the x-axis relates to the length of the respective sequence. Bar colors (here in shades of grey) are associated to different statuses in a particular time interval.

Sequence Index Plot for Indicator *Status*