CIO SURVIVAL AND THE COMPOSITION OF THE TOP MANAGEMENT TEAM

Completed Research Paper

Gregory S. Dawson  
Arizona State University  
Tempe, AZ 85287 USA  
Gregory.dawson@asu.edu

Robert J. Kauffman  
Singapore Mgmt. U. / Dartmouth College  
80 Stamford Rd., Singapore 178902  
rkauffman@smu.edu.sg

Abstract

We explore empirical regularities of CIO survivability in public and private organizations using CIO job tenure durations spanning 1994 to 2009 for 1,594 executives. We employ the Kaplan-Meier estimator from event history analysis to compute survivor functions for CEOs, COOs, CFOs and CIOs. We make log rank comparisons of job tenure durations to make inferences within/across executive titles, and between public and private sector groups. The results suggest that: CIOs have shorter survival durations than CEOs and COOs, comparable to CFOs; private sector CIOs have longer durations than public sector CIOs; CIO membership in the top management team increases survivability; female CIOs stay a shorter time than males; and women on the top management team diminish CIO tenures overall. From an additional executive arrival and departure time proximity analysis, we find that only a quarter of CIOs are members of the top management team, but membership lengthens tenure.

Keywords:  Chief information officer (CIO), empirical research, event history methods, job tenure, Kaplan-Meier estimator, leadership, private sector, proximity analysis, public sector, top management team.
Introduction

There is little doubt about the value of effective senior leadership in producing positive organizational outcomes, and a small group of senior leaders can have a disproportional impact on firm success. Effective leadership enhances firm profitability, infuses organizational innovation, and influences the extent of organizational change. Chief information officers (CIOs) deliver value by reducing operational costs and inventory cycle time, providing a basis for effective supply chain management and fostering development of differentiated products and leading-edge services (Chatterjee, Richardson and Zmud 2001).

Early studies on executive leadership focused on the heroic role of a single leader, however, this is only possible in very simple organizations. Current studies argue that organizations are run by a coalition of dominant individuals, and that a large amount of variance in organizational performance is explained by the performance of this coalition (Finkelstein, Hambrick and Cannella 2009). Although the dominant coalition has been given numerous titles, the most common one is the top management team (Hambrick 1994) and this team has heterogeneous skills and backgrounds, role interdependence and engages in collaborative strategic decision-making. Membership in the team varies across organizations, but generally includes: the chief executive officer (CEO), who is responsible for the organization’s direction; the chief operating officer (COO), who is responsible for day-to-day operations; the chief financial officer (CFO), who is responsible for the finances; and the CIO.

Due to the importance of senior executives, scholars and practitioners have been concerned with their survivability: the length of time that the executive remains in an executive position in an organization (Hambrick and Fukutomi 1991). Numerous relationships have been posited about the effects of executive survivability on firm outcomes, and many show that survivability has an inverted U-shaped relationship with firm performance (Henderson, Miller and Hambrick 2006). Positive organizational outcomes are weakest when an executive joins, improve over eight to ten years (Miller and Shamsie 2001), and then decline. So we expect that organizations should want their executives to remain for at least eight to ten years, but this often is not the case. Studies on executives show that the mean survivability of CEOs and COOs is about seven years (Karlsson and Nielsen 2009), and mean CFO survivability is five years (Liebs 2009). Mean CIO survivability is less at five years, however, the job tenure for CIOs has been shorter historically than for CFOs (CIO Magazine 2009).

Why should this be the case though? First, it isn’t clear why CIO survivability should be shorter than others in the top management team. Is the briefer duration driven by factors that are less impactful for other team members? Or does it have to do with the CIO’s job function? Second, few empirical studies have examined factors that predict CIO survivability. The assumption in prior research on CIOs is that CIO survivability is identical to other top managers’ survivability. This is unlikely though, given the differences in their job roles and the heterogeneous nature of the top management team.

Third, prior research has focused on individual characteristics as explanatory variables for survivability and ignored organizational variables. Are there persistent environmental factors that may allow prediction executive survivability that differentially impact CIOs? Fourth, prior studies also assume that top management team membership reflects participation in a dominant coalition. It’s not clear if other C-suite executives view the CIO as a “true” member of the team though. External observers may view the CIO as a full participant in the organization’s top management team, even though the internal dynamics of the organization do not support the same conclusion. The extent to which this matters in predicting CIO survivability is unclear, but also worthwhile to explore. Finally, it is not clear if the gender of the CIO or the predominant gender of the top management team plays a role in predicting CIO survival.

And so we ask: What factors predict CIO survival? Is the CIO a member of the top management team, and what survival ramifications do membership and non-membership carry? What theoretical perspective will be helpful in establishing our capability to explain and predict CIO job tenure outcomes? What can we learn from a study of these issues in public and private sector organizations in the U.S.?

We next present the relevant theoretical background on C-suite executive survival, with an emphasis on the differences that may exist for CIOs. We also offer preliminary thoughts about its capabilities for prediction. Thereafter, we present our research setting and data, and the choices we made for operationalizing our study’s variables. We describe the empirical analysis methods that we will employ, as well as some empirical regularities of our data. We present our empirical model and its results thereafter. After assess-
ing what we learned, we conclude with contributions and limitations, and lay out arguments that challenge the status quo understanding of CIO survivability and the dynamics of the top management team.

**TOP MANAGEMENT, CIO AND SURVIVABILITY: WHAT WE KNOW**

**About the Jobs of Executives and Executive Survivability**

There is no doubt why IS leadership attracts such interest. The CIO oversees all aspects of IT. The CIO is expected to possess technical, process and business knowledge to manage the information technology (IT) department effectively, create appropriate organizational structures and processes, and shape IT-enabled strategic initiatives. IS leadership has two different roles (Karahanna and Watson 2006). In the technical management role, a CIO is expected to perform a function similar to the chief engineer on a ship – “keeping the engines running,” according to Broadbent and Kitzis (2004). To accomplish this, the CIO needs a detailed understanding of technology to ensure seamless delivery and operational stability. Despite the lack of glamour in the technical aspect of the role, CIOs are often most valued for what they do relative to the IS function in the firm: they provide basic infrastructure and services to the rest of the organization.

The CIO’s strategic management role is broader. The CIO is expected to be a part of the leadership of the organization and recommend IT services that are capable of providing or enabling strategic differentiation and competitive advantage (Karahanna and Watson 2006). Unlike the technical role, in the strategic role the CIO is expected to create demand for services through understanding the business goals of the organization and the political environment, and negotiating for resources (Smaltz, Agarwal and Sambamurthy 2006). However, some CEOs view the strategy advice provided by the CIO as among the least important of all the members of the top management team (Gartner 2005).

Survivability and job tenure synonymously refer to the length of time that an executive remains in a position in a company (Finkelstein, Hambrick and Cannella 2009). Executive survivability has been examined relative to the length of time in a position (Hambrick and Fukutomi 1991), in the organization (Thomas, Litschert and Ramaswamy 1991) and in the industry (Hambrick, Geletkanyczc and Fredrickson 1993). These different lengths of time generally are related, although they are often studied separately. Regardless of the definition used, the results tend to co-vary. This research is focused on differences across positions, so we will refer to survival duration as the length of time an executive spends as a CIO, or in any other executive position within a firm.

On the surface, organizations should want long-serving leaders since this promotes stability, but the relationship between long-serving executives and firm performance is mixed. Waldman, Ramirez, House and Puranam (2001) found a positive relationship between CEO tenure and firm profitability. Sørrenson (1999) found a negative relationship between top management team tenure and growth. And Balkin, Markman and Gomez-Mejia (2000) found no relationship. So more work remains to be done.

There has been a shift from trying to find a linear relationship between survivability and performance to finding an inverted-U relationship (Finkelstein, Hambrick and Cannella 2009). When an executive joins, the person is learning the position, building alliances, and trying to grasp what is involved with being successful. It’s reasonable to expect the person’s performance to suffer during the first several years. After awhile though, the executive will have implemented a strategic vision for the firm and can demonstrate improved performance. Finally, after this productive period, some executives will become “stale in the saddle,” as Miller (1991) has phrased it, and the executive’s and firm’s performance will decline.

Hambrick and Fukutomi (1991) identified seasons of an executive’s survival in a position. The seasons include response to a mandate, experimentation, selection of an enduring theme, and movement toward dysfunctionality. Changes occur in an executive’s commitment, their task knowledge, the related diversity of information, and their task interest and power within each stage. In a study of movie executives that also helped us to shape our understanding of executive seasons, Miller and Shamsie (2001) suggested three stages to look for. The learning stage occurs when the executive is focused on experimentation and looking for new opportunities. The harvest stage is when the executive shifts from experimentation to exploitation. Finally, there is the decline stage, when the executive becomes complacent. Others report
that executives with shorter tenure in a position focus on innovation, while longer-serving executives emphasize stability and efficiency (Finkelstein 2009).

**About Factors Predicting CIO Survival**

**Environmental Turbulence.** *Top management team theory* focuses on the relationship between the management team as a prime impetus for survivability and the length of their job tenure. It is *intra-team* in its orientation. In contrast, the *environmental factors perspective* looks at other predictors of their survivability. Top management team members interface between the firm and its external environment and so we expect that top management team job tenures should be impacted by environmental factors, such as industry or economic turbulence (Krishnan 2008). Three major environment factors identified in different elements of the leadership literature in the 1960s and 1970s are salient: munificence, dynamism and complexity. *Munificence* refers to the ability of the environment to support sustained growth. *Dynamism* refers to environment instability. *Complexity* is the heterogeneity of organizational activities. These environmental factors capture the instability in the relevant internal and external environments.

Turbulence occurs externally, and all executives will face its systemic forces. But the most turbulent times often don’t match up for executives in the different positions. During the 1990s dotcom boom, for example, CIOs faced pressure to increase the use of advanced ITs and to create effective Web presences for their organizations. While the other executives had some pressure due to their firms’ nascent e-business initiatives, CIOs faced greater turbulence during this time. The promise and growth of e-business had the effect of increasing their performance expectations.

Turbulence and increased expectations do not necessarily negatively affect the CIO though. Within periods of high positive turbulence, CEOs will search for more highly-skilled CIOs. If a CIO is perceived to be skillful and effective, CEOs may offer substantially higher salaries to lure this kind of CIO to their organization. The skill set of a given CIO also may be applicable to a number of companies within an industry – or even to a number of industries. This has the effect of broadening the universe of potential employers for the CIO. It also increases the probability that a CIO will leave in more positive environmentally-turbulent times. As such, we expect that CIOs will exhibit higher turnover levels, and lower survivability in periods of high positive turbulence: they will have more attractive job prospects. We further expect positive environmental turbulence to increase the number of jobs available and increase turnover. Negative environmental turbulence, in contrast, may decrease turnover and the number of jobs available. As such, environmental turbulence will impact CIO survival.

**Firm Size.** Firm size also impacts survival. In a smaller firm, a CIO must do more and make mission-critical decisions every day. Any decision in such firms may cause them to fail, while in larger ones, the cost of a single technical failure is small. The relationship between survival and firm size is also reflected in the personality of the CIO. Without the inertia of a large firm, smaller firms are usually more nimble, and the type of CIO attracted to a small nimble firm is unlikely to remain at any firm for long. Hence, smaller firms ought to have higher turnover than medium or larger firms.

**Gender.** Much has been written about gender differences in top management positions, including in the IT field. One school of thought holds that women and men in the top management team are similar in key personal and professional characteristics, so gender differences are not critical (Dennis and Kunkel 2004, Adams, Gupta, Haughton and Leith 2007). The competing school of thought is that men and women have differentiated skill sets, and this ought to lead to gender-related differences in promotion, performance and pay (Gneezy, Niederle and Rustichini 2003, Niederle and Vesterlund 2007). Women have higher turnover during periods of high complexity (Krishnan 2008). Gender differences occur more in the private sector IT work (Reid, Riemenschneider, Allen and Armstrong 2008). So the research is inconclusive.

Despite strides made by women into the boardroom, few are able to penetrate the executive suite (Hillman, Shropshire and Cannella 2007). This holds true for female CIOs and is surprising for several reasons. First, women accounted for 50.7% of the U.S. population in 2009 and 56% of the workforce (Trauth and Quesenberry 2006). Second, in other male-dominated professions, such as law and medicine, women have made advances in the last several decades. For example, in the 1970s women represented less than 10% of U.S. lawyers, but that proportion grew to 44% by 1996. Around 2006, women represented only 32.4% of the IT workforce, a decline from 41% a decade earlier (Trauth and Quesenberry 2006). This is not surprising considering that women represent only about 25% of those earning an undergraduate de-
gree in technology (Grant and Payton 2008). We noted earlier that women are better represented in the board room as opposed to the executive suite, and this is particularly true for the CIO position, where female CIOs represent only 2.6% of the private sector CIO workforce (Wentling and Thomas 2007). So women are under-represented in the IT field and even more so in the CIO position.

We expect that once a female executive shatters the “glass ceiling,” other female executives ought to follow in larger numbers. This would lead to a situation in which there would be many female CIOs in organizations with a history of female executives. A single ground-breaking female executive probably will not have much influence on the composition of the top management team though. So unless a number of females are in the team, a female CIO may have a lower survivability: more “female critical mass” is needed.

The prevalence of women elsewhere within the organization’s C-suite should also have an impact on CIO survival, but it will differ by gender. If the CIO is the same gender as the majority of the team, turnover should decrease over time as a consequence of gender homogeneity. However, if the CIO differs in gender from the remainder of the top management team, then turnover should increase over time due to the gender heterogeneity. Hence, the impact of gender on turnover ought to vary with similarity and time.

**Linkage to the CEO and Top Management Team Membership.** Since no prior research seems to have focused on CIO survivability, we will examine survivability for the other executive positions to see if patterns of influence affect CIO survivability. Much of the success of a top management team stems from the ability of the members to work together effectively. Managerial turnover is much higher when the CEO position turns over (Fee and Hadlock 2004). Most CEOs want to surround themselves with top managers that they have worked successfully with in the past. What matters is team-specific human capital, the overall ability of the team, not just the individual, to operate effectively (Hayes, Oyer and Schaeler 2005).

Although many reasons have been suggested for why leaders bring in familiar faces, the most compelling is that executives enjoy relationships with social complementarities (Hayes, Oyer and Schaefer 2005). This kind of relationship arises based on a successful prior work experience, and creates a sense of cohesion across the team. So incoming CEOs assemble effective teams by bringing in “familiar faces” and “seasoned hands.” This is a result of the trust, enjoyment and cohesion between the executives.

CEOs in the public and private sectors freely appoint their top management team (Bozeman and Rainey 1998). So the team should tend to enter and exit together. If this theory is correct, we would expect to see the CEO bring in his or her team fairly soon, if not immediately. The CIO and CEO will exhibit linked job tenures, but only if the CEO views the CIO as a key member of the top management team. If the CEO views the CIO as a functional manager only, akin to a director of human resources, it is unlikely that the CEO will bring in a CIO who was a past partner around the time when the CEO joins.

Thus, multiple factors may be salient in predicting CIO turnover, but it is unclear which are significant during each season of a CIO’s tenure. It is also not clear if different factors tend to cancel one another, or if all should be accorded equal weight in predicting CIO survival. We believe that job tenure duration data can be used to determine if CIOs are part of the top management team, as well as for predicting the relationship between being a member of the top management team and survival.

**METHODS AND DATA**

**Event History Methods for Empirical Regularities Analysis**

*Survival analysis* is a statistical analysis method associated with a body of knowledge called *event history methods* (Box-Steffensmeier and Jones 2004). It has been widely used in different contexts to understand *failure time* outcomes. In marketing and IS, survival analysis has been used to understand the timing of product releases (Helsen and Schmittlein 1993), the diffusion of innovations (Sinha and Chandresekar 1992), and the timing of IT adoption (Kauffman, McAndrews and Wang 2000). Survival analysis studies

---

1 Duration models are used in IT and technology-related research. Kauffman and Techatassanasootorn (2005) used hazard models to study cross-national mobile phone adoption around the world. Banerjee, Kauffman and Wang (2007) and Kauffman and Wang (2008) explored the capabilities of more advanced duration modeling methods in
in labor economics use duration of unemployment to understand whether training programs for employment are effective. Kuhn and Skuterud (2006) explored whether unemployment durations were different for people who search for new jobs via the Internet. Empirical studies often are conducted to evaluate the efficacy of one kind of training over another for unemployed workers. An example is additional vocational training in the same field versus re-skilling in a new field. Because some unemployed workers start their training at different times, survival analysis focuses on the duration of training from its initiation to the time an event occurs that is of interest (e.g., a person’s rehiring by their prior or a new employer in the same area), or the start of a new job in an area for which they have been re-skilled. If a worker doesn’t find another job, meaning the focal event doesn’t occur during the study period, then the observation is said to be right-censored. In contrast, if a person people started a new training program (e.g., vocational training, a college degree program, etc.) prior to the start of the study, then the observation is said to be left-censored. The relevant events for left-censored data cannot be entirely observed directly, while the relevant events for right-censored data have yet to occur.

There are several different ways to characterize the distribution of time to the occurrence of an event (Hosmer, Lemeshow and May 2008). One is the cumulative failure time probability function, which states that there is a probability for the occurrence of the event at some random time \( t \) less than a later time \( T \). Another is the related probability density function, and a variety of characteristic distributions are commonly used. A third is called the survivor function, which is the probability that the event of interest will not have occurred prior to some time \( T \). The most frequently used, however, is called the hazard function, which is a ratio of the probability density function to the survivor function. The hazard function is often applied to individual data, for example, the conditional probability that someone who is given medication for an illness will recover at time \( t \), given that they are still sick at time \( t - 1 \). It is also possible to develop survival function expression that characterize the likelihood for the focal event to occur within a given period of time, for example, at the end of one, two or three months following treatment with a new medication. The methods also permit prediction of the failure event for right- or left-censored data.

We define duration as the number of years between the start and end year of a senior executive’s tenure. An event occurs when the executive exits the current position. Those who remain at the end of the study period will be right-censored. Because we know the start date of each executive tracked in our research, we do not have any left-censored data. Survival analysis permits us to predict the instantaneous likelihood that an executive will leave his or her position at any point in time, assuming the person hasn’t already left. This lets us predict the duration in years that an executive will remain in a given position.

Most exploratory survival analyses use non-parametric estimation methods since these methods do not require assumptions about data normality. The Kaplan-Meier (KM) estimator is a non-parametric survival analysis technique that uses observed event times to establish the expected time intervals to an event of interest. We use KM to compute the survivor function for an executive who has been in a position for \( t \) years. We do this based on an estimate of the survivor function.\(^2\) In this application, KM states that the survivor function will be based on the products of the proportion of surviving executives not just at the event time that is of interest, but also at all other prior times when executives left. Thus, KM accounts for the event histories of all executives in our sample when we calculate the survivor functions at a point in time. This lets us make inferences about factors that might explain C-suite executives’ job durations.

**Research Context, Data and Descriptive Statistics**

Our research population comes from four sources in the United States: (1) the State of California government Agency Directors, Deputy Directors of Administration, Chief Budget Officers, and CIOs; (2) the State of Massachusetts Agency Directors, Deputy Directors of Administration, Chief Budget Officers, and CIOs; (3) U.S. Federal Government Agency Directors, Deputy Directors of Administration, Chief Budget Officers, and CIOs; (4) U.S. State of California government Agency Directors, Deputy Directors of Administration, Chief Budget Officers, and CIOs. For a discussion of these methods in IS research, see Kauffman, Techatasanasoonthorn and Wang (2011, in press).\(^2\) The estimation form of the survivor function is \( S^t = \Pi_{(y), (d(y))} \{\{n(y) - d(y)\}/n(y)\} \). Here, \( y \) is the number of years in which an executive’s departure might occur. In \( S^t \), \( t(y) \) is the time that a departure occurs, and \( n(y) \) is the number of executives in their positions at time \( t(y) \) who are still at risk for departure. Finally, \( d(y) \) is the number of executives that who depart their positions at time \( t(y) \). This kind of simple representation is a useful starting place for analysis.
Officers, and CIOs; and (4) Fortune 500 corporation CEOs, COOs, CFOs and CIOs. The observations cover fifteen years, from 1994 to 2009. These sources represent a wide diversity of organizations in terms of industry size, firm size and geographic dispersion, and they support the generalizability of the findings we will present. Our data collection began in early 2010 and has continued to the present. For the public sector data, much of the desired information was available on agency websites and no contacts with the agencies were necessary. For agencies without this information available on the website, we sent Freedom of Information Act (FOIA) requests and requested the data. Virtually every agency provided the data within 72 hours, the standard for FOIA requests. Fortune 500 data were collected via Securities and Exchange Commission (SEC) reports, for publicly-traded firms.

We selected the 1994 to 2009 period for several reasons. First, given the reported five-year survival duration of CIOs, this period, we reasoned, would show several turnover events for the executives in our data set. Since turnover events are the focus of this analysis, this period is apropos. Second, the title of CIO was not popularly used until the beginning of 1990 in the U.S., and so we expected to find little evidence of widespread use of the term until a few years after that time. Finally, this period in the U.S. had several different events that created environmental turbulence in the lives of senior executives in many private and public sector settings. For example, the rise of the dotcoms from 1996 to early 2000, and their fall from mid-2000 to late 2002 occurred during this time period in the U.S. The year 2000 era also was in this period, as well as the enactment of Sarbanes-Oxley Act of 2002 by the U.S. House of Representatives and the U.S. Senate. There also were several financial market upswings from 1997 to 2000 and from 2004 to 2006, and downswings from 2000 to 2002 and from 2008 to 2009. As a result, all of the senior management positions that we evaluated faced periods of turbulence – both positive and negative – during this period in North America. This made the period interesting for analysis, since the data permitted us to evaluate how CIO job tenures were impacted relative to those of other executives.

For each executive’s record (reflecting an individual in a position within an organization), we coded a Person Name. We captured a Start Year for the person’s first year in that position. In addition, we coded an End Year as the year that the individual left the position, as well as the person’s Gender. We assigned gender based on the typical gender for that particular name (e.g., Thomas is generally a man, and Sally is generally a woman). For names that are commonly used for both genders (e.g., Chris or Pat), we searched for the individual’s biographic sketch to uncover additional information to accurately code Gender. Extent of Female Leadership was based on the percentage of female executives over the fifteen-year time period for the organization. We measured female leadership based on the number of female leaders in any C-suite position (CEO, COO, CFO, CIO) in our fifteen years of data. We created and used four categories: None (no female executives in fifteen years), Low (1 – 10% female leadership in fifteen years), Medium (11 – 25% female leadership in fifteen years) and High (over 25% female leadership in fifteen years).

Industry was coded as CA for California, MA for Massachusetts, Fed for U.S. federal employees, and F500 for Fortune 500 employees. For Position, we used executive titles in Fortune 500 firm SEC filings that mentioned a person by his or her name. The majority of organizations used the standard CEO, COO, CFO and CIO nomenclature, which made this task easy. For the public sector, we identified the Agency Director as the CEO-equivalent, the Deputy Director of Administration as the COO-equivalent, and the Chief Budget Officer as the CFO-equivalent. The CIOs were mostly identified as such, and the term CIO is commonly used across the public sector domains in many state governments in the U.S. For Firm Size, we used the annual budget for the organization. This worked well for the public sector organizations, however, for the Fortune 500s, we recognized that the size of the firm in terms of its revenues is what makes a firm a member of the Fortune 500. So we coded all Fortune 500 companies as large. For Turbulence, we used the yearly change in stock market for that period and coded Positive (greater than 5%), Neutral (between + 5% and -5%) and Negative (less than -5%). While the stock market is an imperfect predictor of turbulence, it reflects overall turbulence in the economy over time. Since we focus on when executives left their positions, our coding identifies the End Year for each executive’s tenure too.

We also coded for Arrival Proximity, which refers to the closeness in time of arrival of the CEO to the CIO’s arrival in his or her executive position. If their arrivals were in the same calendar year, we coded arrival proximity as Concurrent, meaning that the CEO brought the CIO in as part of the top management team. If the CIO arrived within one calendar year of the CEO, we coded Near-Term arrival for the CIO. And if the CIO arrived two or more calendar years after the CEO did, then we coded the CIO’s arrival as Long-term. Departure Proximity refers to the closeness of the departure of the CIO with the CEO, and is
coded using the same logic as *Arrival Proximity*. We also created a concatenated field using *Arrival Proximity* and *Departure Proximity* to identify CIOs who both arrived and left around the same times as the CEO did. We only used concurrent and long-term proximity in our analysis of CIO arrival and departure times though. This minimized the impact of having the year of arrival and departure only in our data, and not the month. This granularity of information was not available from the public record, and so it was impractical to try to recreate it, since it would have been costly to obtain it and inaccurate anyway.

We have interim appointments, coded *Interim*, in our data, which are common in the U.S. public sector to reflect a temporary appointment for a position. We also used a *Right-Censored Flag* if person was still in the current position as of 2009. We knew the arrival date of all executives, so there was no reason to code with a *Left-Censored Flag*.

In the U.S., as in many other countries, turnover can be voluntary or involuntary, and many useful research questions can be stated that address this distinction. However, even though we are aware of several well-publicized involuntary turnover events within our research population, the real reasons for turnover are seldom publicized and typically were kept confidential due to personnel regulations. Because the reasons for executive turnover are not relevant for this study, we focus primarily on departure dates. Descriptive information for the population of 1,579 executives is shown in Table 1.

<table>
<thead>
<tr>
<th>Table 1. Descriptive Information on the 1,579 Executives in Our Data Set</th>
<th>VARIABLES</th>
<th>ALL EXECUTIVES</th>
<th>CIOS ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>1,579 (CEO = 487, COO = 358, CFO = 386, CIO = 348)</td>
<td>348</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Males = 1,218; Females = 361</td>
<td>Males = 270; Females = 78</td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>State of CA = 558; State of MA = 234; Federal = 398; Fortune 500 = 389</td>
<td>State of CA = 104; State of MA = 54; Federal = 83; Fortune 500 = 107</td>
<td></td>
</tr>
<tr>
<td>Agency Size</td>
<td>Small = 427; Medium = 420; Large = 732</td>
<td>Small = 73; Medium = 97; Large = 178</td>
<td></td>
</tr>
<tr>
<td>Duration (years)</td>
<td>Min = 1; Median = 3; Max = 18</td>
<td>Min = 1; Median = 3; Max = 18</td>
<td></td>
</tr>
<tr>
<td>Turbulence (stock market returns)</td>
<td>Min = -51; Median = 3; Max = 25</td>
<td>Min = -51; Median = 3; Max = 25</td>
<td></td>
</tr>
<tr>
<td>Female Leadership</td>
<td>None = 309; Low = 472; Medium = 474; High = 300</td>
<td>None = 77; Low = 107; Medium = 94; High = 64</td>
<td></td>
</tr>
<tr>
<td>Arrival Proximity (without CEO data)</td>
<td>Concurrent = 409; Near = 185; Long = 470</td>
<td>Concurrent = 117; Near = 62; Long = 163</td>
<td></td>
</tr>
<tr>
<td>Departure Proximity (without CEO data)</td>
<td>Concurrent = 203; Near = 130; Long = 393</td>
<td>Concurrent = 52; Near = 41; Long = 130</td>
<td></td>
</tr>
</tbody>
</table>

Note: (a) Some data were right-censored in the 2005 to 2009 period, since the executives were still in place.

**EMPIRICAL ANALYSIS AND RESULTS**

Our empirical analysis was designed to answer several questions. First, are CIOs different from other senior executives in the U.S., and if so, how? Second, do U.S. CIOs exhibit differences across different dimensions that predict survival? Is membership in the top management team beneficial to CIOs?

**Top Management Team Survival Patterns**

Table 2 shows a comparison over several dimensions of the CIO with other executives. We initially expected one of two things: that there would be similar patterns across all of the C-suite positions; or that the CIO and CFO would be largely similar, given their more functional orientation. Actually neither occurred though, so we will focus on interpreting the data relative to the four positions.
Not surprisingly, there are differences across the C-suite based on the executive title for a given industry. All the C-suite executives survived longer at Fortune 500 companies as compared to governmental organizations – and often substantially longer. In Fortune 500 companies, the survivability of CEOs and COOs is similar, while the survival of CFOs and CIOs is also similar, though the two different groups exhibit differences. This suggests that the CEO and COO are more “executive” in their orientation, while the CFO and COO have more of a functional position. This is supported by the rarity that a CFO or a CIO will ascend to the CEO position; in fact, it is more common for the COO to do so.

Within the Government category, there is no discernable pattern for survival. The CEO and CFO have greater similarity in the survival patterns, and the COO and CIO also share their own similar patterns. Clearly, our assertion about the possible nature of executive versus functional positions does not hold for Government executives. Our data suggest that domain matters for all executives. See Figure 1.

**Turbulence.** The effect of turbulence, in this case stock market performance, is strikingly different for each of the executive titles. CEOs and COOs stay in place the longest during periods of neutral stock market performance but that is the only consistent finding. CFOs and CIOs seem to react differently in the presence of different degrees of turbulence. In general, similar to CEOs and CFOs, CIOs have the shortest tenure when the stock market is a positive influence. This may be a case of these executives’ interest in moving to better-paying positions. Most interesting is that there are no differences in CIO survival in conditions of high or neutral turbulence, but survival durations shorten when the market improves.

Another interpretation is that organizations will see CEOs, CFOs and CIOs as instruments of change in conditions of positive turbulence, and so these executives will have more opportunities. COOs, who are often focused on operational efficiencies, will be perceived as less likely to contribute in times of positive turbulence when the emphasis is on growth rather than on cost management. See Figure 2.

**Table 2. Survival Patterns for the Top Management Team Members**

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>CEO</th>
<th>COO</th>
<th>CFO</th>
<th>CIO</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industry</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fortune 500</td>
<td>8.5</td>
<td>8.1</td>
<td>7.4</td>
<td>7.0</td>
<td>Across titles: p &lt; .000</td>
</tr>
<tr>
<td>Government</td>
<td>6.7</td>
<td>5.0</td>
<td>7.1</td>
<td>6.0</td>
<td>Within CIO: p &lt; .005</td>
</tr>
<tr>
<td><strong>Turbulence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>5.1</td>
<td>3.2</td>
<td>5.7</td>
<td>4.7</td>
<td>Across titles: p &lt; .000</td>
</tr>
<tr>
<td>Neutral</td>
<td>6.5</td>
<td>3.9</td>
<td>4.8</td>
<td>4.7</td>
<td>Within CIO: p &lt; .000</td>
</tr>
<tr>
<td>Positive</td>
<td>3.4</td>
<td>3.8</td>
<td>2.8</td>
<td>2.9</td>
<td></td>
</tr>
<tr>
<td><strong>Firm Size</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>7.5</td>
<td>6.0</td>
<td>8.0</td>
<td>7.2</td>
<td>Across titles: p &lt; .000</td>
</tr>
<tr>
<td>Medium</td>
<td>5.3</td>
<td>4.4</td>
<td>5.4</td>
<td>5.2</td>
<td>Within CIO: p &lt; .000</td>
</tr>
<tr>
<td>Large</td>
<td>8.1</td>
<td>5.0</td>
<td>8.7</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td><strong>Gender of Executive</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>5.7</td>
<td>5.0</td>
<td>7.0</td>
<td>5.1</td>
<td>Across titles: p &lt; .675</td>
</tr>
<tr>
<td>Male</td>
<td>7.4</td>
<td>5.4</td>
<td>7.4</td>
<td>6.7</td>
<td>Within CIO: p &lt; .015</td>
</tr>
<tr>
<td><strong>Extent of Female Leadership</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>9.4</td>
<td>10.0</td>
<td>7.6</td>
<td>7.8</td>
<td>Across titles: p &lt; .000</td>
</tr>
<tr>
<td>Low</td>
<td>6.1</td>
<td>5.7</td>
<td>9.8</td>
<td>5.9</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>6.3</td>
<td>4.1</td>
<td>5.5</td>
<td>6.0</td>
<td>Within CIO: p &lt; .000</td>
</tr>
<tr>
<td>High</td>
<td>6.5</td>
<td>5.0</td>
<td>6.3</td>
<td>5.8</td>
<td></td>
</tr>
</tbody>
</table>

*Note:* Significance in the far right-hand column is evaluated via the log rank comparison of equality with the Mantel-Cox statistic.

**Industry.** Not surprisingly, there are differences across the C-suite based on the executive title for a given industry. All the C-suite executives survived longer at Fortune 500 companies as compared to governmental organizations – and often substantially longer. In Fortune 500 companies, the survivability of CEOs and COOs is similar, while the survival of CFOs and CIOs is also similar, though the two different groups exhibit differences. This suggests that the CEO and COO are more “executive” in their orientation, while the CFO and COO have more of a functional position. This is supported by the rarity that a CFO or a CIO will ascend to the CEO position; in fact, it is more common for the COO to do so.

Within the Government category, there is no discernable pattern for survival. The CEO and CFO have greater similarity in the survival patterns, and the COO and CIO also share their own similar patterns. Clearly, our assertion about the possible nature of executive versus functional positions does not hold for Government executives. Our data suggest that domain matters for all executives. See Figure 1.

**Turbulence.** The effect of turbulence, in this case stock market performance, is strikingly different for each of the executive titles. CEOs and COOs stay in place the longest during periods of neutral stock market performance but that is the only consistent finding. CFOs and CIOs seem to react differently in the presence of different degrees of turbulence. In general, similar to CEOs and CFOs, CIOs have the shortest tenure when the stock market is a positive influence. This may be a case of these executives’ interest in moving to better-paying positions. Most interesting is that there are no differences in CIO survival in conditions of high or neutral turbulence, but survival durations shorten when the market improves.

Another interpretation is that organizations will see CEOs, CFOs and CIOs as instruments of change in conditions of positive turbulence, and so these executives will have more opportunities. COOs, who are often focused on operational efficiencies, will be perceived as less likely to contribute in times of positive turbulence when the emphasis is on growth rather than on cost management. See Figure 2.
Observations: For all positions, the survival curve for Fortune 500 firm is less steep, reflecting longer survival. CEOs, COOs and CFOs have a sharp drop in survival for government positions, starting in Year 3. The drop is less pronounced for CIOs.

Figure 1. Executive Job Tenure Durations by Sector (CA, MA, Federal, Fortune 500)

Observations: While all of the positions are affected by industry turbulence, the CEO, CFO and CIO are more likely to leave during periods of positive stock market movement, as opposed to periods of flat or declining stock market movement.

Figure 2. Executive Job Tenure Durations by Industry Turbulence
Firm Size. All executives had the same pattern related to firm size. Executive survival was longer in small and large firms, however, the job tenure durations were different. Executives may have felt more comfortable with small or large firms. A mid-sized firm may be viewed as a stepping-stone to a larger or smaller firm. The CEO and CIO had similar durations with small firms and medium firms, but different durations with large firms. It is surprising that the CFO had the biggest variation of survival based on firm size. See Figure 3.

Executive Gender. There is a statistically significant difference between the survival of male and female CIOs and this supports the position that gender is an important predictive factor in CIO survival. In assessing gender, it appears that the CFO is an outlier in terms of female executive job durations. This may be due to the belief that the other positions (CEO, COO, CIO) have historically been seen as more friendly for women.

Female Leadership. The extent of female leadership over the fifteen-year period we studied had a strong and salient effect on survival. Yet it is surprising to us that that female representation was so low. See Table 2. Survival was the longest for all positions when either there was no female leadership during the period (CEO, COO, CIO) or only a low level of female leadership (CFO). CEOs and CIOs have the most in common relative to female leadership. While duration is highest with no female leadership, there is not a substantial difference when female leadership is low, medium or high. This suggests that, once female leadership arrives, a greater extent of female leadership is not a factor. COO job tenures seem to have the most powerful and negative reaction to female leadership; they have lower job durations for all positions when any (low, medium or high) female leadership is in place. Clearly, there is great variability across positions in reaction to female leadership. Figure 4.

Observations: All the executive positions have longer survival in small or large companies. This may reflect a belief that mid-sized companies are transition stops for executives, who eventually end up moving to smaller or larger companies.

CIO Entry and Exit Patterns as Evidence of Top Management Team Participation

We also examined our data to see if it supports the assertion that the CIO is a member of the top management team. We used three empirical regularities assessments to make the determination: (1) the corre-
lation between the CEO’s and CIO’s arrival dates in their organizations; (2) the correlation between their departure dates; and (3) the correlation between their arrival and departure dates. If a CIO were a member of the top management team, then we should see evidence of it in one or more of these.

**Similar Arrival Dates.** If a CIO were a member of the top management team, then an incoming CEO would tend to bring a trusted CIO into the new organization upon the former’s arrival. Given the widespread evidence for CEO’s bringing their past lieutenants into new organizations, we expect the CEO will recruit the CIO only if the CIO were considered to be a top management team member, however. We compare the arrival dates of the CEO and CIO for how frequently they arrived in the same year. If the CIO generally were seen as a member of the team, then the majority of CIOs should have arrived within the same calendar year after the CEO. This suggests that the CIO arrived at the behest of the CEO. Also, if the CIO were a member of the top management team, then a CIO who arrived in close time proximity to the CEO should have a longer job tenure duration than a CIO who arrived long after the CEO of their organization arrived. This is because the closer-arriving CIO would have been more likely to be viewed as a valued team member than the CIO who did not arrive in close proximity to the CEO. See Table 3.

The data show that only a slight majority of the CIOs joined concurrently with the CEO. This suggests that there is a great diversity in join time proximity. Our data also show that the mean survival duration for CIOs who joined more than one calendar after the CEO was actually longer than for those CIOs who joined earlier, although this difference was not statistically significant. This further suggests that there was no survivability advantage for a CIO to join in close time proximity to the CEO. We also analyzed the data to see if the correlation between survival durations was greater for CIOs that arrived concurrently with the CEO, as compared to those who did not. We found no significant correlations.

**Observations:** Without exception, lower levels of female leadership lead to longer survival for all executives. The different curve shape for the CEO when no female leadership exists exemplifies this, although similar shapes exist for other positions.

**Figure 4. Executive Job Tenure Duration by Amount of Female Leadership**
Table 3. Comparison of Arrival Dates for CEOs and CIOs

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>NUMBER (%) of CIOs</th>
<th>SURVIVAL DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concurrent Join</td>
<td>180 (51%)</td>
<td>6.00 years</td>
</tr>
<tr>
<td>Long-Term Join</td>
<td>168 (49%)</td>
<td>6.98 years</td>
</tr>
</tbody>
</table>

Note. The log rank comparison of equality between Concurrent Join and Long-Term Join, based on the Mantel-Cox statistic, is not significant at $p < .05$. Survival Duration is reported in terms of the mean number of years of service of the CIO.

Similar Departure Dates. We also evaluated CEO and CIO departure dates. If the CIO were in a position of trust with the CEO, the CEO probably would attempt to take the CIO along to the next organization the person joined. Hence, correlated departure dates ought to provide evidence of the CIO’s membership in the top management team. Even if the CIO was not originally part of the top management team, correlated departure dates suggest that the CIO was able to achieve a position as part of a top management team. Our analysis approach is similar to the one that we used for arrival date. See Table 4.

The data show a slight but significant difference between duration for CIOs who leave in the same calendar year of the CEO and those who leave more than one calendar year after the CEO. Based on departure time proximity, it appears that CIOs who are members of the top management team generally leave more quickly after the departure of the CEO. This provides support for the belief that the CIO is a member of the top management team, although the duration effects are relative slight at approximately four months.

Table 4. Comparison of Departure Dates for CEO and CIO

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>NUMBER (%) CIOs</th>
<th>SURVIVAL DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concurrent Leave</td>
<td>91 (41%)</td>
<td>3.95 years</td>
</tr>
<tr>
<td>Long-Term Leave</td>
<td>130 (59%)</td>
<td>4.26 years</td>
</tr>
</tbody>
</table>

Note. Includes only CIOs that left organizations, a smaller number than those who joined since some CIOs remained in 2009 (right-censored). The log rank comparison of equality between Concurrent Leave and Long-Term Leave, based on the Mantel-Cox statistic, is significant at $p < .05$. Survival Duration is stated in terms of mean number of years of service of the CIO.

Similar Arrival and Departure Dates. We examined CIOs who joined in the same calendar year of the CEO and left in the same calendar year as the CEO. This group is less ambiguously part of top management since the arrival and departure dates of the CIO-CEO are so closely linked. They suggest the CEO recruited and hired the CIO, probably based on a previous working relationship, and the CIO chose to leave the company shortly after the CEO left. This suggests a close relationship. See Table 5.

There are several interesting findings from our third analysis. First, from a frequency perspective, about 25% of our CIOs may be viewed as members of the top management team: they arrived and left with the CEO. This somewhat aligns with the results of prior research that reported approximately 40% of CIOs have a direct reporting relationship with the CEO. While a direct reporting relationship is not a sufficient condition for being viewed as a member of the top management team, it is a necessary one. Hence, we expect that fewer than 40% of the CIOs would be part of the top management team and our finding of 25% has some face validity to it.

Table 5. Log Rank Comparison of Linked Arrival and Departure Dates for CEO and CIO

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>NUMBER (%) CIOs</th>
<th>SURVIVAL DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concurrent Arrival / Concurrent Departure</td>
<td>54 (25%)</td>
<td>4.43 years</td>
</tr>
<tr>
<td>Concurrent Arrival / Long-Term Departure</td>
<td>71 (33%)</td>
<td>4.08 years</td>
</tr>
<tr>
<td>Long-Term Arrival / Concurrent Departure</td>
<td>36 (16%)</td>
<td>3.08 years</td>
</tr>
<tr>
<td>Long-Term Arrival / Long-Term Departure</td>
<td>56 (26%)</td>
<td>4.24 years</td>
</tr>
</tbody>
</table>

Note. For the middle column, the log rank comparison of equality between Concurrent Leave and Long-Term Leave, based on the
Mantel-Cox statistic, is significant at $p < .05$. We calculated Survival Duration and the log rank comparison of equality between those who both join and leave with the CEO (and are unambiguously top management team members) and those that do not. The Mantel-Cox statistic is significant at $p < .05$. Survival Duration is the mean number of years of service of the CIO.

Our results show there is a job tenure advantage for being part of the top management team. Our comparison suggests that CIOs who are members of the top management team stay for almost 4.5 years, while those who are not stay fewer than four years. This suggests that CIOs who attain either formal or informal membership in the top management team enjoy a longer tenure, but we cannot assert cause and effect.

**CONCLUSION**

This empirical research offers useful new knowledge that extends our understanding of the job tenures of CIOs. First, CIOs tend to have longer job tenures when they work for Fortune 500 firms than when they lead the governmental agencies. CIOs have job tenures of shorter duration than CEOs and COOs, and the job tenures of CFOs are roughly comparable. Second, CIO tenures are lowest in times of low turbulence when the market is growing and the economy is positive. Third, CIO tenures were shortest when they worked in mid-sized organizations. Fourth, although the business press and prior research were conflicted on whether we might see gender differences between men and women in service as CIOs, we did indeed detect them. Fifth, in contrast, the presence of women leaders is associated with shorter mean durations for CIO job tenures.

We also examined if entry and exit of CIOs in governmental agencies and Fortune 500 firms were influenced by their association with CEOs, and their membership in the top management team. We conducted three separate analyses to see how their arrival dates, departure dates, and joint arrival and departure dates were connected with one another. We did not find that joint arrival, as evidence of the CIO’s team membership, was a strong predictor of longer job tenures for CIOs in the private and public sectors. We did find some statistical evidence to suggest that the timing of the departures of CIOs was associated with the timing of the departures of the CEOs, which connects the mean durations of their job tenures. We obtained clearer results when we tested for differences in mean job tenure durations for CIOs and CEOs who both arrived and departed their organizations in time proximity to one another. We found that, according to our operational definition of joint CEO-CIO arrival in the organization, about one-quarter of all CIOs were recruited to be part of the top management team. In addition, there is a statistically and managerially significant difference shown by our data set: the mean duration of job tenures for public and private sector CIOs reached a high point when the CEOs and CIOs arrived in and departed from their organizations in closer time proximity to one another. The mean duration of job tenure for CIOs with concurrent arrivals and departures with their CEOs was 4.43 years. All other CIOs had a shorter duration of just 3.90 years. This was our strongest test in this research design, and it suggests that top management team membership on the part of the CIO is important in lengthening the survivability of the CIO.

There are a number of limitations that we should point out to the reader related to this work. First, since our research is still in an exploratory phase, we have sought to conduct empirical regularities analysis of the data that we have available. We have used the findings to evaluate some of the major conjectures that have been proposed about CIO job tenure in the business press and the prior academic literature. We did not pre-specify hypotheses as a basis for testing specific theory or to utilize statistical models based on parametric functions, as is common in IS research. These methods are quite powerful. Nonetheless, we should point out that the requirements that functional forms and parametric specifications impose upon an exploratory analysis of the kind that we wished to conduct here can sometimes be more “overkill” than is appropriate to create useful insights for moving our research agenda forward.

Second, although our data are extensive for the kind of work we have carried out, there is some inherent imprecision in our statistical analysis. One aspect is how the Arrival Proximity and Departure Proximity variables relate to whether the CIO and CEO are specified. A second aspect is whether a breakpoint for near-term arrival at one year after the CIO was hired is sufficient to distinguish prior joint organizational service for the CEO and CIO. The reader should view these cutoffs as starting points that don’t involve inappropriate “cherry picking” on our part, but still might be subject to some bias. We are currently in the process of evaluating the relatively sensitivity of the main results that we presented for the arrival-departure proximity analysis, to gauge the extent of the influence that our operational definitions created.
Finally, we have not sought to explain why CIOs in Fortune 500 firms have longer job tenures than their counterparts in public organizations. Nevertheless, it is important to offer new observations in the form of “stylized facts,” as economist Nicholas Kaldor observed in the 1960s, when it is appropriate to reconsider existing theory or to build new theory. Such new observations are the natural outcomes of exploratory research and ongoing scientific inquiry. They provide a means for researchers with interests in IS human capital, senior management careers, and organizational leadership to think more deeply about the possible “disconnects” that exist relative to current theory. This will give them an opportunity to examine the facts that research like ours can offer in a new way. And, more importantly, this provides “the grist” for a rich, new and interesting agenda for IS researchers to pursue.

The economic crises of the 21st century have highlighted the need for strong leadership in both public and private sector organizations and indeed it is critical for this aspect of human capital to perform. However, public and private sector leaders tend to leave before achieving the peak performance period within an organization. By focusing on environment drivers of departure, this study provides insight into when and why leaders leave and organization and suggests what can be done to stop this brain drain.

REFERENCES


Human Capital Track


