Bridging the Gap: Evidence from externally hired CEOs

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Abstract
External CEOs often experience an employment gap (i.e., a period during which they do not hold an executive position at a public company) prior to joining their new firm. These gaps cannot be accurately identified in common databases. A hand-collected sample of 50 randomly selected new CEOs indicates that approximately half of new CEOs are external hires. These new CEOs experience mean (median) gaps of 2.26 (1.65) years. We hypothesize that labor market frictions and executive skillsets contribute to the existence and length of these executive employment gaps. We also use theories from labor economics to predict (equilibrium) associations between two measures of “fit” (executive compensation and long-term match quality) and gaps (both existence and length). Finally, we will provide descriptive evidence on what executives do (e.g., sit on public company boards, work for private consulting companies, teach, consume leisure) during their gaps.
Bridging the Gap: Evidence from externally hired CEOs

Abstract
We investigate executive employment gaps (hereafter, gaps) between the appointment of an external CEO at a public firm and the individual’s prior executive position at a public company. These gaps cannot be accurately identified in common databases. A hand-collected sample of 50 randomly selected observations indicates that approximately half of new CEOs are external hires. These new CEOs experience mean (median) gaps of 2.26 (1.65) years. We hypothesize that labor market frictions and executive skillsets contribute to the existence and length of these executive employment gaps. We also use theories from labor economics to predict (equilibrium) associations between two measures of “fit” (executive compensation and long-term match quality) and gaps (both existence and length). Finally, we provide descriptive evidence on what executives do (e.g., sit on public company boards, work for private consulting companies, teach, or consume leisure) during their gaps.
1. Introduction

We investigate executive employment gaps (hereafter, gaps) between the appointment of an external CEO at a public firm and the individual’s prior executive position at a public company. Specifically, by augmenting several common databases with extensive hand-collected data, we examine the impact of labor market frictions and executive skillsets on the existence and length of gaps. We also explore whether the existence and length of gaps are associated with executive compensation and long-term match quality (two measures of executive-firm “fit”).

An increasing trend in hiring external executives (Vancil [1987]; Parrino [1997]; Huson, Parrino, and Starks [2001]; Frydman [2007]; Murphy and Zábojník [2007]), reductions in CEO tenure (Kaplan and Minton [2012]), labor market frictions such as noncompete constraints (Garmaise [2011]) and anecdotal evidence (Lublin [2010], Feintzeig [2014]) suggest that transitions into CEO positions are frequently preceded by an employment gap.¹ Prior to the main analysis, we conducted a pilot study with hand-collected dates for 50 randomly selected new CEOs to better understand the frequency and magnitudes of the gaps and evaluate available data sources. In this small sample, external CEO succession is very common.² For 25 of the 27 external hires, we could calculate a gap. Eight of these had gaps of less than 30 days, which we label as effectively having no gap.³ The mean (median) gap for this sample of 25 is 2.26 (1.65) years. This seems economically large considering average tenure (also called time-to-turnover) for CEOs between

¹ Descriptive statistics in Fee and Hadlock (2003) suggest that some of their “nonraided” sample had gaps. In Table 3, they split their sample between 101 “raid” observations, defined as “cases where the individual jumped immediately from a prior public employer to the new position” (page 1333), and 31 “nonraid” observations.
² The 95% confidence interval for the proportion of externally hired CEO is 40.2% to 67.8%.
³ We recognize that minor timing differences (due to physical moves, vacations, etc.) can arise even when a new CEO accepted the position before leaving another firm. Unfortunately, offer acceptance is not necessarily observable. As a result, we will classify any employment gap of less than 30 days as “no gap” or zero. Given the arbitrary nature of this cutoff, we will also report results using a 60- and a 90-day cutoff.
1992 and 2007 is only seven years (Kaplan and Minton [2012]). To the extent that executives do not find supplemental income sources during the gap, a gap of 2.26 years represents $10.8 million foregone compensation for an average CEO at an S&P 1500 firm over the 1992 – 2014 period; this average varies between a low of $3.8 million and a high of $15.8 million based on total compensation in 1992 and 2000, respectively (calculation based on TDC1 in Execucomp).

Understanding employment gaps is important for several reasons. First, ex ante it is not clear whether gaps benefit or harm executives. On one hand, sitting out of the job market can result in lost wages and the deterioration of executives’ skills. On the other hand, gaps may allow executives to recharge and invest in the search process, ultimately resulting in a better CEO-firm match. Second, gaps may have implications for firms and the economy as a whole. As key decision-makers in corporations, CEOs can significantly impact economic growth (Bertrand [2009]). In fact, several studies suggest that individual CEOs affect firm outcomes (e.g., Hambrick and Mason [1984]; Johnson, Magee, Nagarajan, and Newman [1985]; Hayes and Schaefer [1999]; Bertrand and Schoar [2003]). In addition, talented CEOs are a scarce resource – one strand of executive compensation literature argues that the high levels and growth in executive pay result from competition for this scarce resource (Murphy [1999]; Edmans, Gabaix, and Landier [2008]; Gabaix and Landier [2008]; Terviö [2008]; Murphy [2013]). To the extent that gaps lead to the deterioration of executives’ skills or impact the firm-CEO matching process, gaps will affect the allocation of scarce resources in the economy, with potential implications on growth and social welfare.

Our study focuses on the gaps of externally hired CEOs coming from executive positions at other public companies. Given, to the best of our knowledge, this is the first study to examine

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4 We define employment gap based on not working as an executive for a public company. Some of these executives will probably pursue alternative income streams (e.g., consulting, non-executive directorships) during this period.
employment gaps at the executive level, we first provide descriptive evidence about executive employment gaps. Our hand-collected data includes details on the proportion of CEO hires preceded by a gap, gap lengths, and activities in which the executive engaged during the gap.

We then consider the effect of frictions resulting from noncompete constraints and executive skillsets on the existence and length of gaps. Noncompete agreements can mitigate potential damages to the firm caused by departing employees (Garmaise [2011]; Bishara, Martin, and Thomas [2015]), but are not always enforceable (e.g., in California), so simply signing one does not necessarily constrain behavior. As a result, we view an executive to be constrained when he or she signs an agreement and that agreement’s enforceability is relatively high. We use the term noncompete constraint (or NCC) to describe the existence of a noncompete agreement (or “noncompete”) when combined with a high level of enforceability.

With respect to executive skillsets, the increasing importance of general managerial skills and the corresponding decrease in the importance of firm- or industry-specific expertise is arguably the most salient trend related to CEOs’ educational and professional backgrounds over recent decades (Frydman, [2007]; Murphy and Zábojník [2007]; Bertand [2009]; Custódio, Ferreira, and Matos [2013]). Our study, therefore, begins by examining the generalist versus specialist orientation of the executive and the differential role that NCCs are likely to play for these two executive types. First, we hypothesize that NCCs are less binding for generalists. Specifically, we predict that NCCs affect specialists’ gaps (both the existence and length) more than those of generalists. We formally develop our hypotheses in Section 2.

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5 A rich literature in labor economics examines “contemporaneous unemployment spells” among rank-and-file employees, which is analogous to our notion of gaps (see Section 2 for a brief discussion of this literature). Yet the insights from this research may not apply to executive employment gaps. For example, with respect to determinants and with the aim to inform the policy debate on unemployment levels, labor economists typically focus on the effects of unemployment insurance on the duration of unemployment spells, an issue that is not relevant to the executive labor market.

6 In Section 4 we provide a detailed description of how we operationalize noncompete constraints.
Next, we turn our attention to the relation between gaps and match quality (or fit). Conventional wisdom and prior literature in labor economics suggest that gaps for rank-and-file employees are red flags to prospective employers resulting in fewer interviews, fewer offers, and lower pay (e.g., Kroft, Lange, and Notowidigdo [2013]). Gaps exist for a variety of reasons (e.g., illness, factory closings, or voluntary career changes). Potential employers likely view some of these reasons as innocuous and others as worrisome. In rank-and-file employment, there is likely some pooling across gap reasons because applicants with innocuous reasons cannot fully separate themselves from applicants with worrisome ones. Furthermore, skills (or the value of skills) tend to deteriorate over time if not used and updated (Edin and Gustavsson [2008]). Thus, there is often a stigma attached to periods of unemployment that affects recruiting decisions of employers (Vishwanath [1989]; Gibbons and Katz [1991]; Ruhm [1991]; Arulampalam [2001]; Gangl [2006]; Kroft, Lange, and Notowidigdo [2013]).

While the conventional wisdom may accurately describe rank-and-file labor markets, our setting differs in several ways. First, the number of senior executives is relatively low, and the information available about each potential match is relatively high. Using the terminology of Lazear (1986), the “visibility” of executives’ marginal product is relatively high. We thus assume that firms searching for new CEOs are more likely to know about candidates’ skillsets and why gaps exist, reducing the signaling role of gaps. Second, executives are more likely to have the financial resources to use the gaps to assess their career goals and conduct extensive due diligence to evaluate potential matches (Lublin [2010]). Finally, our analysis is predicated on the executive becoming a CEO, an unlikely outcome for poor performers (Harris and Holmstrom [1982]). Thus, it is not obvious that the existence and duration of executive employment gaps lead to negative career consequences.
The above discussion suggests that a key assumption behind signaling models, the existence of substantial information asymmetries, is mitigated in the CEO labor market. However, another class of models, search-theoretic models, may provide insights. These models rely on the notion that market frictions are material—“it takes time and other resources for a worker to land a job, especially a good job at a good wage, and for a firm to fill a vacancy” (Rogerson, Shimer, and White [2005], p. 960). We expect these market frictions to be significant in our setting, where the “worker” of interest is external CEO hires. For example, hiring a new CEO can be politically sensitive for both the hiring firm and potential candidates. Firms often consider both internal and external candidates, and external candidates may desire anonymity during the interview process, especially if employed elsewhere. In some cases, potential candidates with the requisite skillset and interests will not be identified, or will require alternate recruiting methods, due to the desire for anonymity. Finally, it is difficult to predict the arrival of CEO opportunities.

Using search-theoretic models of the labor market as a framework as well as the theory of employee raids, we formulate two sets of hypotheses that we expect to apply within both generalist and specialist executive types. First, these models suggest that (i) employed workers have higher reservation wages than unemployed workers and (ii) the best workers are more likely to be raided, resulting in job transitions without an employment gap. Therefore, we expect that externally hired CEOs with gaps have a worse CEO-firm match (lower compensation and shorter time-to-turnover) than those without gaps. Second, conditional on experiencing a gap, job search models show an unemployed worker’s reservation wage is negatively associated with his or her discount rate (e.g.,

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7 This notion is also supported by the popular press. Lublin (2010) writes: “Quitting a high-powered job at a time when the unemployment rate hangs at 9.5% sounds crazy. Yet, some C-level executives are leaving these days before they line up another plum management spot. Most resign specifically so they’ll have time to job hunt.”

8 This desire for anonymity exists in many labor markets including academic markets. Methods for recruiting experienced faculty or senior administrators are often shaped by such demands.
candidates with lower discounts rates, patient candidates, will turn down “poor” offers leading to higher utility through either higher wages or a better fit). This leads us to expect that, conditional upon having a gap, executives with longer gaps have a better match (higher compensation and longer time-to-turnover). In other words, these hypotheses predict a “U” shaped relation between gaps and CEO-firm fit, with better matches at no gap and at relatively longer gaps, where the executive has the ability to perform sufficient due diligence to achieve a better match.

We use two measure of executive-firm match quality. In search-theoretic models of the labor market, an employee’s best match is the company that allows him or her to be most productive and receive the highest compensation (an ex ante measure of fit). These models assume that employment offers are completely characterized by the wage offered (e.g., Jones [1988]). In reality, employment utility is not only determined by wages, and so we supplement total compensation tests with an ex post measure of fit: time-to-turnover at the new firm. We expect good matches will last longer than poor ones.

We examine these hypotheses using ordinary least squares and hazard models. We acknowledge that our study suffers from the potential for correlated omitted variables. In particular, the potential effect of unobservable factors on the existence and duration of gaps as well as their consequences is a significant concern in our analysis. For example, gaps may be driven either by (lack of) managerial talent, accumulated wealth, or simply desiring more time with family, but none of these are independently observable. In addition, because we focus on successful outcomes (i.e., individuals subsequently hired into a CEO position at an S&P 1500 firm), our results may not be generalizable to individuals with other outcomes (e.g., those hired as a CEO at a non-S&P 1500 firm, hired in a non-CEO position, etc.).
Three prior studies are particularly relevant to our project. First, building on the theory of raids proposed by Lazaer (1986), Hayes and Schaefer (1999) argue that the average ability of managers who leave a firm for a similar position at another should be high. Using a clever research design, Hayes and Schaefer (1999) find that firms whose managers are raided (i.e., hired away) experience an average abnormal return of –1.51% compared to 3.82% abnormal returns for random departures (i.e., sudden managerial deaths). We draw from some of the same labor market theories in our hypotheses development. To focus on raids, Hayes and Schaefer (1999) effectively drop observations with meaningful employment gaps.9 Furthermore, they are interested in the market’s assessment of CEO ability.10 In contrast, we are interested in causes of gaps and what these gaps imply about fit as measured by CEO compensation and employment time-to-turnover.

Second, Fee and Hadlock (2003) examine the movement of executive talent across firms. Their evidence indicates that superior stock price performance increases the likelihood that an executive will obtain a CEO position elsewhere and is associated with larger hiring grants (e.g., stock options and restricted stock) for CEOs. While they include a small sample of executives with employment gaps in the analysis, Fee and Hadlock (2003) do not consider the factors underlying these gap or their consequences for match quality.

Finally, Allgood and Farrell (2003) provide evidence of job-match heterogeneity in the CEO labor market—that is, the productivity of a given manager at a given firm varies with both the manager’s ability and how well the manager’s skills match the firm (e.g., Jovanovic [1979]). Allgood and Farrell (2003) show that, consistent with models of job match where manager-firm pairs learn about the quality of the match over time, the hazard of CEO turnover increases in the

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9 Hayes and Schaefer (1999) specify that a new CEO is only included if he was “employed in the six months prior to his appointment by another publicly traded firm” (p. 133), suggesting nonzero employment gaps exist.

10 Motivated by their study, we collect hire announcements to report market responses in an “Additional Analyses” section.
first five years of tenure and then decreases. They also document that CEO age, firm performance during the CEO’s tenure, and some of the characteristics of the previous CEO are associated with match quality.

Our study makes several contributions. First, it contributes to the literature on executive labor markets. Prior studies in accounting and finance typically take a firm-centric view and focus on the role of firm performance and monitoring mechanisms in (forced) CEO turnover. We adopt a more executive-centric view and add to the few studies on voluntary job changes, movement of executive talent across firms, and CEO-firm match quality (Hayes and Schaefer [1999]: Fee and Hadlock [2003]; Allgood and Farrel [2003]).

Second, and more generally, our paper contributes to the literature on contemporaneous unemployment spells by focusing on an important component of the overall labor market: executives. This literature has historically focused on rank-and-file employees. Given the differences between rank-and-file employees and executives, we expect the insights from our study to complement the literature in this area. Relatedly, an advantage of our setting is that voluntary and mandatory disclosures regarding CEO appointments, backgrounds and compensation allow us to construct a rich dataset on executive gaps.11 In contrast, the literature on rank-and-file employees relies on data from surveys (e.g., Current Population Survey), administrative records (e.g., unemployment insurance) and field experiments. Our dataset enables us to address questions (e.g., how employment gaps relate to employee-employer “fit”) that would be difficult to examine in the rank-and-file setting.

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11 While most disclosure requirements also apply to the five most remunerated employees at public companies, there is often not enough information regarding the employment histories of the other high-level employees (see Section 4). Furthermore, our study requires substantial hand-collection, which is not unduly costly for a substantially larger sample.
Third, our study adds to the debate on noncompetes and the literature on executive skillsets by exploring the interplay between the two. Fourth, we provide descriptive evidence on the existence and length of executive employment gaps, as well as the activities during, as little is known about employment gaps beyond the rank-and-file worker level.

Finally, our study produces a novel and rich dataset on executive transitions as well as an expanded dataset of NCCs. Future research can draw on this data to address important questions. For example, how do executives’ activities during gaps impact their eventual labor market outcomes? How do gaps and executives’ activities during gaps affect the future productivity of the hiring firms (e.g., innovation and performance)? What is the impact on the overall economy of leaving top talent out of the labor market for extended periods? In addition, future research that explores outcomes for unemployment spells in the executive market can use our data as a basis to extend our study. For example, we only examine executives with good outcomes (i.e., those who become CEOs). We do not provide insights on executives that take lower level jobs. We also do not incorporate internal promotions or separately identify interim CEOs, both of which may have different implications for the employee and the firm. Furthermore, while we take a more executive-centric view, one could adopt a firm-centric focus by examining searches for a new CEO and trying to identify how firms choose from a list of likely candidates.12

2. Hypothesis Development

2.1 Determinants of CEO gaps

Efficient human capital deployment is an important driver of economic growth and a central concern for policy makers. An extensive literature examines the determinants and

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12 Press articles often refer to likely candidates. For example: “…the formation of a search committee suggests the board is looking outside. The best-known banking figure currently out of work is former Citigroup executive Jamie Dimon. Other well-regarded bank executives include Firstar Corp. CEO Jerry Grundhofer and Leslie Biller, chief operating officer of Wells Fargo & Co.” (Cahill [1999]).
consequences of employment gaps (i.e., unemployment spells) in rank-and-file labor markets. One strand of this literature focuses on the role of unemployment insurance level and duration on the duration of unemployment spells (e.g., Moffitt [1985], Meyer [1990], Katz and Meyer [1990], Card, Chetty and Weber [2007], Card, Johnston, Leung, Mas and Pei [2015]; also see Krueger and Meyer [2002] for a review). While these studies inform the policy debate on the relation between unemployment insurance and unemployment levels, their insights are not relevant for the executive labor market.

Another strand of the labor economics literature examines whether unemployment spells damage workers’ future labor market careers. These studies are interested in whether long-term spells of contemporary unemployment have adverse effects on re-employment probabilities (“duration dependence”) and whether past spells of unemployment have a negative effect on current employment probabilities as well as compensation (“scarring”) (e.g., Ruhm [1991], Kletzer [1998], Arulampalam [2001], Imbens and Lynch [2006], Kroft, Lange and Notowidigdo [2013], Eriksson and Rooth [2014]; see also Machin and Manning [1999] for a review). Several studies demonstrate a negative relation between unemployment duration and subsequent wages (e.g., see Addison and Portugal [1989]; Farber [1993]; Kroft, Lange, and Notowidigdo [2013]; Eriksson and Rooth [2014]), though establishing causality has been difficult (see Eriksson and Rooth [2014] for a discussion).

In contrast to the rich literature in rank-and-file employment gaps, studies on the executive labor market tend to examine the drivers of turnover, which do not, in and of themselves, imply a gap.13 We first focus on how executive labor market frictions resulting from NCCs interact with executive skillsets to affect the existence and duration of gaps.

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13 Examples include the work of Brickley, Linck, and Coles (1999), DeFond and Park (1999), Hayes and Schaefer (1999), Engel, Hayes, and Wang (2003), and Bushman, Dai, and Wang (2010).
Employees have access to sensitive information about their firms’ products, costs, customers, current R&D projects, and strategy, among other things. Firms also invest in their employees’ human capital on an ongoing basis. Thus employee departures, particularly to competitors, can damage firms. Noncompetes have emerged as a way to constrain employees and mitigate these costs and they pervade the executive labor market.\textsuperscript{14} Garmaise (2011), for example, finds evidence of noncompetes between the firm and its top executives at 70.2\% of a random sample of 500 Execucomp firms (i.e., firms that are in the S&P 1500). In a more recent study, Bishara, Martin, and Thomas (2015) examine 847 CEO employment contracts from a sample of S&P 500 firms from 1996–2010 and find that 80\% include noncompetes.\textsuperscript{15} While U.S. states vary in the enforceability of noncompetes, a common requirement for enforcement is that the agreement must not be overly restrictive (i.e., it should apply to a reasonable geographic area and have a reasonable definition of competing firms). Prior studies show that the existence and enforceability of noncompetes affect executive movements. Specifically, Garmaise (2011) documents that enforceability reduces executive mobility, particularly within a given industry. Similarly, Marx, Strumsky, and Fleming (2009) find that enforcement decreases mobility, especially for employees with greater firm-specific human capital. However, Fee and Hadlock (2003) show that only “26.34\% of outside CEO hires from other public firms come from a firm with the same two-digit SIC code, implying that the majority actually come from other industries” (p. 1328). Thus, for new CEOs who are changing industries, noncompetes are unlikely to be the sole cause of gaps.\textsuperscript{16}

\textsuperscript{14} More broadly, firms and executives enter into other agreements that may include restrictions on employee conduct such as confidentiality and nondisclosure agreements and nonsolicitation agreements prohibiting the recruiting of the firm’s current employees. Consistent with prior research (Garmaise [2011]; Bishara, Martin, and Thomas [2015]), we focus on noncompetes given their prominence and potential impacts on a CEO’s post-employment activity.

\textsuperscript{15} Kaplan and Strömberg (2003) find that noncompetes are used in approximately 70\% of contracts between entrepreneurs and venture capitalists.

\textsuperscript{16} Due to issues of noncompete enforceability, firms in England started paying former employees their full salaries “during the period in which they are restrained from competing” (Lembrich, [2002], p. 2291), a practice known as “garden leaves.” Historically, these provisions were uncommon in the US, and US courts have not consistently
Obviously, enforcement only matters in the presence of a covenant, so our construct of interest is NCCs (noncompete constraints) or the combination of the existence and enforcement of noncompetes. We expect that NCCs increase the likelihood and length of employment gaps. Consider an executive who is interested in an external CEO position but has signed a noncompete in a state with high enforceability (e.g., Florida after 1997). This executive can avoid penalties for violation by finding a CEO position at a firm that does not compete with his or her current employer or by resigning and waiting the required period for the noncompete to expire. In the former case, the executive may not experience an employment gap. In the latter case, a gap is certain. Alternatively, an executive who is not constrained (i.e., who has not signed a noncompete or signed in a state with no enforcement, like California) faces these same options plus the additional possibility of immediately taking a job at any competitor. Given each executive can choose from a menu of options, it is not obvious how NCCs will affect employment gaps in equilibrium. Nevertheless, we expect that the expanded choice set in the absence of NCCs results in a smaller likelihood of experiencing an employment gap.

Conditional upon changing firms, we expect that NCCs will increase the average time it takes for an executive to start a new CEO position. After all, relative to executives who are not constrained, those with NCCs face a more limited set of employment options. We do not view the predictions on the relation between NCCs and the existence and length of employment gaps as having sufficient tension to justify formal hypotheses. We use these arguments to motivate an interactive effect (see below).

Under the optimal contracting view of executive compensation, firms compete for managerial talent in a competitive labor market, resulting in large compensation packages for high quality executives perceived to have the right skills. Murphy and Zábojník (2004) argue that executive pay depends on the portion of CEO skills that is transferable across firms and industries and that the importance of general skills has increased over time. Custódio, Ferreira, and Matos (2013) provide compelling empirical evidence along these lines. They proxy for managerial skillsets using aspects of lagged employment histories. In particular, generalist CEOs have held more positions and have worked at more firms and industries. That is, generalists have demonstrated both an ability and willingness to change jobs, companies, and industries. The high demand for their skills combined with their revealed preferences suggests generalists can more easily avoid triggering noncompetes (i.e., NCCs are less binding). These arguments lead to the following hypotheses (stated in alternative form):

**H1a:** When faced with NCCs, specialists are more likely than generalists to experience a gap.

**H1b:** When faced with NCCs, specialist employment gaps (when they exist) will be longer than generalist employment gaps.

We acknowledge that, to the extent that NCCs are not binding, results may be insignificant. In addition, to the extent that moral obligations or reputation concerns are at play, executives with non-compete clauses in jurisdictions where enforcement is limited may still experience a gap prior to beginning employment at a new firm. This would bias against finding results consistent with **H1a** and **H1b** as we have included these executives in the no-NCC sample.

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17 Murphy (1999), Murphy (2013), Edmans and Gabaix (2015), among others, survey the executive compensation literature and discuss the optimal contracting view in addition to the rent extraction view.

18 They are also somewhat more likely to have been a prior CEO and worked at a conglomerate.

19 Note that we do not have a prediction for the main effect of generalist/specialist on the existence or magnitude employment gaps.

20 As an example, a California firm, Indymac Bancorp, stated the following in their 2007 Proxy Statement: “Although a non-competition provision could not be included in the employment agreement under applicable law, Mr. Perry
2.2 Consequences of CEO gaps – match quality

The next set of hypotheses focus on the consequences associated with the existence and duration of employment gaps. Note that our predictions are based on equilibrium arguments and, therefore, are not expected to be causal. Furthermore, these predictions do not depend on NCCs or executive type (i.e., generalist and specialist). Instead, we use theories from labor market economics to structure our thinking.

Since the 1930s, labor economists have developed theories on the matching of workers and firms and, relatedly, on unemployment (see Petrongolo and Pissarides, [2001] for a brief history). These theories focus on challenges faced by typical (rank-and-file) workers (see, Mortensen and Pissarides [1999]; Petrongolo and Pissarides [2001] and Rogerson, Shimer, and Wright [2005] for reviews of these models). While modeling assumptions and equilibrium concepts vary across papers, some results are fairly general and likely apply to the executive labor market.

We begin by considering executive transitions without employment gaps vis-à-vis those with gaps. Search-theoretic models of the labor market provide a framework for an executive’s decision to accept an external job offer. Burdett (1978) derives two intuitive results. First, workers have greater reservation wages when employed (say, Y) than when not employed (say, X), such that Y>X. That is, a given worker will accept any offer as great as X when unemployed but will continue to look for a job when employed until an offer emerges that is at least as great as Y. Second, employed workers will reject external offers that are lower than their current wages and accept external offers only if they are (sufficiently) higher than the current wage.\(^{21}\) These results recognizes that he should and does have a moral and ethical obligation to Indymac, its shareholders and its employees not to compete with Indymac within one year after any resignation from his position.

\[^{21}\] Note that, if the cost of job hunting while employed is sufficiently higher relative to the cost when unemployed, workers will not engage in on-the-job search (Burdett [1978]). In the executive labor market, this may be the case for executives for whom anonymity is an important concern.
suggest that executives who transition without an employment gap will receive higher compensation from their new employers relative to those who transition with a gap.

Adopting the hiring firm’s perspective leads to a similar prediction. In a setting where a workers’ productivity at a given firm depends both on their ability and how well their skills match the needs of the firm, Lazear (1986) analytically demonstrates that the best workers are more likely to be raided, resulting in job transitions without an employment gap. Consistent with Lazear’s theory, Hayes and Schaefer (1999) empirically show that firms whose executives are raided for an external CEO position experience, on average, −1.51% abnormal returns (compared to average abnormal returns of 3.82% for firms whose managers die suddenly). Based on these two distinct but consistent views, we hypothesize that:

**H2a:** Externally hired CEOs with gaps have lower compensation than those without gaps.

Search-theoretic models are couched in terms of reservation wages, which the workers earn until retirement or, in the case of models that allow for on-the-job search, until they leave for another job. In these models, workers maximize their expected discounted income; this is equivalent to maximizing expected utility under certain conditions (Rogerson, Shimer, and Wright [2005]). Because what ultimately matters is the utility offered by the new job versus the utility offered by the old one, the expected time-to-turnover is also important (i.e., expected “fit”). Better matches result in longer employment relationships (e.g., a better fit implies a longer time-to-turnover), while poor quality matches end early. Thus, we hypothesize that:

**H2b:** Externally hired CEOs with gaps have shorter time-to-turnover than externally hired CEOs without gaps.

H2a and H2b imply that ex ante compensation and ex post employment duration are positively correlated for raided executives. While the predictions reflect logical interpretations of
existing theories, there are arguments to be made for a negative correlation between ex ante compensation and ex post employment duration. For example, an executive who is being lured to a new firm may expect the new job to be very risky, resulting in a high expectation of turnover in the early learning periods (Jovanovic [1979]). Furthermore, firms are more likely to hire external CEOs when the firms’ performance has been poor (e.g., Fee and Hadlock [2003]). As a result, executives that accept riskier jobs may require higher pay (in the cross-section). In this world, one would expect to find results consistent with H2a but inconsistent with H2b. In addition, to the extent that transitions without a gap (e.g., from raids) leave less opportunity for due diligence on the part of the executive, the resulting matches may be of worse quality leading to insignificant or opposite results.

2.3 Consequences of gap length – match quality

We next turn our attention to the subset of executives with positive gaps. We assume that they were not raided (i.e., that they left their jobs for other reasons) and face the basic problem of searching for a job while unemployed. Intuitively, unemployed workers will turn down job offers when they are sufficiently patient and expect future offers to be better. Simple job search models (e.g., Rogerson, Shimer, and White [2005]) formalize this intuition by showing that an unemployed worker’s reservation wage is negatively (positively) associated with his or her discount rate (discount factor). CEO candidates can be patient (have low discount rates) if they have sufficient liquidity to cover expenses until the right offer arrives. Because we cannot

\[22\] Jones (1988) also derives conditions under which reservation wages are positively associated with unemployment duration.

\[23\] People who become CEOs of large firms likely have a history of high paying jobs. But as Charles A. Jaffe puts it, “it’s not your salary that make you rich, it’s your spending habits.” Indeed, executive extravagance in their personal life has become the subject of recent research (e.g., Davidson, Dey, and Smith [2014, 2015]).
measure executive patience or liquidity directly, we provide the reduced form prediction that reservation wages are positively associated with gaps.

**H3a:** For executives who experience a gap, those with longer gaps will receive higher compensation (a proxy for reservation wage).

Relying on the same reasoning as in H2b we also predict:

**H3b:** For executives who experience a gap, those with longer gaps will have longer time-to-turnover (a proxy for ex post fit).

Broadly speaking, H3a contrasts with empirical findings for rank-and-file employees. As previously mentioned, numerous studies find a negative relation between unemployment duration and subsequent wages. These findings seem to suggest that signaling models are more descriptive than search-theoretic models for rank-and-file markets. As we discussed in the introduction, we expect the opposite to be true in the executive market. To the extent that CEOs are more similar to rank-and-file employees than we expect (e.g., if executives learn about their type over time, skills diminish over time, or there is similar level of information asymmetry in the executive labor market as in the rank-and-file labor market) we could find opposite results. To the extent that CEOs differ from rank-and-file employees on some dimensions, but not others, we might find insignificant results. Furthermore, if employment gaps are entirely driven by noncompetes, we will not find support for H3a and H3b.

Taken together, H2a (H2b) and H3a (H3b) predict a nonmonotonic relationship between employment gaps and compensation (CEO time-to-turnover). Overall, based on raid and search theories, we expect pay (future CEO time-to-turnover) to be highest in when gaps are effectively zero and when gaps are relatively long.

3. Research Design
We test H1a–H3b for a comprehensive sample of external CEOs hired at S&P 1500 firms. (See Section 4 for details of sample construction.) Our tests are parametric or semiparametric and therefore sensitive to outliers. As is typical, we will not know whether these outliers are data errors versus correct but extreme observations. To mitigate the influential observation problem, we winsorize (truncate) all continuous independent (dependent) variables at the 1% and 99% levels.

3.1 The Role of Executive Skillset and Noncompete Constraints – H1a and H1b

Our first two hypotheses focus on the relation between executive skillsets and the existence (H1a) and duration (H1b) of gaps in the presence of NCCs. We estimate the following logistic regression to test the prediction that, in the presence of NCCs, generalists are less likely than specialists to experience gaps (H1a):

\[
\text{Gap Indicator} = \alpha_0 + \alpha_1 \text{Generalist} + \alpha_2 \text{NCC-Generalist} + \alpha_3 \text{NCC-Specialist} + \text{Controls} + \epsilon \, (1)
\]

Section 4 provides detailed descriptions of these variables as well as the underlying data sources, and Appendix A provides formal variable definitions. The dependent variable, \textit{Gap Indicator}, is an indicator variable equal to one if the incoming CEO experiences a period of unemployment (i.e., he or she is unemployed for at least 30 days) before beginning a new position. Even when executives smoothly transition from one job to another, they may incidentally experience a gap.\(^{24}\) Therefore, we define an employment gap as at least 30 days of unemployment. (For robustness, we alter this definition to 60 and 90 days.) We include an indicator variable for whether the executive has a general skillset (Generalist).\(^{25}\) The variable \textit{NCC} is the measure of noncompete enforceability (based on Garmaise [2011]) when an executive likely signed a

\(^{24}\) For example, Kenneth Klein, COO of Mercury Interactive Corp., left his position on December 31, 2003, to become chairman, CEO, and president at Wind River Systems but did not begin his new job until January 5, 2004 (per http://www.bloomberg.com/Researchstocks/private/person.asp?personId=328098&privcapId=58963875).

\(^{25}\) In addition to an indicator variable, Custódio, Ferreira, and Matos (2013) also use a \textit{Generalist} index. We will follow their approach and test robustness using index values for \textit{Generalist}. 
noncompete and zero otherwise (because enforceability only matters with an agreement). For ease of interpretation, NCC enters the model separately for generalists and specialists ($NCC_{\text{Generalist}}$ and $NCC_{\text{Specialist}}$). H1a predicts that NCCs are less binding for generalists than specialists. Hence we expect the coefficient on $NCC_{\text{Generalist}}$ to be smaller than the coefficient on $NCC_{\text{Specialist}}$ (i.e., $\alpha_2 < \alpha_3$). Though not explicitly part of our hypothesis, we also expect that $\alpha_1$ will be negative, while $\alpha_2$ and $\alpha_3$ will be positive.

We are not aware of any prior studies that examine the existence and length of executive employment gaps, but there is a vast empirical literature in labor economics on unemployment spells for rank-and-file employees (e.g., Lancaster [1979]; Nickell [1979]; Meyer [1990]; Lockwood [1991]; Lalive [2008]; also see Devine and Kiefer [1991] for an overview). These studies identify personal and demographic characteristics, demand conditions in the labor market, and the level and duration of unemployment benefits as important factors in determining the existence and length of these gaps. We rely on this literature for control variables. In particular, we control for the age of the executive ($Age$), whether the executive is close to retirement age ($Age > 60$), and the executive’s gender ($Female$). We include year-quarter fixed effects to control for demand conditions in the labor market.26

As we discuss in the introduction, we expect there to be relatively more information available about executives compared to the rank-and-file employees. This is likely to be most pronounced for the CEO. Therefore, we include an indicator variable that captures whether the incoming CEO held a CEO position at the prior employer, $Previous \text{ Position--CEO}$. In addition, we include the performance of the prior employer ($Abnormal \text{ Returns--Prior \text{ Employer}}$), which proxies for both the executive’s quality and the reason behind the employment gap—higher returns

26 Specifically, the fixed effects are generated using the date the new CEO left his/her former public employer.
suggest a better executive and a less “problematic” reason underlying the employment gap. This is, of course, a noisy measure, particularly for lower level executives for whom the correlation between individual effort and firm performance is likely to be low. To account for the variation in the informativeness of this proxy, we interact Abnormal Returns–Prior Employer with Previous Position–CEO.

The inputs to this regression require substantial hand-collection (see Appendices B–F), so exact sample sizes are unknown. Instead we estimate sample sizes. Our starting sample before hand-collection (as detailed in Section 4 and Appendices G and H) is 5,095 new CEO/firm observations (with available data in both Execucomp and CRSP). Our pilot study (noted previously) randomly sampled 50 of these observations and collected key date fields to determine employment type (internal versus external) and gaps before becoming CEO (for external hires). We could classify all 50 observations (54% are external and 46% are internal) and collect gaps for 92.6% of the external hires (25 of 27). This suggests that our total sample of external CEOs with nonmissing employment gaps will be approximately 2,500 observations (5,095 × 54% × 92.6%).

This test also requires a generalist/specialist measure. Custódio, Ferreira, and Matos (2013) find that they can calculate this measure for 85.7% of their Execucomp firm-years. As a result, our estimated sample for H1a is 2,143 (2,500 × 85.7%). Typically, this would be considered a “large” sample resulting in this being a powerful test (e.g., Cohen [1992]).

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27 Given this small number of observations, these estimated sample sizes will contain considerable noise.
28 As detailed in Section 4, we do not expect hand-collection of NCCs and inclusion of control variables to meaningfully affect our sample size.
29 This power discussion is based on “orthodox statistics” as opposed to Bayesian statistical inference. According to Dienes (2011), the orthodox approach is likely inappropriate when a researcher is 1) trying to determine when to stop collecting data, 2) running post hoc comparisons and 3) running multiple tests. While we may exhaust our 2,500 hours of research assistant work before collecting all of our data, we do not anticipate this to be the case. We expect to collect the necessary data for all external hires. To the extent possible, we are committing to our testing procedures ex ante (reducing problems associated with post hoc comparisons and running multiple tests).
Note that H1a is generated using causal arguments. Obviously, the above model (even after adding control variables) is ill-suited for addressing causality. If we had enough random shocks to NCCs (given that generalist versus specialist is predetermined at the time of the shocks), then the case for causation would be stronger. Garmaise (2011) documents that several states (Texas, Florida, and Louisiana) change the strength of their enforcement. He exploits this fact to provide better identification (through the use of firm fixed effects). Our sample covers a substantially longer period than his, allowing for the possibility of more changes. We also report the results using these shocks as instruments. Given that we do not know exactly how many shocks occurred during our window or what proportion of our observations will be affected, we acknowledge this test likely lacks power. We note that our estimated full sample of externally hired CEOs is 2,143 observations, which is a fraction (about 10.2% based on Table 2) of the total sample in Garmaise (2011).

Related to our duration hypothesis (H1b), time to event analysis (i.e., survival analysis) is common in many fields. As far back as Lancaster (1979) and Nickell (1979), labor economists have used a class of hazard models designed for the challenges that unemployment spell data (an example of time-to-event data) presents. This data is typically nonnormal and censored. For example, at the time of the data collection ends, some individuals would not have completed their unemployment spells, resulting in right censoring (Keifer [1988]). Even when the researcher observes complete spells, hazard models are preferable to static models because they incorporate potential duration dependence into the estimation (Keifer [1988], Shumway [2001]).

In the spirit of this literature, we estimate the Cox semiparametric proportional hazard model to test the H1b prediction that NCCs are less binding for generalists (resulting in shorter

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30 These models also allow for inclusion of covariates that change over time, which is crucial for policy analysis but not required for our analysis. Our covariates will be time-constant.
gaps) than for specialists. Our sample contains “complete unemployment spells” for executives—we know the start date and the end date of their employment gaps such that our data is not censored. The dependent variable, *Gap Length*, is the time the executive spends “unemployed” when transitioning between positions. The proportional hazard model relates the explanatory variables to the hazard of the executive exiting the gap (i.e., becoming employed as a CEO). We estimate the model with the same set of independent variables as in Equation (1). Our hypothesis predicts the coefficient on *NCC_Specialist* to be greater than the coefficient on *NCC_Generalist*. We also expect both of these coefficients to be positive and the coefficient on the baseline *Generalist* to be negative.

We estimate this regression for all new CEOs with gaps. Returning to the random sample, of the 25 externally hired CEOs with nonmissing employment gaps, 68% were coded as having gaps (i.e., gaps of more than 30 days). As a result, we expect a sample size of 1,457 observations (2,143 × 68%) for this test. This test is also likely to be quite powerful.

3.2 The Role of Executive Gaps for Match Quality – H2a and H2b

To examine whether externally hired CEOs with employment gaps have lower compensation than those without employment gaps (Hypothesis 2a), we estimate the following regression for a comprehensive sample of external CEO hires:

\[
Total\ Compensation = \alpha_0 + \alpha_1 \text{ Gap Indicator} + Controls + \varepsilon
\]

(2)

The dependent variable, *Total Compensation*, is the sum of salary, bonus, other annual total value of restricted stock granted, total value of stock options granted (using Black-Scholes), long-

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31 The standard hazard model assumes “single-spell data,” which is consistent with the data available from most unemployment surveys (i.e., each person can only be unemployed a single time). In our sample, the same person becomes a new CEO at multiple firms X times (X% of our turnover observations). Excluding these observations has X effect on our tabulated results.

32 Alternatively, we could estimate a Tobit model given that we are primarily interested in how covariates affect duration.
term incentive payouts, and all other compensation from the Execucomp database. We have no strong theoretical reason to either transform (e.g., log) this variable or not, so we present results both ways.\footnote{Some studies that examine the determinants of CEO compensation do not to transform this variable (Core, Holthausen, and Larcker [1999]; Grinstein and Hribar [2004]; Rajgopal, Taylor, and Venkatachalam [2012]; Custódio, Ferreira, and Matos [2013]), while other studies take the log (Core, Guay, and Larcker [2008] and Cadman, Carter, and Hillegeist [2010]).}

Rajgopal, Taylor, and Venkatachalam (2012) find that the properties of first-year pay differ significantly from those of subsequent years and that the cross-sectional variation in first-year pay is largely influenced by the CEO’s reservation wage. Theories of reservation wages assume workers earn their reservation wage until retirement or until they leave for another job. To better align with this notion, we estimate Equation (2) separately for the first and second years of the CEO’s employment. By also testing second-year compensation, we ensure that any results are not strictly driven by one-time items in first-year pay (e.g., signing bonuses or initial stock grants) or partial year employment.

The variable of interest, \textit{Gap Indicator}, is an indicator variable that is equal to one if the executive experiences an employment gap before joining the firm as a CEO and zero otherwise. We expect the coefficient of \textit{Gap Indicator} to be negative, $\alpha_1 < 0$.

It is not immediately clear whether it is appropriate to include any control variables in Equation (2). Including controls that capture managerial ability or search costs eliminates precisely the effects we want to capture with the existence of an employment gap. The challenge we face resembles that of Fee and Hadlock (2003), who examine whether CEO compensation packages at a new employer are driven by stock performance of the prior employer and the value of forfeited compensation. They focus on estimations that include only their variables of interest (i.e., stock performance of the prior employer and the value of forfeited compensation). They then estimate
an alternate model with a parsimonious set of control variables (CEO age and a time trend) for completeness. We follow a similar strategy.

We start by estimating a regression where the only independent variable is the variable of interest, *Gap Indicator*. Next, we estimate a second specification where we include control variables that, in the context of labor market models we use as a framework, could lead to cross-sectional variation in CEO compensation. Mortensen and Pissarides (1999) argue that search and matching frictions generate match-specific rents and that wages divide these rents between the employee and the employer. For example, certain governance structures may give the CEO greater bargaining power, allowing him or her to extract a greater proportion of these rents from the firm. Therefore, similar to studies that take into account the “managerial power” view of executive compensation, we include a number of control variables that capture the governance of the firm. In particular, we control for *CEO-Chair Duality, Board Size, % Outside Directors, Blockholder Indicator, and % Institutional Ownership*. (See Core, Holthausen, and Larcker [1999]; Grinstein and Hribar [2004]; Rajgopal, Taylor, and Venkatachalam [2012]).\(^{34}\) In this expanded specification, we also control for performance of the prior employer (*Abnormal Returns–Prior Employer*) given its positive association with first-year compensation at the new employer (Fee and Hadlock [2003]). Macroeconomic conditions (e.g., overall growth in the economy, merger and acquisition waves, IPO waves, etc.) may result in supply/demand fluctuations for CEOs, which, in turn, affect CEO compensation. We include year-quarter fixed effects (as described above) to capture these effects.

\(^{34}\) One concern that is not unique to our study is that these variables, rather than proxying for the effectiveness of governance, proxy for CEO quality or the complexity of the CEO’s job. If this is the case, including the governance structure variables as controls will remove (at least) some of the effect we intend to capture with our variable of interest.
Studies of executive compensation typically control for the economic determinants of total pay when examining the relation between total compensation and the variable of interest (e.g., governance characteristics in Core, Holthausen, and Larcker [1999]; compensation consultants in Cadman, Carter, and Hillegeist [2010] and Armstrong, Ittner, and Larcker [2012]; talent agents in Rajgopal, Taylor, and Venkatachalam [2012]). The list of variables typically includes firm size \( \text{Log}(Sales) \), investment opportunities \( \text{Book-to-Market} \), performance \( \text{Return on Assets and Abnormal Returns-Current Firm} \), and firm risk \( \text{Standard Deviation–ROA and Standard Deviation-Returns} \). We believe that, in our context, controlling for the economic determinants of compensation should remove much of the effect of interest, so we tabulate (but not interpret) a specification that includes these variables.

The primary data constraint for this test is the ability to measure the gap for externally hired CEOs. (We do not need measures of generalist/specialist, and we do not need to measure NCCs.) As a result, we expect a sample size of approximately 2,500 observations \( (5,095 \times 54\% \times 92.6\%) \).

We next examine whether externally hired CEOs with gaps experience shorter ex post employment duration than externally hired CEOs without gaps (Hypothesis 2b). Our analysis of employment duration is related to CEO turnover literature. (See Murphy [1999] for an overview.) These studies often focus on the firm performance-CEO turnover relation and the factors that affect this relation (e.g., monitoring by the board or institutional shareholders). While this literature has traditionally relied on logistic and multinomial logistic models (Weisbach [1988]; Parrino [1997]; Huson, Parrino, and Starks [2001]), a number of more recent studies use hazard models (Campbell, Gallmeyer, Johnson, Rutherford, and Stanley [2011]; Hazarika, Karpoff, and Nahata [2012]; Jenter and Kanaan [2015]). Similar to these more recent studies, and as in our tests of H1b (\textit{Gap Length}), we employ the Cox semiparametric proportional hazard model in our estimation. The dependent
variable, *Time-to-Turnover*, is the length of time that the executive spends employed as the CEO of the new firm. In this analysis, our data is right censored because the CEOs in office at the end of our sample period have not yet left their positions.

Studies of CEO turnover try to distinguish between voluntary and forced turnover, either focusing solely on forced turnover or estimating separate hazard functions for each. Because we are interested in match quality, we want to identify both forced and voluntary turnover events that indicate poor firm-CEO matches. We identify turnover reasons representing both forced and voluntary–poor match quality based on the process described in Parrino (1997), Huson, Parrino, and Starks (2001), and Hazarika, Karpoff, and Nahata (2012). We outline the process for this partition in detail in Section 4. All other turnover events not classified as resulting from a bad match (e.g., death, merger or acquisition, or planned retirement) are treated as censored observations. In addition to estimating a hazard model where we combine forced and voluntary–poor match departures, we use competing-risks hazard models to estimate separate coefficients for forced and voluntary–poor match departures.

The variable of interest in the duration of employment models is *Gap Indicator*, an indicator variable that is equal to one if the executive experiences a gap before appointment to the CEO position. We expect the coefficient of this variable to be negative. The hazard models include control variables for the CEO’s demographic characteristics (*Age, Female*), governance structure of the firm at the time the executive began as CEO (*CEO-Chair Duality, Board Size, % Outside Directors, Blockholder, and % Institutional Ownership*), and the performance of the firm over the 12-months preceding the executive’s appointment to the CEO position (*Past Abnormal Returns-Current Firm*). Controlling for prior performance controls for systematic differences in time-to-turnover for CEOs that join firms after a period of poor performance, and, relatedly, for the
possibility of greater match uncertainty after a turbulent period. We control for the governance structure because we expect firms with better monitoring to dismiss poor matches earlier.

In addition to the hazard models above, following Allgood and Farrell (2003), we estimate a multinomial logit model with three possible outcomes: good match (the duration of employment is three years or longer), bad match (the duration of employment is less than three years) that ends with forced turnover, and bad match that ends with voluntary turnover due to poor match quality.

The estimated sample size for this specification matches that for H2a (approximately 2,500 observations). This test includes all observations with a gap. The primary data constraint for this test is the ability to measure gap for externally hired CEOs. (We do not need measures of generalist/specialist and we do not need to measure NCCs.) As a result, we expect a sample size of approximately 2,500 observations (5,095 × 54% × 92.6%); 68% were coded as having employment gaps (i.e., gaps of more than 30 days). We thus expect a sample size of 1,457 observations (2,143 × 68%) for this tests. This test is likely to be quite powerful.

3.3 The Role of Executive Gap Length for Match Quality – H3a and H3b

Tests of H3a and H3b closely follow the tests of H2a and H2b, but several important differences are worth highlighting. First, both H3a and H3b are about gap length (\( \text{Gap Length} \)), as opposed to the existence of a gap (\( \text{Gap Indicator} \)). Typically, one expects predictions related to existence to match predictions related to duration. For example, when examining wages and education, people who enrolled in college make more than those who did not, while people who graduated from college make more than those that simply enrolled.\(^{35}\) Our predictions do not follow this example. We expect the best matches for people who either have no gap or have a relatively long gap. As a result, the predicted signs on \( \text{Gap Length} \) (in H3a and H3b) are opposite of the

\(^{35}\) https://www.census.gov/hhes/www/income/data/earnings/call1usboth.html
predicted signs on *Gap Indicator* (in H2a and H2b). Second, the sample sizes for testing H3a and H3b are smaller, because we exclude executives without a gap from these models. Finally, when we log the dependent variable (as a robustness test), we also log the independent variable of interest (*Gap Length*).

Both of these models estimated for all observations with gaps. We expect this to be the case for approximately 68% of the observations used to estimate H2a and H2b, leading to an expected sample of approximately 1,700 observations (2,500 × 68%).

**4. Data Gathering Methods**

**4.1 Data gathering investments**

Per our understanding, the REP process is specifically designed to “Encourage Investment” and “Enhance Reliability.” This section and the relevant appendices detail our investment. In our opinion, reliability is enhanced by reducing perverse incentives (e.g., not violating the revelation principle), ex ante commitments, and ex post transparency. We think the perverse incentive problem is largely mitigated by editorial commitments (i.e., publication is not impacted by reported results). Given the nature of this project, we mitigate potential problems by committing to ex post transparency. Specifically, we provide data-gathering procedures, references to source documents for hand-collected data, executed programming code (SAS, Stata, and Python), and (delayed) public access to our final datasets (subject to user agreements). This commitment ensures that an interested reader can replicate our findings and allows for discussion of the type of assumptions frequently omitted in published papers.

To conduct the empirical analyses we describe in Section 3, we construct a comprehensive sample of external CEO hires at firms in Execucomp from 1992–2014.36 The first step in this

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36 The Execucomp database covers the S&P 1500, companies removed from the index that are still trading, and some client requests. Data collection on the S&P 1500 began in 1994, and data before 1994 is mostly for the S&P 500.
process is identifying all CEO transitions at S&P 1500 firms. To this end, we start with executives in Execucomp who became a CEO in or after 1992, relying on the \textit{BECAMECEO} variable. We refer to this variable as \textit{E\_Becameceo}, where the prefix \textit{E\_} refers to Execucomp.\textsuperscript{37} We then require the CEO’s new employer to be in the CRSP database as of the \textit{E\_Becameceo} date, resulting in 5,095 CEO successions. (See Appendix H for brief verbal summaries of the relevant SAS programs and Appendix I for the .log files.)

The second step is isolating external hires, the focus of our study. Below we discuss the classification of succession types, the key variables, and provide detailed information on the required hand-collection. The key variables are \textit{Gap Indicator} (source: hand-collect), \textit{Gap Length} (source: hand-collect), \textit{NCC} (source: hand-collect), \textit{Generalist/Specialist} (source: BoardEx), \textit{CEO Total Compensation} (source: Execucomp), and \textit{Time-to-Turnover} (source: hand-collect). Appendix A presents the descriptions of all the variables we use (including control variables) and their sources.

Given the substantial amount of hand-collection required, we collected the data in random order to ensure the scientific validity of our sample in the event we were not able to collect the date for the entire population. While we were able to make estimates of the time required for data collection, some uncertainty was unavoidable. For example, one task is determining whether a specific person (or company) has a noncompete agreement or a noncompete clause as part of a different agreement (e.g., an employment, severance, or merger), which we collectively refer to as

\textsuperscript{37} \textit{E\_Becameceo} is well populated in Execucomp. Only 3.5\% of the CEO observations (based on the annual CEO flag, \textit{CEOANN}) have missing values for this variable. Our preliminary assessment of machine-readable data, which we outline in this section, assumes that \textit{E\_Becameceo} is accurate when not missing. While conducting our pilot sample hand-collection, we have seen numerous examples where this date is not accurately captured. Nevertheless, for the purposes of evaluating available machine-readable data from the perspective of someone focusing on avoiding hand-collection, we take this variable as is. As we outline below, for our sample, we plan to hand-check all \textit{E\_Becameceo} dates.
If we only consider agreements filed on EDGAR, a first step would be to download the EDGAR universe (possibly excluding some filing types, like Form 4s) and extract the portions of text that contain key words related to noncompetes. Until we wrote and ran the programs, we had no way to determine how many documents (and paragraphs) would be flagged.

4.2 Succession types and employment gaps

Given there is no prior research on executive gaps, we begin with a brief discussion of four high profile CEOs we have chosen as examples to illustrate succession types and gaps: Jamie Dimon (Bank One and JPMorgan Chase), James Kilts (Nabisco and Gillette), Marissa Mayer (Yahoo) and Meg Whitman (eBay and Hewlett Packard). For parsimony, we provide the most details for Jamie Dimon’s appointment at Bank One. These examples are from very large firms and should not be viewed as representing the population of CEOs. Also, these examples are meant only to illustrate and not to support or refute any hypotheses.

With respect to succession type, we view cases where the executive has been with the company for more than two years before becoming CEO as internal. We consider executives who first start with a company as its CEO as well as executives who join the company as part of a succession plan, whereby their early employment overlaps with the existing CEO, as external hires. The latter group is often referred to in the literature as “heir apparent” (see Vancil [1987]).

Thus, identifying external successions, our sample of interest, requires us to observe the date the

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38 Researchers typically proxy for this arrangement in one of two ways. The first method is based on how long the executive was at the firm before being promoted to CEO (Allgood and Farrell [2003]). Alternatively, researchers use executive titles to identify heirs (Berry, Bizjak, Lemmon, and Naveen [2006]). This method follows the discussion in Vancil (1987), arguing that an “heir apparent” is typically appointed to the president or COO position before becoming CEO. We propose to combine these methods and classify someone as an external heir if he or she (i) started working for the company within a year of becoming CEO or (ii) started working for the company as a president/COO within two years of becoming CEO. To ensure method (ii) is accurately implemented, we will hand-collect starting titles for anyone who joined the firm between one and two years of becoming CEO. Given that we have not collected this data yet, our programs classify anyone hired within two years of becoming CEO as “external,” likely resulting in minor overstatement of the number of external hires.
executive joined the company and the date the CEO appointment became effective. We then must determine when the new CEO left his or her former employer and compare it to the date he or she joined the firm to calculate the length of the gap.

Table 1 summarizes the key dates, succession types, and gap length for Jamie Dimon, James Kilts, Marissa Mayer, and Meg Whitman. In the case of Jamie Dimon, public documents indicate that he left Citigroup on Nov. 2, 1998\(^{39}\), became the CEO of Bank One on March 27, 2000,\(^{40}\) and did not work at another public firm between the two. That is, he was not employed as an executive for a public company for approximately 1.40 years (\textit{Gap Length}=1.40). JP Morgan Chase and Bank One merged on July 1, 2004.\(^{41}\) When the companies combined, Dimon became the president and chief operating officer of the merged entity. His employment agreement with JP Morgan Chase (dated Jan. 14, 2004—before the completion of the merger) makes it clear that he was expected to become CEO (satisfying Vancil’s notion of an “heir”).\(^{42}\) A year and a half later, he became CEO.\(^{43}\)

Our second example is James Kilts. On March 24, 1997, he resigned his position (Executive Vice President, Worldwide Food) at Philip Morris (now Altria Group). On Jan.1, 1998, he joined RJR Nabisco as its CEO. He was an external hire with a gap of approximately 0.78 years. In 1999, RJR Nabisco spun off its tobacco business and became Nabisco Holdings Corp. On Oct. 20, 1999, Nabisco Group Holdings Corp, announced that Kilts would become its new CEO.

\(^{39}\) http://www.sec.gov/Archives/edgar/data/831001/0001047469-99-008885.txt  
\(^{40}\) http://www.sec.gov/Archives/edgar/data/1067092/000095013100002400/0000950131-00-002400-d2.pdf  
\(^{41}\) http://www.sec.gov/Archives/edgar/data/19617/000119312504112906/d8k.htm  
\(^{42}\) “(i) During the Initial Period, the Executive shall serve as the President and Chief Operating Officer of the Company, and, during the Second Period, the Executive shall serve as the President and Chief Executive Officer of the Company”; http://www.sec.gov/Archives/edgar/data/19617/000095012304002100/v93326exv10w1.htm  
\(^{43}\) This example highlights the potential importance of business combinations. When equals merge, we will eliminate these observations (Wulf [2004]). In situations where a larger firm and smaller firm combine, we will keep the observation only if the CEO of the smaller firm becomes the CEO of the merged entity, and we will consider that person to be an external hire (e.g., Jamie Dimon becoming CEO of JPMorgan Chase).
(effective Jan. 1, 2000) while remaining the CEO of Nabisco Holdings. From an executive turnover perceptive, this is akin to an internal hire, and we exclude this type of (primarily) technical employment status change. On June 26, 2000, Philip Morris announced that it was acquiring Nabisco Holdings, and Kilts was not offered a job at Philip Morris. The acquisition was completed on Dec. 11, 2000. On Jan. 22, 2001, Gillette announced Kilts would be its new CEO, starting on Feb. 12, 2001 (per Dow Jones Business News). Kilts was an external hire for Gillette, and his gap was two months (approximately 0.17 years). In total, Kilts has had three separate CEO appointments, two of which are external appointments and therefore relevant to our study.

Our third example is Marissa Mayer, who became CEO of Yahoo effective July 17, 2012 (announced on July 16, 2012). This release also served as notice of her resignation as Google’s vice president, local, maps & location services. She was an external hire with no gap.

Our final example is Margaret “Meg” Whitman, who was a top five executive at Stride Right, eBay, and Hewlett-Packard (HP). Her first transition was to leave Stride Rite and join eBay as its CEO. However, this occurred while eBay was still a private firm. Since accurate dates and compensation details are not available for private companies, we exclude these types of observations for the sample. She then left eBay (after it became public), effective March 31, 2008. After leaving eBay, Whitman joined the board of HP (effective Jan. 21, 2011) and subsequently became the CEO of HP (effective Sept. 22, 2011). Her gap before becoming an employee of HP (i.e., CEO) was almost 3.5 years. While she was not an executive at a public company for this extended period, she was active. Most notably, she announced her candidacy for governor of California in February 2009. She won the Republican primary but lost the general election (on Nov. 2, 2010).

44 http://www.wsj.com/articles/SB96195174440823793
45 Factiva document number: Document djon00020010711dx1m009jm
These examples highlight the key information we need to determine succession types and calculate gap length. To assess the extent of “enhanced investment” required to complete this project, we hand-collected this key information for the pilot study of 50 CEOs (from the sample of 5,095 CEO successions over the 1992–2014 period) and compared it to information from three machine-readable databases: Execucomp, BoardEx, and Thomson Financial. The details of this pilot study are provided in Appendix B.

The majority of papers on executive compensation and turnover rely exclusively on Execucomp. Several recent studies supplement (or replace) Execucomp with the BoardEx database (e.g., Custódio, Ferreira, and Matos [2013]). While less typically used, Rogers and Van Buskirk (2009) demonstrate that (at least in some cases) executive turnover can be inferred from Thomson Financial insider trading database. Ignoring their result would likely understate the value of common databases and overstate the need for hand-collection. To conservatively estimate the need for hand-collection, we used Thomson to develop proxies for when an executive started with and left public companies. Because not all executives are required to file insider trading reports and are certainly not required to trade on the day they start working for a new firm or the day they leave an old firm, these dates are noisy proxies.

Two key takeaways emerge from the analysis of the 50 random cases of CEO succession. First, Execucomp, BoardEx, and Thomson often lack the key information to classify succession types into internal and external. Second, the machine-readable databases perform even worse when it comes to identifying gaps for external successions. Not only do the databases lack the key information to determine the gap in a significant fraction of external successions (40%–88%)

46 On p. 152 the authors state: “To validate this procedure, [they] compare the insider trading inferred turnover to turnover based on the Execucomp data for firms with sufficient data in both Execucomp and the insider trading database. The comparison indicates that the two procedures agree approximately 94% of the time.”

47 Only officers, directors, and beneficial owners of more than 10% are required to file with the SEC.
depending on the database), but they also introduce measurement error by classifying executives incorrectly as having a gap when they do not and vice versa.\footnote{Our study is not the first to document problems with the machine-readable databases that collect data from proxy statements. For example, Cadman, Campbell, and Klasa (2015) find errors and omissions related to severance agreement details in Execucomp relative to their hand-collected data. Furthermore, a key source of the problems they note is when information must be extracted from text rather than tabular formats (i.e., the data in Execucomp deteriorates markedly when the vendor must extract information from text, which is exactly where our information on dates of employment is likely to be found).} Of course, given the small sample size, it is difficult to arrive at firm conclusions with respect to measurement error.

Overall, our analysis of the 50 random cases as well as the systematic overview of machine-readable databases underscore the importance of hand-collection for both succession type and for the existence and length of gaps. We therefore proceed as follows. For each observation, we hand-collect succession type unless at least two machine-readable databases indicate that the succession type is internal (in which case we automatically exclude the observation from our sample). If the succession type is external, (i) we verify the date the executive became the CEO, (ii) hand-collect the date the executive joined the company, and (iii) hand-collect the date the executive left his or her prior company. Finally, because during the required hand-collection we have to read relevant proxy statements, we also collect information about the executives’ activities during their gap, when disclosed.

4.3 Noncompete constraints (NCC)

An ideal measure of NCCs would reflect (i) whether a specific executive has signed a noncompete agreement and (ii) the degree to which the terms of that agreement can be enforced. When we think a noncompete likely exists, our NCC variable captures the state-level enforceability of such agreements. When we fail to find evidence of such an agreement, our NCC variable is set to zero.
As discussed in Appendix D, we believe it is not possible to accurately assess whether an executive who joins a given firm as a CEO or an external heir signed a noncompete with his or her prior firm. The two main problems that arise are 1) firms do not always provide individual contracts (employment agreements, severance agreements, etc.) even for CEOs and 2) the majority of our sample is likely to come from non-CEO positions. As a result, we proxy for whether a new CEO had previously signed a noncompete using whether his or her prior employer uses noncompetes in any employment or severance agreements for any employee. To determine whether a company uses the agreements, we download all relevant EDGAR documents and use Python to identify likely agreements and potentially relevant subsections of these agreements. We then read the subsections to determine whether the company actually uses these covenants. (A more complete description is available in Appendix D.)

There is substantial variation across states in the enforceability of noncompetes. At one extreme is California, where no aspects of noncompetes are enforceable (Bishara, Martin, and Thomas [2015]). At the opposite extreme is Florida (since 1997). To capture this variation in enforceability, we use the index developed by Garmaise (2011). Garmaise published summary scores by state and year for 1992–2004. To ensure we could comply with conference deadlines, we hired three law student research assistants to extend this index to cover 1980–2013. We note this window includes years preceding Execucomp, which we use as a starting point to create our

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49 Custódio, Ferreira, and Matos (2013) investigate have a sample of 21,909 CEO-firm-years. For this pooled sample, they report that 35.4% of these observations are for individuals with CEO experience.

50 Despite the lack of enforcement, about 65% of contracts for CEOs in California still contain noncompetes (Bishara, Martin, and Thomas [2015]). Similarly, descriptive statistics provided by Kaplan and Strömberg (2003) suggest that approximately 60% of contracts between entrepreneurs (in California) and venture capitalists contain noncompetes.

51 Professor Garmaise has graciously shared the answers to the individual questions that provided the basis for the index. This should greatly enhance to accuracy and consistency of our collection efforts. We would have to get permission from Professor Garmaise before any public distribution of these details.
sample. We decided on this large window to minimize the chances that we would need to recollect this data (details in Appendix E).

To apply this index to new CEOs, we also must determine the location of their prior employer’s headquarters. Compustat and BoardEx only include the current state and backfill prior observations with current state information. In Garmaise’s sample, about 5% of firms move their headquarters. As a result, we use the addresses from SEC filings (specifically insider filings in Thomson) to determine whether and when a firm relocated its headquarters.

Returning to the example of Jamie Dimon, non-EDGAR sources indicate that he signed a separation agreement, which contained noncompete clauses, with Citibank. Unfortunately, we could not find a copy of this agreement on EDGAR, but we did find reference to it in the Citigroup proxy statement (DEF 14A) dated March 8, 1999. This reference did not explicitly mention noncompetes (as defined by Garmaise [2011]). In this same proxy statement, Citigroup does reference a “noncompetition agreement” for its subsequent CEO (Sanford Weill).52 Based on this observation, we conclude that Dimon was also likely to have had a noncompete and set the value of NCC equal to three—the enforceability index score of New York in 1999, where Citigroup is headquartered, per Garmaise (2011). Note that, while Bank One (CRSP SICCD=6172 HSICCD=6021 as of Oct. 30, 1998) and Citigroup are both financial services firms (CRSP SICCD=6331 HSICCD=6211 as of Oct. 30, 1998), they are not in the same two-digit SIC code, and they are not competitors based on Hoberg and Phillips (2010 and 2015) classification scheme.53 We document whether new CEOs came from competitors (for descriptive purposes only).

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52 “During such period of continuing payments and stock option vesting and exercise, Mr. Weill would be subject to a noncompetition agreement in favor of the Company.”
4.4 Generalist/Specialist measure

Economists have been interested in general versus specific skill investment for decades (e.g., Becker [1962]). As discussed in the research design section, several of our tests rely on measuring whether a new CEO is more of a generalist or a specialist. We capture this construct using the procedures summarized in Custódio, Ferreira, and Matos (2013).

The measure used by Custódio, Ferreira, and Matos (2013) incorporates five aspects of a CEO’s “professional career.” We to estimate the variable similarly using machine-readable data and an indicator variable (Generalist). The estimation of this variable is detailed in Appendix G.

4.5 CEO total compensation

The testing of hypotheses 2a and 3a requires us to measure Total Compensation for the first and second year of the CEO’s employment. As has become standard in the literature, we define Total Compensation as the sum of salary, bonus, other annual total value of restricted stock granted, total value of stock options granted (using Black-Scholes), long-term incentive payouts, and all other total from the Execucomp database.

4.6 CEO time-to-turnover and reason for CEO departure

The testing of hypotheses 2b and 3b requires us to determine how long the CEO stayed with the hiring firm and, in the case of turnover, the reason for the departure. Execucomp serves as our starting point to identify potential turnover events (i.e., cases where a different executive becomes the CEO). We then search SEC filings and press releases/business press articles to verify turnover event.

We include all turnover events in our analyses, though our focus is on those suggesting a poor firm-executive match (i.e., forced turnovers, which we assume stem from poor matches, and voluntary turnovers that indicate a poor match). We identify these departures based on the process
used in Parrino (1997), Huson et al. (2001), and Hazarika et al. (2012). Specifically, we identify forced turnovers if the CEO is fired, forced from the position, or departed due to policy differences. We also classify departures as forced turnovers if the (i) the departing CEO is under the age of 60 and the reason for the departure is not listed as involving death, poor health, or the acceptance of another position (i.e., a board membership within the firm or a full time executive position elsewhere or within the firm); or (ii) the departing CEO is under the age of 60 and announcement is fewer than six months before the succession. We classify turnover events as voluntary-poor match if the departing CEO takes a comparable position elsewhere (i.e., a full time executive position at a different public firm) or departs for previously undisclosed personal or business reasons that are unrelated to the firm’s activities. All other turnover events are treated as censored and are assumed to be for reasons other than a poor firm-executive match.

5. Results

5.1 Descriptive evidence

5.2 Determinants of CEO gaps

5.3 Consequences of CEO gaps – match quality

5.4 Consequences of CEO gap length – match quality
Appendix A: Variable Definitions

Dependent Variables

Gap Indicator = an indicator variable equal to one if the executive has a gap between the last day of employment at the prior firm and first day of employment at the current firm, zero otherwise. We define a gap as at least 30 days between the last day of employment at the prior firm and the first day of employment at the current firm (source: hand-collect).

Gap Length = the years between the last day of employment at the prior firm and the first day of employment at the new firm (i.e., the number of days divided by 365) (source: hand-collect).

Total Compensation = the sum of salary, bonus, other annual total value of restricted stock granted, total value of stock option granted (using Black-Scholes), long-term incentive payouts, and all other total compensation. We measure Total Compensation alternatively in the first and second year of employment as CEO in the current firm (source: TDC1 variable in Execucomp).

Time-to-Turnover = the years that the executive spends employed as the CEO of the new firm (i.e., the number of days divided by 365), (source: hand-collect).

Independent Variables

Generalist = an indicator variable equal to one if the executive has a general skillset per Custódio, Ferreira, and Matos (2013), and zero otherwise. Section 4 and Appendix G provide further details about this variable (source: BoardEx).

NCC_Signed = an indicator variable equal to one if the executive is likely to have signed a noncompete, zero otherwise (source: hand-collect).

NCC = the measure of noncompete enforceability (based on Garmaise [2011]) when an executive is likely to have signed a noncompete, zero otherwise (source: hand-collect).

NCC_Generalist = the measure of noncompete enforceability (based on Garmaise [2011]) when a generalist executive (Generalist=1) is likely to have signed a noncompete, zero otherwise. Section 4 and Appendix G provide
further details on the construction of this variable (source: hand-collect).

\[ \text{NCC\_Specialist} \]

= the measure of noncompete enforceability (based on Garmaise [2011]) when a specialist executive (Generalist=0) likely to have signed a noncompete, and zero otherwise. Section 4 and Appendix G provide further details about the construction of this variable (source: hand-collect).

\[ \text{Age} \]

= the age of the executive. In tests of H1a and H1b, we measure \( \text{Age} \) at the beginning of the executive’s gap. In tests of H2 and H3, we measure \( \text{Age} \) at the time the executive joins the firm as a CEO (source: Execucomp and BoardEx; hand-collect when not available on either).

\[ \text{Age}>60 \]

= an indicator variable equal to one if \( \text{Age} \) is greater than 60, zero otherwise (source: Execucomp and BoardEx; hand-collect when not available on either).

\[ \text{Female} \]

= an indicator variable equal to one if the executive is a female, zero otherwise (source: Execucomp and BoardEx; hand-collect when not available on either).

\[ \text{Previous Position–CEO} \]

= an indicator variable equal to one if the executive was the CEO at their prior firm, zero otherwise (source: Execucomp and BoardEx; hand-collect when not available on either).

\[ \text{Abnormal Returns–Prior Firm} \]

= abnormal returns of the prior employer. We define abnormal returns as the size- and book-to-market adjusted buy-and-hold returns over a 12-month performance period preceding the departure of the employee. As a robustness, following Fee and Hadlock (2003), we will use a 60-month period to measure buy-and-hold returns (source: CRSP and Compustat).

\[ \text{Abnormal Returns–Current Firm} \]

= abnormal returns of the current employer. We define abnormal returns as the size- and book-to-market adjusted buy-and-hold returns over the relevant fiscal year (source: CRSP and Compustat).

\[ \text{Past Abnormal Returns–Current Firm} \]

= abnormal returns of the current employer prior to the CEO’s tenure. We define abnormal returns as the size- and book-to-market adjusted buy-and-hold returns over a 12-month performance measurement period preceding the executive joining the firm as the CEO (source: CRSP and Compustat).

\[ \text{CEO-Chair Duality} \]

= an indicator variable equal to one if the CEO is also the Chair of the Board of Directors in the CEO’s first
year of employment, zero otherwise (source: ISS Directors Database).

**Board Size**

= number of individuals on the Board of Directors in the CEO’s first year of employment (source: ISS Directors Database).

**% Outside Directors**

= percent of independent directors on the Board of Directors in the CEO’s first year of employment (source: ISS Directors Database).

**Blockholder Indicator**

= an indicator variable equal to one if the firm has at least one institutional investor with at least 5% ownership in the CEO’s first year of employment (source: Thomson Reuters).

**% Institutional Ownership**

= the percent of equity owned by institutions based on 13-F filings in the CEO’s first year of employment (source: Thomson Reuters).

**Log(Sales)**

= natural logarithm of the firm’s sales (Compustat item sale) in the relevant fiscal year (source: Compustat).

**Book-to-Market**

= book value of assets (Compustat item at) divided by the sum of book value of liabilities (Compustat item at less Compustat item ceq) and market value of equity (Compustat item prcc_f multiplied by Compustat item csho) in the relevant fiscal year (source: Compustat).

**Return on Assets**

= operating income before depreciation (Compustat data item oibdp) scaled by average total assets in the relevant fiscal year (source: Compustat).

**Standard Deviation–ROA**

= standard deviation of Return on Assets over the five fiscal years preceding the CEO’s first year of employment (source: Compustat).

**Standard Deviation–Returns**

= standard deviation of Abnormal Returns–Current Firm over the over the five fiscal years preceding the CEO’s first year of employment (source: CRSP).
Appendix B – Pilot Study

To assess the extent of “enhanced investment” required to complete this project, we hand-collected this key information for a random sample of 50 CEOs (from the sample of 5,095 CEO successions over the 1992–2014 period) and compared it to information from three machine-readable databases: Execucomp, BoardEx, and Thomson Financial.

To determine succession types, we must compare the date the executive became the CEO to the date he or she joined the firm. Execucomp is the only database that explicitly tracks the date an executive became CEO (E_Becameceo). Therefore, when identifying succession types per different machine-readable databases, we rely on E_Becameceo. We then use the date the executive joined the firm and, when the date executive joined the firm is not available, the date the executive left his or her prior firm from each database (Execucomp, Boardex, and Thomson) to classify succession types.

For Execucomp, E_Joined_Co and E_Prior_Leftco capture the date the executive joined the company and the date the executive left his or her prior company, respectively (E_ denotes Execucomp). To determine succession types based on Execucomp, we classify a CEO as external if E_Becameceo – E_Joined_Co is less than (or equal) to two years. When E_Joined_Co is missing, we classify a CEO as external if E_Becameceo – E_Prior_Leftco is less than (or equal) to two years.54 If we do not observe when a CEO joins the company and do not observe employment at another public firm within two years of becoming the CEO, we cannot classify the employment type (“N/A”).

In the case of BoardEx, B_Starting_Date_Company and B_Prior_End_Date are the dates the executive joined the company and left his or her prior company, respectively (B_ denotes BoardEx). We compare B_Starting_Date_Company (B_Prior_End_Date when B_Starting_Date_Company is not available) to E_Becameceo to determine succession types based on BoardEx.

Finally, for Thomson, we rely on the first transaction date at the company (T_First_Trandate_Company) and, when the first transaction date at the company is not available, the last transaction date at the previous company (T_Last_Trandate_Prior_Company). Table B1 presents the comparison of succession-type classifications based on hand-collected data to those based on machine-readable data. (See Appendix H for brief verbal summaries of the relevant SAS programs and Appendix I for the .log files).

<table>
<thead>
<tr>
<th>Source</th>
<th>Succession Type</th>
<th>Hand-collected = External (N=27)</th>
<th>Hand-collected = Internal (N=23)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>External</td>
<td>Internal</td>
<td>N/A</td>
</tr>
<tr>
<td>Execucomp</td>
<td>10</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>BoardEx</td>
<td>14</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Thomson</td>
<td>19</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

54 While this second step of classifying executives as “external” is accurate as long as these public executive positions are mutually exclusive (i.e., they are full-time jobs), it would cause a downward bias in gaps (because it requires a gap of less than two years by construction and does not account for the fact that the executive may have joined the new firm early to aid in a smooth transition).
Contrary to what one might expect, the hand-collected data suggest that external CEO succession is somewhat more common than internal—27 out of the 50 CEO successions are external (54%).\textsuperscript{55} Execucomp classifies 20% of observations as external ((10+0)/50) and 26% as internal ((1+12)/50), with succession type undetermined (denoted as “N/A”) for 54% ((16+11)/50) of the cases. Using BoardEx data results in 30% (16%) external (internal) succession, with 54% undetermined. Somewhat surprisingly, the Thomson insider-trading database correctly identifies the most matches (36 out of 50).

For 25 of the 27 external hires, we could calculate a gap using public sources. Eight (32%) of these executives do not have a gap before joining the firm as a CEO while 17 (68%) do. Table B2 provides information about how the machine-readable databases classify the gap for external successions:

<table>
<thead>
<tr>
<th>Source</th>
<th>Hand-collected – External</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Gap (N=8)</td>
</tr>
<tr>
<td></td>
<td>No Gap</td>
</tr>
<tr>
<td>Execucomp</td>
<td>1</td>
</tr>
<tr>
<td>BoardEx</td>
<td>3</td>
</tr>
<tr>
<td>Thomson</td>
<td>1</td>
</tr>
</tbody>
</table>

It takes more (nonmissing) data to calculate gaps than it does to determine succession type.\textsuperscript{56} While none of the three machine-readable databases performs well, Execucomp performs the worst. The data to calculate the gap (i.e., the date the executive joined the company and the date the executive left his or her prior job) is available for three observations out of 25, with only one of the three classified correctly. BoardEx performs somewhat better—we could classify 10 of the 25 observations, where nine of the 10 are classified correctly. The necessary data from Thomson is available for 15 out of the 25 cases, with 10 of the 15 classified correctly. Note that the database least used in the CEO turnover literature, Thomson, is the one that performs the best both in terms of classifying succession type and identifying when a gap actually exists. However, the length of the gap is (almost always) biased long resulting in external hires without gaps being coded as having gaps.

Finally, to systematically evaluate the usefulness of these databases, we report summary results across all of the 5,095 CEO transitions at S&P 1500 firms from 1992–2014. Table B3 provides the succession type classification by database:

\textsuperscript{55} However, small sample distributions should not be overly interpreted. (The 95% confidence interval is 40.19% to 67.81%.) Also note that two (7.4%) of the 27 external successions were external “heirs” (each joining the company within about nine months of being appointed CEO). This proportion is noticeably lower than several prior studies (e.g., Cannella and Lubatkin [1993] and Helfat and Bailey [2005]), but again the sample size is small.

\textsuperscript{56} Even in cases where we can determine whether the new CEO is an external hire (including external heirs), the data for calculating the actual gap is often missing. For example, if you know the executive was appointed CEO on 12/31/2010 and left his or her former employer on 1/1/2010, to be able to calculate gap you still need to know when he or she joined the new company, which is frequently missing.
Table B3 Succession Type by Database

<table>
<thead>
<tr>
<th>Succession Type</th>
<th>Execucomp</th>
<th>BoardEx</th>
<th>Thomson</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>External</td>
<td>914</td>
<td>17.94</td>
<td>1,281</td>
</tr>
<tr>
<td>Internal</td>
<td>1,141</td>
<td>22.39</td>
<td>1,427</td>
</tr>
<tr>
<td>N/A</td>
<td>3,040</td>
<td>59.67</td>
<td>2,387</td>
</tr>
<tr>
<td>Total</td>
<td>5,095</td>
<td>100</td>
<td>5,095</td>
</tr>
</tbody>
</table>

Table B3 shows that, similar to the 50 random CEO successions above, machine-readable databases often do not have sufficient data to classify successions into external/internal—approximately 60%, 47%, and 20% of the cases using Execucomp, BoardEx, and Thomson, respectively. Execucomp identifies 914 CEOs (~18%) as external hires compared to 1,281 (~25%) in BoardEx and 1,953 (~38%) in Thomson.

In addition, we can calculate the gap length only for a fraction of external hires. For example, in the case of Execucomp, the dates the executive joined the company ($E_{\text{Joined\_Co}}$) and left his or her prior company ($E_{\text{Prior\_Lefico}}$) are available only for 178 (19.5%) of the 914 external succession events. As a result, this key variable can only be calculated for 178 observations using Execucomp data. These observations result in a mean (median) Gap Length equal to 0.98 (0.37) years. This sample is by no means random, because $E_{\text{Joined\_Co}}$ is more likely to be populated for high profile CEOs. Similarly, the variable in BoardEx for when a CEO left his or her former employer ($B_{\text{Prior\_End\_Date}}$) is often missing. As a result, we can calculate a gap for 775 of the 1,281 observations. The mean (median) Gap Length is 2.00 (0.39) years. Finally, if we use Thompson Insider to proxy for the dates the executive joined the firm and left his or her prior firm, we can calculate gaps for 1,058 of the 1,953 external successions—the mean (median) Gap Length is 2.85 (1.35) years. Each of the databases suggests gaps do in fact exist and they are of a material duration (considering the average external CEO only stays in office for about seven years; see Kaplan and Minton [2012]).
Appendix C – Hand-collection of Required Dates and Reason for CEO Departure

Goal:
To collect relevant dates including when a CEO originally joined the firm, became CEO, and left their most recent prior (public) employer. We also include the date the executive left the CEO position (allowing us to calculate Time-to-Turnover) and the reason for departure (allowing us to isolate departures that relate to the quality of CEO-firm match and to identify censoring type).

Overview:
In the programs in Appendices H and I, we use Execucomp to generate a sample of new CEOs. We then combine Execucomp, BoardEx and Thomson Insider to proxy for when the new CEO started working for the company, when he became the CEO (effective date), and when he left his prior public company executive position. Our steps to verify these dates revealed significant measurement error in database dates. As a result, we hand-collect all required dates for our entire sample57 and only use database generated dates when we are unable to gather the data ourselves (noting that it is possible the databases have access to additional resources). When exact dates are unable to be identified, we approximate the date erring on the side of longer employment periods (e.g. an approximate departure in March 2001 would be recorded as 3/31/2001 while an approximate arrival in 2003 would be recorded as 1/1/2003) and make a note that an approximation occurred. We retain a reference to the source document for each date that we collect.

We collect the date information using Bloomberg, Edgar, and Google searches. Specifically, we start with a Bloomberg Terminal search for news articles and press releases that discuss the promotion or hiring of the CEO at the new firm. We then search for articles and press releases to find the date that the CEO joined the firm as an executive and the departure date from the CEO’s last (public) firm. When no exact dates are found, we read the CEO’s biography in the first proxy statement after hiring to see what date is listed. When no exact date is listed, we search for the 8-K announcing the promotion of the executive to CEO. If we are still unsuccessful, we expand our search to Google. We perform the same process for dates relating to when the CEO departed from his or her prior public firm.

The following is the process the RAs performed. For each CEO observation, we provided the RAs with the CEO’s name, new firm name (and ticker), and the “became CEO” date from Execucomp to provide a starting point (and make sure that the right employment spell was collected for CEOs with multiple employment spells at the same firm). The RAs were not given additional information from Execucomp, BoardEx, or Thomson to prevent confirmation bias.

RA Date Collection Process:

Bloomberg Terminal Process

   a) If CEO’s name displays, select CEO. Proceed to step 2.

57 An alternative would be to hand-collect a random sample and attempt to diagnose specific situations where errors are likely to occur. Without actually completing this task and testing it out of sample, we are unable to know the accuracy with which our key variables are measured.
b) If CEO’s name does not display, go to the Related Functions Menu, select 4) Company News. Enter CEO’s last name in <Narrow This Search>, ensuring the search is for “all terms” rather than “any terms”. Proceed to step 5.

2. On CEO’s Profile Page, look in right column to identify tenure as CEO position. These dates can be used for direction when finding news articles corresponding to date left, date announced, date became etc.

3. If individual is the current CEO of firm, mark as “Current CEO” for date left CEO position. Search CEO’s name in Google followed by “Bloomberg” e.g. “First M. Last Bloomberg” Open CEO’s bio page on Bloomberg.com and cite by copying and pasting Bloomberg.com bio page link into spreadsheet as source or cite the most recent DEF 14A

4. On Profile Page select 19) or 20)58 News.

5. Find news article corresponding to departure from CEO position. Find date left CEO position within article and cite using news source and article date (e.g. BUS – DD/MM/YYYY). If provided, state reason for departure - this may require looking at multiple news releases related to departure. If no reason is given, mark as “Unknown”. If articles cannot be found discussing departure, go to SEC Filings Process. If the CEO was an interim CEO at departure, include this in the notes.

6. Hit “Menu” on keyboard to go back to previous screen. Find news article corresponding to date announced CEO. News articles can be restricted by date by entering “before Month Year” in <Narrow More>. e.g. for a CEO who started in May 2013 enter “before September 2013”.

7. Find news article corresponding to date became CEO. This is commonly found in the same article as date announced CEO, but may require citing a separate article.

8. Find news article corresponding to announcement for date joined as exec. This date pertains to when the individual became an executive at the company – VP, President, Exec VP etc. Record date as specific as possible. If only month and year are given, mark as “Yes” in approximate column and make note in notes column.

9. Find news article corresponding to date left prior public firm. Perform an equity search for prior public company and identify date using same process as step 5. Record the position at prior firm, mark approximate when applicable, and record any necessary notes.

10. Record past private firm information when applicable (when the executive went public→private→public).

11. If a gap period existed between date left prior public firm and date joined as exec, record any information pertaining to activities during gap period and source accordingly. This may require looking through multiple news articles or going to other sources.

12. For any information not found in Bloomberg Terminal, or for information that is marked as being approximate, proceed to SEC Filings Process.

SEC Filings Process

1. Using SEC EDGAR Search Page, search for firm using either new firm name or ticker.

58 The number on the profile page changed midsummer for a subset of our CEOs.
2. For reference dates on CEO’s tenure, search CEO’s name in Google followed by “Bloomberg” e.g. “First M. Last Bloomberg” Open CEO’s bio page on Bloomberg.com and find any information provided on tenure as CEO.

3. Using reference dates from Bloomberg.com bio, restrict date of filings using “Prior to:” (e.g. if CEO is believed to have departed in March 2009, enter “20090401”). 8-K filings containing Item 5 or 5.02 indicate departure of directors. Find 8-K filings pertaining to arrival or departure of CEO. Cite by copying and pasting link into spreadsheet. If 8-K does not exist, use alternative steps a) –c).
   a) Find nearest Def 14a filed after date believed CEO departed. Search CEO’s name in filing and find any information corresponding to date departed.
   b) Find nearest 10-Q filed after date believed CEO departed. Search CEO’s name in filing and find any information corresponding to departure.
   c) Find nearest 10-K filed after date believed CEO departed. Search CEO’s name in filing and find any information corresponding to departure.

4. Use steps 1 – 3 to identify remaining dates, past firms, and gap activities. For date left prior public firm, cite SEC Filing issued from previous firm when available. Copy and paste links into spreadsheet as source.

5. For any information not found in Bloomberg Terminal, proceed to Bloomberg.com and General Internet Search Process.

**Bloomberg.com and General Internet Search Process**

1. For any dates not found in Bloomberg Terminal or SEC Filings, CEO’s Bloomberg.com bio page may be cited by copying and pasting link into spreadsheet as source. This data source commonly states broad dates and should therefore only be used as a data source when all other sources fail.

2. When relevant dates are still not found using previous sources, a general Google search may be used to find articles corresponding to relevant information.

We also provided our RAs with 6 additional pages of examples and clarifications that are available upon request.

**Synchronization Process and Cross Checking:**

Once the RAs collected the dates, we performed the following processes to synchronize and standardize the data collected by multiple RAs and collect any final pieces of necessary information.

1. **External vs. Internal CEO Appointment:**
   For all observations, if the collected Date Became CEO is different from E_BECAMECEO by 30 days or more we confirm the relevant dates. If the RA dates indicate that the CEO has been with the firm for more than 2 years prior to being appointed CEO, we confirm the Date Joined as Exec and Date Became CEO to ensure that the CEO is an internal hire.

   Once it is determined that the CEO has been with the firm for more than 2 years, the CEO is considered an internal hire and removed from our sample. If the CEO has been with the firm for
more than 1 year but less than 2 years, the CEO is considered an external heir only if the CEO started working as a president or COO. For these CEOs, we confirm the beginning title of the CEO to confirm their external heir status and record the position in the Notes.

2. Notes and Interim CEO Flags:
For all remaining observations, we read the notes recorded during initial data collection, make a note if the CEO was an interim or acting CEO, and address any concerns noted by the original RA.

3. CEO Departure Classification:
We go through and classify departures as being Censored, Forced, Voluntary-Poor Match, or Voluntary-Other. This often requires collecting additional pieces of information (such as age or date of departure announcement) that are not needed for all observations (and thus was not collected by the original RA). When the initial collection indicates that the CEO departed due to M&A activity, we confirm the transaction date with SDC, and check SDC for whether it was a “Merger of Equals” (MoE).
We follow the following rules (based on the process described in Parrino [1997], Huson et al. [2001], and Hazarika et al. [2012]) when classifying departures:
1. Classify the departure as being Censored if the departure is due to:
   - Death
   - The firm merging or being acquired within 60 days of departure
   - The firm going bankrupt within 60 days of departure
   - The firm delisting within 60 days of departure (in cases where the firm delists during the employment spell, the censured departure date is the delisting date)
   - The firm undergoing reorganization (i.e. engaging in a spin off) within 60 days of departure
2. Classify the departure as Forced if the CEO:
   - Was fired
   - Was forced/ousted from position
   - Departed due to unspecified policy differences
   - Was under 60 and all of the following:
     - Departure was not announced 6 months prior
     - Departure was not related to poor health
     - The CEO did not start at a different public firm as an executive within 60 days
     - The CEO did not remain employed or on the board for at least 6 months
3. Classify the departure (and reclassify Forced) as Voluntary-Poor Match if the CEO:
   - Starts at an executive position at a different public firm within 60 days
   - Departs due to personal or business reasons
4. Classify all remaining departures as Voluntary-Other.

4. Gap Length and Prior Public Firm Confirmation:
Since the length of employment gaps is one of the primary variables of interest in this study, we confirm the following:

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59 In order to consistently implement our departure classification, we use 60 days as the default timeframe for departures being associated with (or resulting from) firm activities.
1. When there is a Prior Public Firm listed, we confirm that the firm was public at departure and pull their CIK number from the EDGAR database. If the prior public firm is the same as the new firm (e.g. CEO → Chairman → Interim CEO), the CEO is considered an internal hire.

2. If the CEO arrives at the firm from a pre-spin-off or otherwise related firm (e.g. significant investor), the start dates recorded are for when the CEO joined the pre-spin-off firm.

3. When there is a Prior Private Firm listed we confirm that it was actually private while the CEO was working there.

4. When there is a gap of 1 day or less or more than 5 years, we confirm the dates and look into additional SEC filings to find a more accurate date if the RAs indicated that the date was an approximation.

5. **Gap Activity Classification:**
   1. If the first pass did not discover any gap activities, we confirm with the Bloomberg Terminal’s CEO profile page and new firm’s proxy statements that the CEO was not on other boards at the time of hire and perform a basic Google search for other activities.
   2. We make note of common activities that the CEO performed for any length of time during the gap (board membership, private firm employment, consulting, and investing). If the CEO worked for a private investment firm, it is recorded as being an investing activity and not as working for a private firm.
   3. We make note of what appears to be the activity that the CEO spent the most time on during the gap in *Primary Gap Activities*. While this is often fairly clear, we do have to make a judgement call when it is not clear. Our basic rule of thumb is to go off of the number of months worked when determining between private employment, consulting, investing, and other. When determining whether board membership is the primary activity in the presence of other activities, membership on 3 public boards (Fich and Shivdasani [2006]) trumps other activities. However, if it is clear that the CEO was consulting or investing in the firms that the CEO is a board member of, those activities trump board membership.

6. **M&A Activity Confirmation:**
   When the CEO comes to the firm because of a merger, we confirm the dates with the SDC database and check if it was a “Merger of Equals”.

   For non-MoEs, we record the following where L acquires S (as identified in the SDC database):
   1. The tenure of the CEO at firm L is unaffected as long as he retains his job.
   2. The departure of the CEO at firm S is "Censored" regardless of whether he becomes employed at firm L.
   3. The departure of the CEO at firm L is "Censored" if he does not retain his job (it is irrelevant whether he remains employed or on the board).
   4. If the CEO of firm S becomes the CEO at firm L, he is considered an external hire with a start date of the merger date.

   For MoEs, we record the following:

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60 If we cannot find anything indicating that the firm was public at the time of the departure, we look for the next prior public firm that the executive worked for.
1. For CEOs who retain their job as CEO after a MOE, we record the start date at the pre-MOE firm.
2. For CEOs who do not retain their job as CEO, but remain affiliated with the new firm (as chairman, president, etc.), we mark these as censored.
3. For CEOs who do not retain their job as CEO, and do not remain affiliated with the new firm, we mark these as censored.
Appendix D: (Python assisted) hand-collection of covenants not to compete

There are many factors that determine the extent to which a noncompete constrains an employee’s option set. First (and most obviously), if the employee did not sign a noncompete then the employee is free to pursue any and all future options. Therefore, an ideal proxy would include this simple fact. Unfortunately, this simple fact is not easily observed. One complicating factor is that these clauses can appear in different types of agreements (e.g., employment agreement, severance agreement, merger agreement). Furthermore, some of the agreements are ex-ante in nature (e.g., employment agreement) and some are ex-post (e.g., severance agreement). Firms are currently required to disclose employment contracts for high-ranking executive officers, but the disclosure requirements for agreements with exiting officers (e.g., severance agreements) are less clear. Garmaise (2011) uses 10kwizard.com to find evidence of noncompetes. For a random sample of 500 Execucomp firms, Garmaise was able to find evidence of noncompetes for 70.2%. It is worth noting that he was conducting a firm level analysis (as opposed to executive level) and only required evidence of the noncompete. An employment contract with a noncompete would be sufficient, as would a simple statement that certain employees had signed noncompetes. We also propose to use a firm-level variable to capture the likely presence of noncompetes. Instead of using 10kwizard.com we prefer to download all of the SEC filings to our server and process them using Python. To partially test the feasibility of this task, we started to download the filings from the Edgar website. To date, we have downloaded all filing from 2012 through 2014. Based on this subset of years, we estimate it will take several months to download the remainder of Edgar. As a result, we believe a full download of potentially relevant Edgar documents is feasible.

An alternative to the firm specific measure is an employee specific measure. Bishara, Martin and Thomas (2015) select a random subset of 500 S&P 1500 firms (covering 2,109 CEOs per Execucomp). For this sample of large firm CEOs, they were only able to find 874 usable explicit contracts (less than 42% of the total potential CEO contracts). For the majority of the sample, it was not possible to determine whether the CEO employment agreement was only “implicit” or formal but not disclosed. Given this result, an estimate of the upper bound on the fraction of useable contracts is approximately 42%. We expect firms are more likely to disclose employment contracts with CEOs than with lower level employes (see Jamie Dimon example below). However, the majority of new CEO were not CEOs in the past. Custódio, Ferreira, and Matos (2013) have a sample of 21,909 CEO-firm-years. For this pooled sample, they report that 35.4% of these observations are individuals with previous CEO experience. Assuming the number of years spent as a CEO is unrelated to prior CEO status (a nontrivial assumption), then the estimated number of prior CEOs in our sample is 1,804 (35.4% of 5,095). Of these, we are likely to be able to find useable contracts for 757 CEOs (42% of 1,804). These 757 observable contracts (less than 15% of our sample) should be viewed as an approximate lower bound, given some firms will disclose employment agreements for non-CEO executives. Even with extensive hand-collection, we would likely get employment agreements for less than 50% of our sample (with the missing observations being an unknown fraction of executives without agreements and, hence, no constraints, versus undisclosed agreements with potential constraints). As a result, we propose taking the firm-level approach. Our anticipated inability to find employee specific agreements suggests we will also be

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61 The firm-level proxy assumes agreements are somewhat sticky through time and across people. Providing some support for the sticky through time assumption, Bishara, Martin and Thomas (2015) find that once a CEO of a company signs a noncompete agreement, future CEOs are likely to do the same.
unable to observe agreement parameters (e.g., length of prohibition, geographic restrictions, lists of actual competitors).

We return to the Jamie Dimon example, which highlights the employee specific contract issue. Mr. Dimon had a gap between leaving Citigroup and joining Bank One. We would like to know whether this gap was related to a noncompete. To answer this question, we do not need to know whether Mr. Dimon signed an agreement with noncompete clauses as CEO of Bank One but, rather, whether he agreed to any noncompete clauses at Citigroup. Given his high profile, there are numerous accounts of his departure from Citigroup, with several referencing noncompetes in his severance agreement. Most new CEOs will not have this type of prior job coverage.

To get a sense of generally available coverage, we tried to confirm the presence Jamie Dimon’s Citigroup noncompete on EDGAR. We tried numerous Google searches of EDGAR (e.g., we type the following phrase into Google search to dialogue box: "0000831001" "citigroup" "james" "dimon" "severance" site:https://www.sec.gov) to locate the terms of the severance agreement. The closest reference we found only mentions a non-solicit agreement:

SEPARATION AGREEMENT

The Company has entered into a separation agreement with Mr. Dimon dated as of November 2, 1998 pursuant to which, in consideration of certain agreements by Mr. Dimon, including a non-solicit agreement, the Company has agreed to pay Mr. Dimon (i) a bonus for 1998 as set forth in the Summary Compensation Table and (ii) a separation payment of $1.3 million payable in equal installments on December 31, 1999 and 2000. In addition, the agreement provides for continued vesting and exercisability for existing options and for continued vesting for existing restricted stock awards.

http://www.sec.gov/Archives/edgar/data/831001/0001047469-99-008885.txt

Non-solicitation agreements do not prevent an executive from working at another firm, rather, they prevent former employees from communicating with (or poaching) their former employer’s customers, accounts, or employees. For this reason, we ignore non-solicitation agreements (consistent with Garmaise [2011]). Furthermore, the enforcement of non-solicitation agreements does not perfectly correlate with the enforcement of noncompete agreements (Malsberger provides another summary of these provisions in his 3,500 page guide titled “Employee Duty of Loyalty: A State-By-State Survey”).

Using Python, we create text files containing excerpts from SEC filings surrounding key terms that potentially refer to NCCs. The key terms were determined by reading 50 non-compete agreements and noting common language. Specifically, we use the following wordlists:
1. NCA: “non-compet*”, “noncompet*”, “not to compet*”

62 We tried a number of different Google searches (not restricted to any particular domain or website) and found several references to a noncompete agreement contained in 1) a Vanity Fair article, 2) an autobiography by Sandy Weill (CEO of Citigroup and Jamie Dimon’s mentor) and 3) a book about ten executives who faced high profile setbacks (Redmond and Crisafulli, 2010).

The agreement, as Dimon described it, was for a three-year non-compete, involving a “very hard non-compete for a year, a very tough non-solicit prohibiting me from hiring people away from Citigroup for the second year, and a normal non-solicit for a third year.” (p. 187)

63 “0000831001” is the CIK number for Citigroup.
3. Engage: “engage in”, “engaging in”
4. Covenant not: “covenant not”
5. Covenant to: “covenant to”
6. Compete: “compet*”

We provide our RAs with a list of prior firm CIKs, text excerpts for all CIKs in our sample, example NCCs, and the following directions.

**Hand collection process (from Python excerpts)**

1. Working from the CIK list, go through all excerpts for each firm (starting with excerpts from nca, then restrictive, and so on) until you determine that an NCC exists or have read all available excerpts.
2. Open the excerpt in notepad and search for the relevant key terms until you find an NCC. If you are unsure if something represents an NCC, make a note of it and keep looking. If it is the only potential NCC, put “Maybe” in the NCC Present? column.
3. Once you find a document with an NCC, fill in the NCC Present?, Wordlist, Filename (everything after the CIK), and NCC Wording columns.
5. Link to the filing detail page in *EDGAR Link* and fill in the Form Filing Year and Form Type columns. If you are unable to find the file on EDGAR, continue reading excerpts.

After the RAs collect the NCCs, we read the wording for each collected NCC to confirm that a NCC actually exists between the firm and an employee.
Appendix E – Hand-collection of Noncompetition Agreements Enforceability

Goal:
To supplement the Garmaise index of state-level enforceability of noncompetes in employment agreements to cover the entire window from 1980 to 2013 (compared to his window of 1992 to 2004).\textsuperscript{64} This window is likely broader than what we need (given Execucomp begins coverage in 1992), but we decided to incur the extra costs to ensure we did not have to repeat the task.

We hired three law students with experience in analyzing employment contracts to gather the necessary data. While the process description in Garmaise (2011) is fairly detailed, the implementation is still somewhat subjective, so each RA collected all of the data (to reduce the possibility of errors or idiosyncratic interpretations). Across the twelve questions, for each state and year not completed by Garmaise, all three RAs recorded the same conclusion 95\% of the time (12,272/12,852). One common way of measuring agreement when there are multiple parties making separate judgments is to measure an intraclass correlation coefficient. We use a two-way mixed-effects model of absolute agreement as explained in Shrout and Fleiss (1979) and McGraw and Wong (1996) and find a correlation coefficient of 0.91, which is high by traditional standards. For the 5\% where there was disagreement, we have tabulated the majority conclusion. See Table 4 for the summary scores.

In addition to the score for each state, we need to know the state in which the firm is headquartered. In Garmaise’s sample, about 5\% of firms move the headquarters. Compustat and BoardEx only include the current state and backfill prior observations with current state information. As a result, we will use the addresses from SEC filings (specifically insider filings in Thomson) to determine whether and when a firm relocated its headquarters.

Process Sketch:
Our RAs followed the process outlined by Garmaise (2011) to measure the state levels of enforceability of noncompetes before and after his window of time. Garmaise used a survey of the state laws surrounding noncompetes written by Malsberger (2004) to develop an index of state enforceability. Garmaise evaluated each state using 12 questions related to when each policy became effective (e.g., court ruling dates), extent of enforcement, and the role of state courts in enforcement. Using this information, each state received a score from 0-12. Higher scores indicate states with higher noncompete enforceability (i.e., noncompetes are more binding).

First, each RA recreated the Garmaise index for 2004 using the information provided in Malsberger (2004) and the details described in Garmaise (2011). We used this test run 1) to educate the RAs about the hand-collection task, and 2) to estimate how many hours would be required to extend the index. Each RA was given the summary measure by state, so their total scores matched the total scores in Garmaise (2011) by construction, though a matching total could come from offsetting errors. Second, we gave RAs the answers to each of the 12 individual questions by state and year. This additional detail allowed them to correct offsetting errors, improving their ability.

\textsuperscript{64} Given noncompete enforceability is fairly sticky through time and our other data sources end in 2014, we will proxy for 2014 noncompete enforceability using 2013 data.
to make inferences consistent with Garmaise (2011).\(^6^5\) Third, we provided the RAs with the most recent version of the source document (Malsberger [2013]) and had them extend the sample forward (2005-2013) and backwards (1980-1991).

\(^{65}\) Professor Garmaise generously provided us with question specific answers for the years 1992-2004. We believe this additional detail will result in a substantially more accurate CNC enforceability measure and also ensures greater consistency through time.
Appendix F: Additional Data Collection for Executives’ Activities During the Gap

Firm disclosures about employment gaps

As discussed in the body of this proposal, we would like to know what executives did during their gap. Unfortunately, firms/executives do not have to disclose this information. As a result, any disclosure we see is voluntary and potentially incomplete. The poor observability of this data is a key reason we do not develop hypotheses about the how gap activities relate to future outcomes. Nevertheless, we think the typical reader would be interested in descriptive evidence about gap activities. We plan to provide such evidence using a combination of common databased and hand-collection.

Using a combination of BoardEx and Thomson Insider data, we should be able to observe public board participation during gaps and will report what we find. For example, according to BoardEx, Jamie Dimon served as an independent director for YUM! Brands Inc. between 10/07/1997 and 5/19/2005. In other words, he became a director before leaving Citigroup on 11/1/1998 and continued with his directorship after becoming the CEO of Bank One Corp on 3/27/2000. Thomson Insider also supports the inference. He first traded in YUM! Brands (formerly Tricon Global Restaurants) on 09/30/1997 and last traded on 12/11/2003 (all have Rolecode1=D for “director”). During his gap, Thompson records 21 stock and 5 option transactions in YUM! Brands confirming he continued as a director during this period. Jamie Dimon resigned as director on 07/15/2004.66

We can also review the CEO hiring announcement and the following proxy statement for additional descriptive data. We expect this data to be limited (as the high profile example below demonstrates) and we do not plan to use it for hypotheses testing. We collect gap activities for CEOs during the date collection stage (see Appendix C). Specifically, for CEOs with employment gaps of 30 days or longer, we look for gap activities disclosed in one or more of the following: (a) the hiring announcement by the new firm, (b) the departure announcement by the old firm, (c) any news articles that are flagged by the Bloomberg Terminal to be related to the CEO during his employment gap, (d) the Bloomberg Terminal CEO Profile Page, (e) the new firm’s proxy statement, (f) the new firm’s hiring 8-k (when available), (g) the CEO’s Bloomberg.com biography, (h) the CEO’s equilar.com biography, and (i) anywhere that shows up from a basic Google search (such as the CEO’s LinkedIn profile, university alumni profiles, etc.).

Below is the director background discussion from the first Bank One Proxy Statement that includes Jamie Dimon (dated 04/05/2000):

Mr. Dimon, 44, was elected Chairman of the Board and Chief Executive Officer of the Corporation on March 27, 2000. From November 1998 until he assumed his positions with the Corporation, he was a private investor. Prior to that time he served as President of Citigroup Inc., having held that position during October and November 1998 following the merger of Travelers Group Inc. and Citicorp. Prior to the creation of Citigroup, Mr. Dimon had been President and Chief Operating Officer of Travelers Group for seven years. He was named Chairman and Chief Executive Officer of its Smith Barney Inc. subsidiary in January 1996, previously been the firm’s Chief Operating and Chief Administrative Officer. In November 1997, he was named Co-Chairman of the Board and Co-Chief Executive Officer of Salomon Smith Barney Holdings Inc. Mr. Dimon also is a director of Tricon Global Restaurants Inc. He became a director of the Corporation on March 27, 2000, and is Chair of the Executive Committee.

https://www.sec.gov/Archives/edgar/data/1067092/00009501311000002400/0000950131-00-002400-d1.html

66 http://www.sec.gov/Archives/edgar/data/1041061/0001041061040000245/form8kdimon.htm
We were unable to find any additional information when searching press releases and business wires. They primarily contain information such as the following (though most contained less information): From article titled “NEWSMAKER-Dimon finally to run his own show at Bank One.” Reuters News 03/27/2000

Dimon, 44, becomes chairman and CEO of Chicago-based Bank One after being ousted in late 1998 as president of Citigroup Inc. by Weill - his mentor and chairman of the financial services powerhouse.

Dimon had worked with Weill for most of his career and was viewed as his heir-apparent. But he lost his job after $1.3 billion in bond trading losses at the division he ran - the Salomon Smith Barney securities arm. These losses, which came at a time of global market turmoil, pushed Citigroup's 1998 third-quarter profits down more than 50 percent.
Appendix G: Extending Coverage of Specialist versus Generalist Inputs

Our tests require a measure for whether an incoming CEO is a “specialist” or a “generalist” (i.e., whether the executive has a general or specialist skillset). As discussed in the body of this document, we propose using the fairly comprehensive measure developed by Custódio, Ferreira, and Matos (2013). They rely on BoardEx to generate five inputs for this measure. As we have noted, our testing indicates that BoardEx does not completely and accurately cover all of the information we need to determine succession type and gaps. By extension, it seems unlikely that BoardEx would completely and accurately cover all inputs for a comprehensive generalist/specialist measure. While we originally intended to use proxy statements and press releases to reduce measurement error in the generalist/specialist proxy (and extend its coverage), we do not believe this task to be implementable (especially while adhering to the conference deadlines). Specifically, we are concerned that the details provided in available documents (for example, the Jamie Dimon example in Section 4) are insufficient to accurately code the “five aspects of a CEO’s professional career: past number of (1) positions, (2) firms, and (3) industries in which a CEO worked; (4) whether the CEO held a CEO position at a different company; and (5) whether the CEO worked for a conglomerate” (Custódio, Ferreira, and Matos (2013, p 472)).

While our samples will certainly be impacted by the BoardEx requirement, we believe the reduction should be fairly modest. After hand-matching names from Execucomp to BoardEx, Custódio, Ferreira, and Matos (2013) get 85.7% of Execucomp firm years to match BoardEx. We will follow their method to construct an indicator variable for whether an executive is more likely to be a generalist or specialist (Generalist). In an attempt to match their proxy construction as close as possible, we will follow the description in Custódio et al. (2013) as closely as possible and note where further (previously undocumented) assumptions were necessary.
Appendix H – Summary Preliminary SAS programs

For an online appendix, we propose posting all program files (.sas .lst and .log files for SAS; .do and .log files for Stata; .py and .pyc for Python). Up to this point, all of our statistical coding has been in SAS and we have only used Python to begin downloading documents from the SEC. In the future, we expect to leverage text analysis tools (e.g., Python) to gather documents, pages or paragraphs of likely interest, reducing the amount of material that must be read and hand-coded.

In order to be (at least somewhat) parsimonious for this submission, we are only including our program summaries (in this appendix) and SAS .log files (in Appendix G), which demonstrate each programming step and some corresponding notes (e.g., dataset size). Note, we did alter these file to remove identifying information (e.g., SAS licensed to information) and the program summaries (which were written directly into the SAS files) and certain verbose and repetitious data notes (e.g., NOTE: Invalid numeric data, 'Un', at line 90 column 28.).

**Program 1: 01a_execucomp.sas**

This program reads in the Execucomp Annual Compensation database for all new CEOs that started in 1992 or after. We then attempt to find the date the new CEO joined the company (in any executive capacity) and the last employment date for new CEO at a prior company. Note: Using Execucomp is very restrictive because it only covers top paid executives for S&P 1500 companies (meaning prior executives at smaller public firms and those not in the top five are likely to be missed). We also create our own (internal) unique sample identification number to allow for easier tracking of and matching of observations in future programs.

**Program 2: 02a_boardex_ids.sas**

This program reads in BoardEx “Company_Details” to get identifiers. We then match to Compustat based on CIK. If unable to match on CIK, match on CUSIP. Future programs will also check firm name match quality if multiple matches arise.

**Program 3: 02b_make_ccm_link.sas**

This program is a modified copy of the link table (CRSP and Compustat) creation code provide by WRDS. The log file below provides the description from WRDS.

**Program 4: 03a_boardex_comp_empl.sas**

There are eight separate (and fairly large) BoardEx files that contain information about current and historic employment. This program stacks the eight datasets after making key field lengths compatible.

Note: The “dir_mapping_file” and the “smde_mapping_file” use MASKED_ID whereby other important BoardEx files refer to this variable as DIRECTOR_ID.
Program 5: 03b_add_boardex.sas

This program starts with the link file created to match BoardEx (COMPANYID) to Execucomp (GVKEY). If a single GVKEY matches to multiple COMPANYIDs, which currently does not happen, we choose the one with closest name match (4,335 out of 6,057 observations matched).

Once we have GVKEY, we use the CRSP/Compustat link table (lnk) to get PERMNO and first CRSP trading date (5,097 observations have matching PERMNOs). We require a PERMNO to ensure that the company was publicly traded at the point the CEO took office. Without this requirement, we could not get reliable first year compensation.

We then find all public company (QUOTED) observations with a ROLE that contain 'CEO' and have a valid start date. Then merge (SQL) the BoardEx CEO data with the results from Execucomp. For now, we are assuming that start dates in Execucomp are accurate and only match to BoardEx if it has the same start date. (Note: We will consider relaxing this assumption in future versions of the program)

In addition to matching on company and CEO start date, we also require that first names and last names match across the databases.

Next, we create a dataset of all public company executive (not just director) employment observations in BoardEx (820,467 individual jobs). We then pick only the observations that represent the first job at a given company (481,657 individual first executive jobs). We use this data to determine whether a newly hired CEO started with the company in the CEO role or whether he/she worked at the company before being promoted to CEO. Using this procedure, we were able to collect company start dates for 2,708 (out of 5,095) observations.

Using similar the logic to that just described, we create a dataset of when each executive left their executive role at a company (437,324 executive/company end dates). We then merge (SQL) this data into our new CEO database to determine when each CEO left his/her (most recent) former public employer. We were able to collect prior company end dates for 1,145 (out of 5,095) observations.

Program 6: 04a_add_insider.sas

Rogers and Van Buskirk (2009) describe a method for identifying executive turnover (specifically CEO turnover) using from the Thomson Financial insider trading database and validate their approach using Execucomp data (94% agreement for the overlapping sample, p. 152). Building on their logic, we explore whether the insider trading database can help us determine a new CEO former employer and the (approximate) date he/she left the former employer.

We may gain additional details not available in either Execucomp or BoardEx because all officers of public companies must file insider trading reports, many of these officers will not be will on of the five most highly compensated officers and will not be (or have ever been) in the S&P 1500. In total Execucomp covers 3,451 firms, BoardEx covers (at least one executive) for 22,104 firms and Thomson Insider covers 31,986 firms.

Start by stacking the stock file (Table1) and the derivatives file (Table2) to get a list of all Thomson security ids (T_SECID) and corresponding company names (T_CNAME). We then merge this data into our turnover dataset based on eight-digit CUSIPs. If we get more than one match, we keep the one with the most similar company name (T_CNAME versus E_CNAME).
We then create a variables T_CEO and T_EXECTIVE for everyone who filed with a ROLOCODE (ROLECODE1-ROLECODE4) equal to "CEO" or equal to any executive, respectively. We merge all CEO trades into our turnover dataset by T_SECID. For each match, we keep the trade that is closest to the E_BECAMECEO date. We then eliminate any matches where we cannot match first and last name to Execucomp. Now that we have a “good” match to T_PERSONID, we check whether that same person traded closer to the E_BECAMECEO date using a non-CEO title (which often happens for internal hires).

Of 4,079 new CEOs who we matched to Thomson, 49.6% (19.6%) have a trade within 30 (1) day(s) of becoming CEO.

We then make a dataset with all executives and their first trading date at each company. We merge these first trades into our turnover dataset to identify the first time a new CEO traded at his firm that named him/her CEO (allowing us to proxy for whether he/she was an internal hire).

We then make a dataset with all executives and their last trading date at each company. We merge these last trades into our turnover dataset to identify the last trade a new CEO made at a prior company. We are able to match 1,624 new CEO to trades at former employers.

**Program 7: 05a_hire_type.sas**

This program was used to generate the 50 random observations that were hand collected. It was also used to examine database details for our four example executives.

This program starts by reading the combined Execucomp-BoardEx-Thomson dataset created in the prior programs. It then defines succession type (internal vs external) and calculated gap (when possible) using each of the databases.

It then identifies the observations that will not require hand-collection (because at least two databases agree that the the succession type is "internal" while the third does not classify it as "external" and saves these into a dataset).

Next, it merges in the 50 hand-collected observations and determines when each data source agrees or disagrees with hand-collected Gap/No-Gap classification.
Appendix I: SAS LOG FILES

Log for Program 1: 01a_execucomp.sas

The SAS System
17:48 Thursday, October 15, 2015

NOTE: Copyright (c) 2002-2010 by SAS Institute Inc., Cary, NC, USA.
NOTE: This session is executing on the Linux 3.2.0-38-generic (LIN X64) platform.

NOTE: Updated analytical products:

SAS/STAT 9.3_M1, SAS/ETS 9.3_M1, SAS/OR 9.3_M1

You are running SAS 9. Some SAS 8 files will be automatically converted
by the V9 engine; others are incompatible. Please see
http://support.sas.com/rnd/migration/planning/platform/64bit.html

PROC MIGRATE will preserve current SAS file attributes and is
recommended for converting all your SAS libraries from any
SAS 8 release to SAS 9. For details and examples, please see
http://support.sas.com/rnd/migration/index.html

This message is contained in the SAS news file, and is presented upon
initialization. Edit the file "news" in the "misc/base" directory to
display site-specific news and information in the program log.
The command line option "-nonews" will prevent this display.

NOTE: SAS initialization used:

real time 0.01 seconds
cpu time 0.00 seconds

16 17 options nocenter nonumber ps=max ls=max; title;
18 libname execcomp '/huge/wrds_2015/comp/sasdata/execcomp';
NOTE: Libref EXECOMP was successfully assigned as follows:
Engine: V9
Physical Name: /huge/wrds_2015/comp/sasdata/execcomp
19 !
20 libname comp '/huge/wrds_2015/comp/sasdata/nam';
NOTE: Libref COMP was successfully assigned as follows:
Engine: V9
Physical Name: /huge/wrds_2015/comp/sasdata/nam
20 !
21 libname tfn '/ssd/groups/errz/insider_data';
NOTE: Libref TFN was successfully assigned as follows:
Note: Data file EXECCOMP.ANNCOMP.DATA is in a format that is native to another host, or the file encoding does not match the session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might reduce performance.
/*NOTE: BECAMECEO DATES ARE CONSTANT ACROSS CO_PER_ROLE*/

NOTE: There were 46968 observations read from the data set WORK.EC_CEOS.
NOTE: The data set WORK.TEMP has 46968 observations and 15 variables.
NOTE: DATA statement used (Total process time):
  real time      0.01 seconds
  cpu time       0.01 seconds

proc sort NODUPKEY; by E_CO_PER_ROL;
/*NOTE: OUT OF THE 6,057 NEW CEOs WITH NON-MISSING BECAMECEO DATES, (36.92%) HAVE NON-MISSING JOINED_CO DATES*/

NOTE: There were 46968 observations read from the data set WORK.TEMP.
NOTE: 40911 observations with duplicate key values were deleted.
NOTE: The data set WORK.TEMP has 6057 observations and 15 variables.
NOTE: PROCEDURE SORT used (Total process time):
  real time      0.03 seconds
  cpu time       0.00 seconds

proc freq; tables E_JOINED_CO_dum;

NOTE: There were 6057 observations read from the data set WORK.TEMP.
NOTE: The PROCEDURE FREQ printed page 1.
NOTE: PROCEDURE FREQ used (Total process time):
  real time      0.01 seconds
  cpu time       0.01 seconds

data temp; set temp;
/*CREATE AN INTERNAL SAMPLE ID NUMBER*/
sample_id = _N_; if E_JOINED_CO='.' or E_JOINED_CO > E_BECAMECEO then E_hire_type='not available';
else if E_BECAMECEO = E_JOINED_CO then E_hire_type='external hire';
else if (E_BECAMECEO - E_JOINED_CO) <= 365 then E_hire_type='external_heir';
else if (E_BECAMECEO - E_JOINED_CO) > 365 then E_hire_type='internal';

NOTE: There were 6057 observations read from the data set WORK.TEMP.
NOTE: The data set WORK.TEMP has 6057 observations and 17 variables.
NOTE: DATA statement used (Total process time):
  real time      0.00 seconds
  cpu time       0.00 seconds

proc freq; tables E_hire_type;

/*FIND DEPARTURE DATE FROM PRIOR EMPLOYERS*/

NOTE: There were 6057 observations read from the data set WORK.TEMP.
NOTE: The PROCEDURE FREQ printed page 2.
NOTE: PROCEDURE FREQ used (Total process time):  
  real time 0.00 seconds
  cpu time 0.00 seconds

proc sql;
create table temp2 as select a.*, b.titleann as E_prior_titleann, b.gvkey as E_prior_gvkey, b.year as E_prior_year, b.LEFTCO as E_prior_leftco, b.CONAME as E_prior_Coname
  from temp as a LEFT JOIN execcomp.anncomp as b
  on a.E_EXECID = b.EXECID
  and a.E_gvkey ne b.gvkey
  and a.E_becamegeo >= b.leftco;

NOTE: Data file EXECOMP.ANNCOMP.DATA is in a format that is native to another host, or the file encoding does not match the session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might reduce performance.
NOTE: Table WORK.TEMP2 created, with 13048 rows and 22 columns.

quit;

NOTE: PROCEDURE SQL used (Total process time):  
  real time 0.55 seconds
  cpu time 0.65 seconds

/*KEEP MOST RECENT PRIOR EMPLOYER*/
data temp2; set temp2;
E_prior_leftco_dum = 0; if E_prior_leftco ne . then E_prior_leftco_dum = -1;

NOTE: There were 13048 observations read from the data set WORK.TEMP2.
NOTE: The data set WORK.TEMP2 has 13048 observations and 23 variables.
NOTE: DATA statement used (Total process time):  
  real time 0.01 seconds
  cpu time 0.02 seconds

proc sort; by sample_id DESCENDING E_prior_leftco;

NOTE: There were 13048 observations read from the data set WORK.TEMP2.
NOTE: The data set WORK.TEMP2 has 13048 observations and 23 variables.
NOTE: PROCEDURE SORT used (Total process time):  
  real time 0.01 seconds
  cpu time 0.01 seconds
proc sort NODUPKEY; by sample_id;
NOTE: There were 13048 observations read from the data set WORK.TEMP2.
NOTE: 6991 observations with duplicate key values were deleted.
NOTE: The data set WORK.TEMP2 has 6057 observations and 23 variables.
NOTE: PROCEDURE SORT used (Total process time):
   real time          0.01 seconds
   cpu time           0.01 seconds

proc freq; tables E_prior_leftco_dum E_hire_type*E_prior_leftco_dum;
NOTE: There were 6057 observations read from the data set WORK.TEMP2.
NOTE: The PROCEDURE FREQ printed page 3.
NOTE: PROCEDURE FREQ used (Total process time):
   real time          0.00 seconds
   cpu time           0.01 seconds

proc sort; by E_hire_type;

proc sort NODUPKEY; by sample_id;
NOTE: There were 13048 observations read from the data set WORK.TEMP2.
NOTE: 6991 observations with duplicate key values were deleted.
NOTE: The data set WORK.TEMP2 has 6057 observations and 23 variables.
NOTE: PROCEDURE SORT used (Total process time):
   real time          0.00 seconds
   cpu time           0.01 seconds

data curr.execucomp_turnover; set temp2;
NOTE: There were 6057 observations read from the data set WORK.TEMP2.
NOTE: The data set CURR.EXECUCOMP_TURNOVER has 6057 observations and 23 variables.
NOTE: DATA statement used (Total process time):
   real time          0.00 seconds
   cpu time           0.00 seconds

NOTE: SAS Institute Inc., SAS Campus Drive, Cary, NC USA 27513-2414
NOTE: The SAS System used:
   real time          1.20 seconds
   cpu time           1.31 seconds
Log for Program 2: 02a_boardex_ids.sas

NOTE: Copyright (c) 2002-2010 by SAS Institute Inc., Cary, NC, USA.
NOTE: SAS (r) Proprietary Software 9.3 (TS1M1)
NOTE: This session is executing on the Linux 3.2.0-38-generic (LIN X64) platform.

NOTE: Updated analytical products:

SAS/STAT 9.3_M1, SAS/ETS 9.3_M1, SAS/OR 9.3_M1

You are running SAS 9. Some SAS 8 files will be automatically converted
by the V9 engine; others are incompatible. Please see
http://support.sas.com/rnd/migration/planning/platform/64bit.html

PROC MIGRATE will preserve current SAS file attributes and is
recommended for converting all your SAS libraries from any
SAS 8 release to SAS 9. For details and examples, please see
http://support.sas.com/rnd/migration/index.html

This message is contained in the SAS news file, and is presented upon
initialization. Edit the file "news" in the "misc/base" directory to
display site-specific news and information in the program log.
The command line option "-nonews" will prevent this display.

NOTE: SAS initialization used:
real time 0.82 seconds
cpu time 0.02 seconds

options nocenter nonumber ps=max ls=max; title;

*Define libraries;
libname boardex '/huge/wrds_2015/boardex';

NOTE: Libref BOARDEX was successfully assigned as follows:
Engine: V9
Physical Name: /huge/wrds_2015/boardex

libname comp '/huge/wrds_2015/comp/sasdata/nam';

NOTE: Libref COMP was successfully assigned as follows:
Engine: V9
Physical Name: /huge/wrds_2015/comp/sasdata/nam

libname curr '.';

NOTE: Libref CURR was successfully assigned as follows:
*Prepare CIKs in CompanyDetails...need to convert to character and rename as cik;

```sas
data CompanyDetails;
  set boardex.company_details;
  NOTE: Data file BOARDEX.COMPANY_DETAILS.DATA is in a format that is native to another host, or the file encoding does not match the session
  encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might reduce
  performance.
  char_CIK_Code = put(CIK_Code, 10.);
  char_CIK_lead = translate (right(char_CIK_Code),'0',' '); cik = char_CIK_lead;
  drop CIK_Code char_CIK_Code char_CIK_lead;
run;

NOTE: There were 11084 observations read from the data set BOARDEX.COMPANY_DETAILS.
NOTE: The data set WORK.COMPANYDETAILS has 11084 observations and 29 variables.
NOTE: DATA statement used (Total process time):
  real time    0.57 seconds
  cpu time     0.08 seconds

*11084 observations;

*Obtain cusips from ISINs;
```
ISIN_Code
Ticker
Sector
Index
ISIN1
ISIN2
cusip1
cusip2
cusip16
cusip26
******************************************************************************
JOIN GVKEYS FROM COMPUSTAT TO CompanyDetails MATCHING ON cik
******************************************************************************
*Pull compustat data;
data cstat;
set comp.funda (keep = gvkey comm cik cusip);
NOTE: Data file COMP.FUNDA.DATA is in a format that is native to another host, or the file encoding does not match the session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might reduce performance.
cusip06 = substr(cusip,1,6);
run;
NOTE: There were 713492 observations read from the data set COMP.FUNDA.
NOTE: The data set WORK.CSTAT has 713492 observations and 5 variables.
NOTE: DATA statement used (Total process time):
real time  4.73 seconds
cpu time  2.97 seconds

!  *713492 observations;

!  *Combine datasets;
proc sql undo_policy = none;
!
create table CIKgvkey as select distinct
a.*, b.gvkey, b.comm, b.cusip, b.cusip06
from CompanyDetails a left join cstat b
on (a.cik = b.cik);
NOTE: Table WORK.CIKGVKEY created, with 11084 rows and 39 columns.
!
QUIT;
NOTE: PROCEDURE SQL used (Total process time):
real time  3.77 seconds
cpu time  3.68 seconds

!  *11084 observations;
*Identify firms that matched based on cik;  
data cik;  
set CIKgvkey;  
if gvkey ~=.;  
run;  
NOTE: Character values have been converted to numeric values at the places given by: (Line):(Column).  
81:5  
NOTE: There were 11084 observations read from the data set WORK.CIKGVKEY.  
NOTE: The data set WORK.CIK has 8129 observations and 39 variables.  
NOTE: DATA statement used (Total process time):  
real time           0.13 seconds  
cpu time            0.02 seconds  

!      *8129 observations match based on CIK;  
*Identify firms missing gvkey, but have ISIN;  
data isin;  
set CIKgvkey;  
if gvkey = .;  
if ISIN_Code ~= ' ';  
drop gvkey conm cusip cusip06;  
run;  
NOTE: Character values have been converted to numeric values at the places given by: (Line):(Column).  
87:5  
NOTE: There were 11084 observations read from the data set WORK.CIKGVKEY.  
NOTE: The data set WORK.ISIN has 617 observations and 35 variables.  
NOTE: DATA statement used (Total process time):  
real time           0.01 seconds  
cpu time            0.02 seconds  

!      *617 observations don't have gvkey, but have ISIN_Code;  
*match on cusip1 and cusip;  
proc sql undo_policy = none;  
create table isin1 as select distinct  
a.*, b.gvkey, b.conm, b.cusip, b.cusip06  
from isin a left join cstat b  
on (a.cusip16 = b.cusip06);  
NOTE: Table WORK.ISIN1 created, with 621 rows and 39 columns.  

!      quit;  
NOTE: PROCEDURE SQL used (Total process time):  
real time           0.32 seconds  
cpu time            0.56 seconds
*621 observations...will isolate duplicates and delete those without exact cusip match;
*Identify observations with duplicate cusip06;
proc sort data = isin1;
by CompanyID;
run;
NOTE: Input data set is already sorted, no sorting done.
NOTE: PROCEDURE SORT used (Total process time):
  real time           0.10 seconds
  cpu time            0.00 seconds

!  *621 observations;
proc sql undo_policy = none;
create table multiple as select *
  , n(cusip06) as nobs
  from isin1 group by CompanyID;
NOTE: The query requires remerging summary statistics back with the original data.
NOTE: Table WORK.MULTIPLE created, with 621 rows and 40 columns.

!  *621 observations;
quit;
NOTE: PROCEDURE SQL used (Total process time):
  real time           0.10 seconds
  cpu time            0.00 seconds

!  *621 observations;
data multiples;
set multiple;
if nobs = 0 then delete;
if cusip1 = cusip then delete;
run;
NOTE: There were 621 observations read from the data set WORK.MULTIPLE.
NOTE: The data set WORK.MULTIPLES has 4 observations and 40 variables.
NOTE: DATA statement WORK.MULTIPLES used (Total process time):
  real time           0.00 seconds
  cpu time            0.00 seconds

!  *4 observations;
*Delete observations from isin1 that are contained in multiples;
proc sql undo_policy = none;
!
create table isin1 as select *
from isin1
where cusip not in (select cusip from multiples);
NOTE: Table WORK.ISIN1 created, with 617 rows and 39 columns.
!
quit;
NOTE: PROCEDURE SQL used (Total process time):
real time 0.10 seconds
cpu time 0.00 seconds

*617 observations...yay!;
*identify firms matched on cusip1;
data isinfirms;
set isin1;
if gvkey ~=.;
run;
NOTE: Character values have been converted to numeric values at the places given by: (Line):(Column).
NOTE: There were 617 observations read from the data set WORK.ISIN1.
NOTE: The data set WORK.ISINFIRMS has 425 observations and 39 variables.

*425 observations;
*obtain firms still missing gvkey, but have second isin;
data isin;
set isin1;
if gvkey = .;
if ISIN2 =~ ' ';
drop gvkey comm cusip cusip06;
run;
NOTE: Character values have been converted to numeric values at the places given by: (Line):(Column).
NOTE: There were 617 observations read from the data set WORK.ISIN1.
NOTE: The data set WORK.ISIN has 67 observations and 35 variables.

*67 observations;
*match on cusip2 and cusip;
proc sql undo_policy = none;
!
create table isin2 as select distinct a.*, b.gvkey, b.conm, b.cusip, b.cusip06
from isin a left join cstat b
on (a.cusip26 = b.cusip06);
NOTE: Table WORK.ISIN2 created, with 67 rows and 39 columns.
!
quit;
NOTE: PROCEDURE SQL used (Total process time):
real time           0.22 seconds       cpu time            0.42 seconds
!
*66 observations;
*identify firms matched on cusip2;
data isinfirm;
set isin2;
if gvkey ^=.;
run;
NOTE: Character values have been converted to numeric values at the places given by: (Line):(Column).

150:5
NOTE: There were 67 observations read from the data set WORK.ISIN2.
NOTE: The data set WORK.ISINFIRM has 25 observations and 39 variables.
NOTE: DATA statement used (Total process time):
real time           0.00 seconds       cpu time            0.00 seconds
!
*67 observations;
*update datasets;
data curr.updateisinsix;
update isin1 isin2;
by CompanyID;
run;
NOTE: There were 617 observations read from the data set WORK.ISIN1.
NOTE: There were 67 observations read from the data set WORK.ISIN2.
NOTE: The data set CURR.UPDATEISINSIX has 617 observations and 39 variables.
NOTE: DATA statement used (Total process time):
real time           0.07 seconds       cpu time            0.01 seconds
!
*617 observations;
data curr.updateallsix;
update CIKgvkey curr.updateisinsix;
by CompanyID;
run;

NOTE: There were 11084 observations read from the data set WORK.CIKGVKEY.
NOTE: There were 617 observations read from the data set CURR.UPDATEISINSIX.
NOTE: The data set CURR.UPDATEALLSIX has 11084 observations and 39 variables.
NOTE: DATA statement used (Total process time):
   real time           0.50 seconds
   cpu time            0.04 seconds

!  *11084 observations;

*Total gvkeys obtained;
   data gvkey;
   set curr.updateallsix;
   if gvkey ~=.
   run;

NOTE: Character values have been converted to numeric values at the places given by: (Line):(Column).
NOTE: There were 11084 observations read from the data set CURR.UPDATEALLSIX.
NOTE: The data set WORK.GVKEY has 8579 observations and 39 variables.
NOTE: DATA statement used (Total process time):
   real time           0.03 seconds
   cpu time            0.04 seconds

!  *8579 observations;
endsas;

NOTE: SAS Institute Inc., SAS Campus Drive, Cary, NC USA 27513-2414
NOTE: The SAS System used:
   real time           12.20 seconds
   cpu time            7.91 seconds
Log for Program 3: 02b_make_ccm_link.sas

NOTE: Copyright (c) 2002-2010 by SAS Institute Inc., Cary, NC, USA.
NOTE: SAS (r) Proprietary Software 9.3 (TS1M1)
NOTE: This session is executing on the Linux 3.2.0-38-generic (LIN X64) platform.

NOTE: Updated analytical products:
SAS/STAT 9.3_M1, SAS/ETS 9.3_M1, SAS/OR 9.3_M1

You are running SAS 9. Some SAS 8 files will be automatically converted by the V9 engine; others are incompatible. Please see http://support.sas.com/rnd/migration/planning/platform/64bit.html

PROC MIGRATE will preserve current SAS file attributes and is recommended for converting all your SAS libraries from any SAS 8 release to SAS 9. For details and examples, please see http://support.sas.com/rnd/migration/index.html

This message is contained in the SAS news file, and is presented upon initialization. Edit the file "news" in the "misc/base" directory to display site-specific news and information in the program log. The command line option "-nonews" will prevent this display.

NOTE: SAS initialization used:
real time 0.91 seconds
cpu time 0.02 seconds

options nocenter nonumber ps=max ls=max; title;
libname crsp '/huge/wrds_2015/crsp/sasdata/a_ccm';

NOTE: Libref CRSP was successfully assigned as follows:
Engine: V9
Physical Name: /huge/wrds_2015/crsp/sasdata/a_ccm

libname curr '.';

NOTE: Libref CURR was successfully assigned as follows:
Engine: V9
Physical Name: /ssd/groups/errz/proposal_programs3

/*GET GVKEY*/
/******************************************************************************
 * Last Modified : January 2014 */
* Usage : * This program shows the main processing part of the CCM web queries. * XpressFeed version CCM product provides more detailed information on linking * history, in the meanwhile it also populates much more observations than the old * version, among which there are some consecutive records (consecutive linking * date range). This program will collapse such consecutive rows and combine them * into one. * An example might be helpful: * Two records can be found in the link table (ccmxpf_lnkhist): * GVKEY LINKPRIM LID LINETYPE LPERMNO LPERMCO LINKDT LINKENDDT *
001043 C 00X LC 18980 20009 19501230 19620130 *
001043 C 01 LC 18980 20009 19620131 19820427 *
* After this program, there is only one line left: *
001043 C 01 LC 18980 20009 19501230 19820427 *
* Notes: *
* Include LIID in all the BY statements ONLY IF the LNK table is to be used *
* to merge with Security Monthly table. Otherwise, LIID should be removed from *
* the BY statements.

/*****************************************************************************/

%let andlt = %str(linktype in ("LC", "LS", "LU", "LX", "LD", "LS"));
%let andlu = %str(linktype in ("LC", "LS", "LU"));
%let andlt = %str(linktype in ("LC", "LN", "LU", "LX", "LD", "LS"));

/* Create LNK table by selecting rows with desired GVKEYs and date */
/* range. */
proc sql;
create table lnlk as select *
  from crsp.ccmxf_lnkhist
  where &andlu and &andlt
    order by gvkey, lpermno, lpermco, linkdt, linkenddt
;
NOTE: Data file CRSP.CCMXPF_LNKHIST.DATA is in a format that is native to another host, or the file encoding does not match the session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might reduce performance.

NOTE: Table WORK.LNK1 created, with 29991 rows and 8 columns.

```sql
quit;

NOTE: PROCEDURE SQL used (Total process time):
  real time           0.31 seconds
  cpu time            0.08 seconds

/* ---------------------------------------------------------------- */
/* Processing LNK table to collapse */
/* ---------------------------------------------------------------- */

data lnk2;
  set lnk1;
  by gkey lpermno lpermco linkdt linkenddt;
  format prev_ldt prev_ledt yymmddn8.;
  retain prev_ldt prev_ledt;
  if first.lpermno then do;
    if last.lpermno then do;
      /* Keep this obs if it's the first and last matching permno pair */
      output;
    end;
  else do;
    /* If it's the first but not the last pair, retain the dates for future use */
    prev_ldt = linkdt;
    prev_ledt = linkenddt;
    output;
  end;
  else do;
    if linkdt-prev_ledt+1 or linkdt-prev_ledt then do;
      /* If the date range follows the previous one, assign the previous linkdt value */
      linkdt = prev_ldt;
      prev_ldt = linkenddt;
      output;
    end;
    /* If it doesn't fall into any of the above conditions, just keep it and retain the link date range for future use*/
    output;
  end;
drop prev_ldt prev_ledt;
```

run;

NOTE: There were 29991 observations read from the data set WORK.LNK1.
NOTE: The data set WORK.LNK2 has 29991 observations and 8 variables.
NOTE: DATA statement used (Total process time):
       real time          0.22 seconds
       cpu time           0.01 seconds

   data curr.lnk;
   set lnk2;
   by gvkey lpermno linkdt;
   if last.linkdt;
   /* remove redundant observations with identical LINKDT (result of the previous data step), so that
      each consecutive pair of observations will have either different GVKEY-IID-PermNO match, or
      non-consecutive link date range
   */
run;

NOTE: There were 29991 observations read from the data set WORK.LNK2.
NOTE: The data set CURR.LNK has 27559 observations and 8 variables.
NOTE: DATA statement used (Total process time):
       real time          0.10 seconds
       cpu time           0.01 seconds

proc print data=curr.lnk (obs=100);
run;

NOTE: There were 100 observations read from the data set CURR.LNK.
NOTE: The PROCEDURE PRINT printed page 1.
NOTE: PROCEDURE PRINT used (Total process time):
       real time          0.46 seconds
       cpu time           0.01 seconds

NOTE: SAS Institute Inc., SAS Campus Drive, Cary, NC USA 27513-2414
NOTE: The SAS System used:
       real time          2.43 seconds
       cpu time           0.14 seconds
Log for Program 4: 3a_boardex_comp_empl.sas

NOTE: Copyright (c) 2002-2010 by SAS Institute Inc., Cary, NC, USA.
NOTE: SAS (r) Proprietary Software 9.3 (TS1M1)
NOTE: This session is executing on the Linux 3.2.0-38-generic (LIN X64) platform.

NOTE: Updated analytical products:
SAS/STAT 9.3_M1, SAS/ETS 9.3_M1, SAS/OR 9.3_M1
You are running SAS 9. Some SAS 8 files will be automatically converted by the V9 engine; others are incompatible. Please see http://support.sas.com/rnd/migration/planning/platform/64bit.html
PROC MIGRATE will preserve current SAS file attributes and is recommended for converting all your SAS libraries from any SAS 8 release to SAS 9. For details and examples, please see http://support.sas.com/rnd/migration/index.html

This message is contained in the SAS news file, and is presented upon initialization. Edit the file "news" in the "misc/base" directory to display site-specific news and information in the program log. The command line option "-nonews" will prevent this display.

NOTE: SAS initialization used:
real time 0.01 seconds
cpu time 0.00 seconds

options /*nonotes nosource nodate*/ nocenter nonumber ps=max ls=max; title;
*Define libraries;
libname boardex '/huge/wrds_2015/boardex';
NOTE: Libref BOARDEX was successfully assigned as follows:
Engine: V9
Physical Name: /huge/wrds_2015/boardex

libname comp '/huge/wrds_2015/comp/sasdata/nam';
NOTE: Libref COMP was successfully assigned as follows:
Engine: V9
Physical Name: /huge/wrds_2015/comp/sasdata/nam

libname curr '.';
NOTE: Libref CURR was successfully assigned as follows:
Engine: V9
Physical Name: /ssd/groups/errz/proposal_programs3

19 !
20
21  /*EACH DIRECTOR ID IS ONLY ASSOCIATED WITH A SINGLE NAME*/
22  data master_mapping; set boardex.dir_mapping_file boardex.smde_mapping_file;
NOTE: Data file BOARDEX.DIR_MAPPING_FILE.DATA is in a format that is native to another host, or the file encoding does not match the session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might reduce performance.
NOTE: Data file BOARDEX.SMDE_MAPPING_FILE.DATA is in a format that is native to another host, or the file encoding does not match the session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might reduce performance.

NOTE: There were 93634 observations read from the data set BOARDEX.DIR_MAPPING_FILE.
NOTE: There were 188566 observations read from the data set BOARDEX.SMDE_MAPPING_FILE.
NOTE: The data set WORK.MASTER_MAPPING has 282200 observations and 3 variables.
NOTE: DATA statement used (Total process time):
   real time          0.27 seconds
   cpu time           0.17 seconds

24 proc sort NODUPKEY; by director_id masked_id director_name;

NOTE: There were 282200 observations read from the data set WORK.MASTER_MAPPING.
NOTE: 21326 observations with duplicate key values were deleted.
NOTE: The data set WORK.MASTER_MAPPING has 260874 observations and 3 variables.
NOTE: PROCEDURE SORT used (Total process time):
   real time          0.08 seconds
   cpu time           0.23 seconds

25 proc sort NODUPKEY; by director_id masked_id ;

NOTE: There were 260874 observations read from the data set WORK.MASTER_MAPPING.
NOTE: 0 observations with duplicate key values were deleted.
NOTE: The data set WORK.MASTER_MAPPING has 260874 observations and 3 variables.
NOTE: PROCEDURE SORT used (Total process time):
   real time          0.08 seconds
   cpu time           0.08 seconds

26 proc sort NODUPKEY; by director_id ;

27
28  /*COMBINE SMDE AND DIRECTOR EMPLOYMENT FILES*/
29  /*SOME DATAFIELDS HAVE DIFFERENT LENGTHS ACROSS DATASETS*/
30  /*SET LENGTH FOR FIELDS WE PLAN TO USE TO AT LEAST THE MAX ACROSS THE DATASET*/

NOTE: There were 260874 observations read from the data set WORK.MASTER_MAPPING.
NOTE: 0 observations with duplicate key values were deleted.
NOTE: The data set WORK.MASTER_MAPPING has 260874 observations and 3 variables.

80
NOTE: PROCEDURE SORT used (Total process time):
real time 0.08 seconds
cpu time 0.08 seconds

32    data smde_current_nb;
33    length role $ 250;
34    length role_description $ 250;
35    set boardex.smde_empl_current_nonboard;
NOTE: Data file BOARDEX.SMDE_EMPL_CURRENT_NONBOARD.DATA is in a format that is native to another host, or the file encoding does not match the session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might reduce performance.
36    employment_file = 'smde_curr_nb';

NOTE: There were 184463 observations read from the data set BOARDEX.SMDE_EMPL_CURRENT_NONBOARD.
NOTE: The data set WORK.SMDE_CURRENT_NB has 184463 observations and 16 variables.

NOTE: DATA statement used (Total process time):
real time 0.55 seconds
cpu time 0.47 seconds

37    proc contents;
38
NOTE: The PROCEDURE CONTENTS printed page 1.
NOTE: PROCEDURE CONTENTS used (Total process time):
real time 0.02 seconds
cpu time 0.02 seconds

39    data smde_historic_nb;
40    length role $ 250;
41    length role_description $ 250;
42    set boardex.smde_empl_historic_nonboard;
NOTE: Data file BOARDEX.SMDE_EMPL_HISTORIC_NONBOARD.DATA is in a format that is native to another host, or the file encoding does not match the session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might reduce performance.
43    employment_file = 'smde_hist_nb';

NOTE: There were 998780 observations read from the data set BOARDEX.SMDE_EMPL_HISTORIC_NONBOARD.
NOTE: The data set WORK.SMDE_HISTORIC_NB has 998780 observations and 25 variables.
NOTE: DATA statement used (Total process time):
real time 6.13 seconds
cpu time 5.61 seconds

44    proc contents;
45
NOTE: The PROCEDURE CONTENTS printed page 2.
NOTE: PROCEDURE CONTENTS used (Total process time):
data smde_current_b;
length role $ 250;
set boardex.smde_empl_current_board;
NOTE: Data file BOARDEX.SMDE_EMPL_CURRENT_BOARD.DATA is in a format that is native to another host, or the file encoding does not match the session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might reduce performance.
employment_file = 'smde_curr_b';

NOTE: There were 65952 observations read from the data set BOARDEX.SMDE_EMPL_CURRENT_BOARD.
NOTE: The data set WORK.SMDE_CURRENT_B has 65952 observations and 15 variables.
NOTE: DATA statement used (Total process time):
   real time 0.22 seconds
cpu time 0.18 seconds

proc contents;

NOTE: The PROCEDURE CONTENTS printed page 3.
NOTE: PROCEDURE CONTENTS used (Total process time):
   real time 0.00 seconds
cpu time 0.00 seconds

data smde_historic_b;
length role $ 250;
length role_description $ 250;
set boardex.smde_empl_historic_board;
NOTE: Data file BOARDEX.SMDE_EMPL_HISTORIC_BOARD.DATA is in a format that is native to another host, or the file encoding does not match the session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might reduce performance.
employment_file = 'smde_hist_b';

NOTE: There were 182734 observations read from the data set BOARDEX.SMDE_EMPL_HISTORIC_BOARD.
NOTE: The data set WORK.SMDE_HISTORIC_B has 182734 observations and 16 variables.
NOTE: DATA statement used (Total process time):
   real time 1.00 seconds
cpu time 0.92 seconds

proc contents;

NOTE: The PROCEDURE CONTENTS printed page 4.
NOTE: PROCEDURE CONTENTS used (Total process time):
   real time 0.00 seconds
CPU time: 0.00 seconds

```
data dir_current_nb;
length role $ 250;
length role_description $ 250;
set boardex.dir_empl_current_nonboard;
NOTE: Data file BOARDEX.DIR_EMPL_CURRENT_NONBOARD.DATA is in a format that is native to another host, or the file encoding does not match the session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might reduce performance.
employment_file = 'dir_curr_nb ';
NOTE: There were 73693 observations read from the data set BOARDEX.DIR_EMPL_CURRENT_NONBOARD.
NOTE: The data set WORK.DIR_CURRENT_NB has 73693 observations and 13 variables.
NOTE: DATA statement used (Total process time):
  real time: 0.27 seconds
  cpu time: 0.18 seconds
```

```
proc contents;
```

NOTE: The PROCEDURE CONTENTS printed page 5.
NOTE: PROCEDURE CONTENTS used (Total process time):
  real time: 0.00 seconds
  cpu time: 0.00 seconds

```
data dir_historic_nb;
length role $ 250;
length role_description $ 250;
set boardex.dir_empl_historic_nonboard;
NOTE: Data file BOARDEX.DIR_EMPL_HISTORIC_NONBOARD.DATA is in a format that is native to another host, or the file encoding does not match the session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might reduce performance.
employment_file = 'dir_hist_nb ';
NOTE: There were 462085 observations read from the data set BOARDEX.DIR_EMPL_HISTORIC_NONBOARD.
NOTE: The data set WORK.DIR_HISTORIC_NB has 462085 observations and 14 variables.
NOTE: DATA statement used (Total process time):
  real time: 2.30 seconds
  cpu time: 2.18 seconds
```

```
proc contents;
```

NOTE: The PROCEDURE CONTENTS printed page 6.
NOTE: PROCEDURE CONTENTS used (Total process time):
  real time: 0.00 seconds
  cpu time: 0.00 seconds
data dir_current_b;
length role $ 250;
length role_description $ 250;
set boardex.dir_empl_current_board;
NOTE: Data file BOARDEX.DIR_EMPL_CURRENT_BOARD.DAT is in a format that is native to another host, or the file encoding does not match the
session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might
reduce performance.
employment_file = 'dir_curr_b ';
NOTE: There were 193153 observations read from the data set BOARDEX.DIR_EMPL_CURRENT_BOARD.
NOTE: The data set WORK.DIR_CURRENT_B has 193153 observations and 15 variables.
NOTE: DATA statement used (Total process time):
  real time           0.57 seconds
  cpu time            0.48 seconds

proc contents;

NOTE: The PROCEDURE CONTENTS printed page 7.
NOTE: PROCEDURE CONTENTS used (Total process time):
  real time           0.00 seconds
  cpu time            0.01 seconds

data dir_historic_b;
length role $ 250;
length role_description $ 250;
set boardex.dir_empl_historic_board ;
NOTE: Data file BOARDEX.DIR_EMPL_HISTORIC_BOARD.DAT is in a format that is native to another host, or the file encoding does not match the
session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and
might reduce performance.
employment_file = 'dir_hist_b ';
NOTE: There were 589501 observations read from the data set BOARDEX.DIR_EMPL_HISTORIC_BOARD.
NOTE: The data set WORK.DIR_HISTORIC_B has 589501 observations and 16 variables.
NOTE: DATA statement used (Total process time):
  real time           3.02 seconds
  cpu time            2.85 seconds

proc contents;

NOTE: The PROCEDURE CONTENTS printed page 8.
NOTE: PROCEDURE CONTENTS used (Total process time):
  real time           0.00 seconds
  cpu time            0.00 seconds
data b_employment; set smde_current_nb smde_historic_nb smde_current_b smde_historic_b dir_current_nb dir_historic_nb dir_current_b dir_historic_b;
rename DIRECTOR_ID=directorid;
start_dateFormatted = mdy(substr(start_date,1,2),substr(start_date,4,2),substr(start_date,7,4));
end_dateFormatted = mdy(substr(end_date,1,2),substr(end_date,4,2),substr(end_date,7,4));
format start_dateformatted date9.;
format end_dateformatted date9.;

/*ADD DIRECTOR_NAME TO EMPLOYEMENT FILE*/
/*FOR SOME REASON THE MAPPING FILES CALL THE DIRECTOR_ID MASKED ID*/
/*NOTE: DIRECTOR_NAME IS NEVER MISSING*/

NOTE: Character values have been converted to numeric values at the places given by: (Line):(Column).
90:28 90:51 90:74 91:26 91:47 91:68
NOTE: Missing values were generated as a result of performing an operation on missing values.
Each place is given by: (Number of times) at (Line):(Column).
1322416 at 90:24 1553997 at 91:22
NOTE: There were 184463 observations read from the data set WORK.SMDE_CURRENT_NB.
NOTE: There were 998780 observations read from the data set WORK.SMDE_HISTORIC_NB.
NOTE: There were 65952 observations read from the data set WORK.SMDE_CURRENT_B.
NOTE: There were 182734 observations read from the data set WORK.SMDE_HISTORIC_B.
NOTE: There were 73693 observations read from the data set WORK.DIR_CURRENT_NB.
NOTE: There were 462085 observations read from the data set WORK.DIR_HISTORIC_NB.
NOTE: There were 193153 observations read from the data set WORK.DIR_CURRENT_B.
NOTE: There were 589501 observations read from the data set WORK.DIR_HISTORIC_B.
NOTE: The data set WORK.B_EMPLOYMENT has 2750361 observations and 32 variables.
NOTE: DATA statement used (Total process time):
  real time 7.97 seconds
  cpu time 5.18 seconds

proc sql;
create table curr.b_employment as select
  a.*, b.director_name
from b_employment as a left join master_mapping as b
  on a.directorid = b.masked_id;
NOTE: Table CURR.B_EMPLOYMENT created, with 2750361 rows and 33 columns.
quit;
NOTE: PROCEDURE SQL used (Total process time):
  real time 18.87 seconds
  cpu time 18.63 seconds


proc contents;

NOTE: The PROCEDURE CONTENTS printed page 9.
NOTE: PROCEDURE CONTENTS used (Total process time):
   real time 0.01 seconds
   cpu time 0.00 seconds

proc freq; tables employment_file;

NOTE: There were 2750361 observations read from the data set CURR.B_EMPLOYMENT.
NOTE: The PROCEDURE FREQ printed page 10.
NOTE: PROCEDURE FREQ used (Total process time):
   real time 0.84 seconds
   cpu time 0.84 seconds

proc means;
endsas;

NOTE: There were 2750361 observations read from the data set CURR.B_EMPLOYMENT.
NOTE: The PROCEDURE MEANS printed page 11.
NOTE: PROCEDURE MEANS used (Total process time):
   real time 0.69 seconds
   cpu time 1.01 seconds

NOTE: SAS Institute Inc., SAS Campus Drive, Cary, NC USA 27513-2414
NOTE: The SAS System used:
   real time 43.08 seconds
   cpu time 39.13 seconds
Log for Program 5: 3b_add_boardex.sas

NOTE: Copyright (c) 2002-2010 by SAS Institute Inc., Cary, NC, USA.
NOTE: SAS (r) Proprietary Software 9.3 (TS1M1)
NOTE: This session is executing on the Linux 3.2.0-38-generic (LIN X64) platform.

NOTE: Updated analytical products:
SAS/STAT 9.3_M1, SAS/ETS 9.3_M1, SAS/OR 9.3_M1
You are running SAS 9. Some SAS 8 files will be automatically converted
by the V9 engine; others are incompatible. Please see
http://support.sas.com/rnd/migration/planning/platform/64bit.html
PROC MIGRATE will preserve current SAS file attributes and is
recommended for converting all your SAS libraries from any
SAS 8 release to SAS 9. For details and examples, please see
http://support.sas.com/rnd/migration/index.html

This message is contained in the SAS news file, and is presented upon
initialization. Edit the file "news" in the "misc/base" directory to
display site-specific news and information in the program log.
The command line option "-nonews" will prevent this display.

NOTE: SAS initialization used:
real time 0.01 seconds
cpu time 0.00 seconds

38   options /*nonotes nosource nodate*/ nocenter nonumber ps=max ls=max; title;
40   *Define libraries;
42   libname crsp '/huge/wrds_2015/crsp/sasdata/a_ccm';
NOTE: Libref CRSP was successfully assigned as follows:
   Engine: V9
   Physical Name: /huge/wrds_2015/crsp/sasdata/a_ccm
42   !
43   libname crspq '/huge/wrds_2015/crsp/sasdata/q_stock';
NOTE: Libref CRSPQ was successfully assigned as follows:
   Engine: V9
   Physical Name: /huge/wrds_2015/crsp/sasdata/q_stock
43   !
44   libname boardex '/huge/wrds_2015/boardex';
NOTE: Libref BOARDEX was successfully assigned as follows:
Engine: V9
Physical Name: /huge/wrds_2015/boardex
NOTE: Libref COMP was successfully assigned as follows:
Engine: V9
Physical Name: /huge/wrds_2015/comp/sasdata/nam
NOTE: Libref CURR was successfully assigned as follows:
Engine: V9
Physical Name: /ssd/groups/errz/proposal_programs3

/*NOTE BOARDEX ONLY BEGINS COVERAGE WITH ANNUAL REPORTS DATED JANUARY 1999*/
data boardex_id; set curr.updateallsix (keep =gvkey companyid); where gvkey ne '';
NOTE: There were 8579 observations read from the data set CURR.UPDATEALLSIX.
WHERE gvkey not = '';
NOTE: The data set WORK.BOARDEX_ID has 8579 observations and 2 variables.
NOTE: DATA statement used (Total process time):
real time 0.01 seconds
cpu time 0.02 seconds

proc sort NODUPKEY; by companyid;
NOTE: There were 8579 observations read from the data set WORK.BOARDEX_ID.
NOTE: 0 observations with duplicate key values were deleted.
NOTE: The data set WORK.BOARDEX_ID has 8579 observations and 2 variables.
NOTE: PROCEDURE SORT used (Total process time):
real time 0.00 seconds
cpu time 0.00 seconds

proc sort NODUPKEY; by gvkey;

/*THERE ARE CURRENTLY MULTIPLE COMPANYIDs WITH THE SAME GVKEY*/

NOTE: There were 8579 observations read from the data set WORK.BOARDEX_ID.
NOTE: 258 observations with duplicate key values were deleted.
NOTE: The data set WORK.BOARDEX_ID has 8321 observations and 2 variables.
NOTE: PROCEDURE SORT used (Total process time):
real time 0.00 seconds
cpu time 0.00 seconds
proc sql;
!
create table temp as select a.*, b.companyid as B_companyid from curr.execucomp_turnover as a LEFT JOIN boardex_id as b on a.E_gvkey = b.gvkey;
NOTE: Table WORK.TEMP created, with 6057 rows and 24 columns.
!
quit;
NOTE: PROCEDURE SQL used (Total process time):
real time 0.01 seconds
cpu time 0.02 seconds
!
/*GET THE COMPANY NAME*/
proc sql;
!
create table tempb as select a.*, b.COMPANY_NAME as B_COMPANY_NAME from temp as a LEFT JOIN boardex.company_details as b on a.B_companyid = b.companyid;
NOTE: Data file BOARDEX.COMPANY_DETAILS.DAT is in a format that is native to another host, or the file encoding does not match the session encoding. Cross EnviRonment Data Access will be used, which might require additional CPU resources and might reduce performance.
NOTE: Table WORK.TEMPB created, with 6057 rows and 25 columns.
!
quit;
NOTE: PROCEDURE SQL used (Total process time):
real time 0.04 seconds
cpu time 0.04 seconds
!
/*KEEP THE ONE THAT HAS THE CLOSEST NAME MATCH*/
data tempb; set tempb;
B_co_name_score = compged(trim(upcase(B_COMPANY_NAME)),trim(upcase(E_CONAME)));
NOTE: There were 6057 observations read from the data set WORK.TEMPB.
NOTE: The data set WORK.TEMPB has 6057 observations and 26 variables.
NOTE: DATA statement used (Total process time):
real time 0.01 seconds
cpu time 0.02 seconds
!
proc sort; by sample_id B_co_name_score;
NOTE: There were 6057 observations read from the data set WORK.TEMPB.
NOTE: The data set WORK.TEMPB has 6057 observations and 26 variables.
NOTE: PROCEDURE SORT used (Total process time):
   real time 0.00 seconds
   cpu time 0.01 seconds

77 proc sort NODUPKEY; by sample_id;
78    /*GET PERMNO FROM LINK FILE*/

NOTE: There were 6057 observations read from the data set WORK.TEMPB.
NOTE: 0 observations with duplicate key values were deleted.
NOTE: The data set WORK.TEMPB has 6057 observations and 26 variables.
NOTE: PROCEDURE SORT used (Total process time):
   real time 0.00 seconds
   cpu time 0.01 seconds

81 proc sql;
81    !
82 create table tempc as select
83    a.*, b.permno as C_permno, b.linkprim as C_linkprim
84    from tempb as a
85    left join curr.lnk as b
86    on a.E_gvkey = b.gvkey
87    and b.LINKTYPE in ('LU','LC','LD','LF','LN','LO','LS','LX')
88    and (b.LINKDT<=a.E_BECAMECEO)
89    and (a.E_BECAMECEO<b.LINKENDDT or b.LINKENDDT=.E);

NOTE: Table WORK.TEMPC created, with 6116 rows and 28 columns.

88 quit;
89 NOTE: PROCEDURE SQL used (Total process time):
   real time 0.03 seconds
   cpu time 0.04 seconds

89 !
90 /*REQUIRE A PERMNO*/
91 data tempc; set tempc; where C_permno ne .;
93 /*SET PRIORITY ACROSS LINKPRIM TYPES*/
94 if C_linkprim = 'F' then C_priority = 1;
95 else if C_linkprim = 'C' then C_priority = 2;
96 else if C_linkprim = 'J' then C_priority = 3;
97 else C_priority = 4;

NOTE: There were 5156 observations read from the data set WORK.TEMPC.
WHERE C_permno not = .;
proc sort ; by sample_id C_permno C_priority;

/*GET FIRST TRADING DATES FOR ALL CRSP SECURITIES BASED ON MONTHLY STOCK FILE*/

data first_crsp; set crspq.msf (keep = permno date); by permno;
NOTE: Data file CRSPQ.MSF.DATA is in a format that is native to another host, or the file encoding does not match the session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might reduce performance.
if first.permno ne 1 then delete;
/*MERGE IN FIRST TRADING DATE*/

proc sql;
create table tempd as select a.*, b.date as C_first_trading_date
from tempc as a LEFT JOIN first_crsp as b
on a.C_permno = permno;
NOTE: Table WORK.TEMPD created, with 5097 rows and 30 columns.

proc sort NODUPKEY; by sample_id;
/*MERGE IN FIRST TRADING DATE*/
NOTE: PROCEDURE SQL used (Total process time):
real time 0.02 seconds
cpu time 0.02 seconds

NOTE: There were 5095 observations read from the data set WORK.TEMPD.
WHERE (E_becameceo-C_first_trading_date)>0;
NOTE: The data set WORK.TEMPD has 5095 observations and 29 variables.
NOTE: DATA statement used (Total process time):
real time 0.00 seconds
cpu time 0.01 seconds

NOTE: The data set WORK.B_EMPLOYMENT_CEO has 67393 observations and 6 variables.
NOTE: DATA statement used (Total process time):
real time 2.33 seconds
cpu time 2.33 seconds

NOTE: There were 67393 observations read from the data set CURR.B_EMPLOYMENT.
WHERE (INDEX(UPCASE(ROLE), 'CEO')>0) and (Company_type='Quoted') and (start_date_formatted not = .);
NOTE: The data set WORK.B_EMPLOYMENT_CEO has 67393 observations and 6 variables.
NOTE: DATA statement used (Total process time):
real time 2.33 seconds
cpu time 2.33 seconds

proc sort NODUPLICATE; by B_directorid B_start_date_formatted; /*ASSUMES YOU DON'T START TWO DIFFERENT CEO JOBS ON THE SAME DAY*/

/*REQUIRE SECURITY TO BE TRADED PRIOR TO THE CEO TAKING OFFICE*/
data tempd; set tempd (drop = C_priority); where E_becameceo-C_first_trading_date gt 0;

/*GET ALL CEO POSITION START DATES*/
NOTE: There were 5095 observations read from the data set WORK.TEMPD.
WHERE (E_becameceo-C_first_trading_date)>0;
NOTE: The data set WORK.TEMPD has 5095 observations and 29 variables.
NOTE: DATA statement used (Total process time):
real time 0.00 seconds
cpu time 0.01 seconds

data b_employment_ceo; set curr.b_employment (keep = Company_type DIRECTOR_NAME DIRECTORID role start_date_formatted COMPANYID);
where index(upcase(ROLE),'CEO') >0 and Company_type = 'Quoted' and start_date_formatted ne .;

Rename
DIRECTOR_NAME =  B_DIRECTOR_NAME
DIRECTORID  =   B_DIRECTORID
role  =   B_role
start_date_formatted =  B_start_date_formatted
COMPANYID =   B_COMPANYID;

NOTE: There were 67393 observations read from the data set CURR.B_EMPLOYMENT.
WHERE (INDEX(UPCASE(ROLE), 'CEO')>0) and (Company_type='Quoted') and (start_date_formatted not = .);
NOTE: The data set WORK.B_EMPLOYMENT_CEO has 67393 observations and 6 variables.
NOTE: DATA statement used (Total process time):
real time 2.33 seconds
cpu time 2.33 seconds

proc sort NODUPLICATE; by B_directorid B_start_date_formatted; /*ASSUMES YOU DON'T START TWO DIFFERENT CEO JOBS ON THE SAME DAY*/

/*GET DIRECTORID BASED ON A COMBINATION:
1 - MATCHING BASED ON START DATE
2 - MATCHING ON NAME*/
/*START*/

NOTE: There were 67393 observations read from the data set WORK.B_EMPLOYMENT_CEO.
NOTE: 29293 observations with duplicate key values were deleted.
NOTE: The data set WORK.B_EMPLOYMENT_CEO has 38100 observations and 6 variables.

NOTE: PROCEDURE SORT used (Total process time):
real time          0.04 seconds
cpu time           0.03 seconds

136 proc sql;
137 !
138 create table temp2 as select
139     a.*, b.*
140     from tempd as a LEFT JOIN b_employment_ceo as b
141     on a.B_companyid = b.B_COMPANYID
142     and a.E_becameceo=b.B_start_date_formatted;
WARNING: Variable B_COMPANYID already exists on file WORK.TEMP2.
NOTE: Table WORK.TEMP2 created, with 5171 rows and 34 columns.
144 !
145 quit;

NOTE: PROCEDURE SQL used (Total process time):
real time          0.05 seconds
cpu time           0.09 seconds

142 !
143
144 data temp2; set temp2;
145 E_EXEC_LNAME_mod=scan(E_EXEC_LNAME,1,','); /*STRIPS OFF JR, III, Ph.D, etc...when EXECCOMP USES COMMAS*/
146 E_EXEC_LNAME_mod2=scan(E_EXEC_LNAME_mod,1,','); /*STRIPS OFF JR, III, Ph.D, etc...when EXECCOMP USES SPACES*/
147 E_EXEC_FNAME=compress(E_EXEC_FNAME,..);
148 E_EXEC_LNAME_mod=compress(E_EXEC_LNAME_mod,..);
149 if index(upcase(B_DIRECTOR_NAME),trim(upcase(E_EXEC_FNAME)))> 0 then B_match_first_name = 1; else B_match_first_name=0 ;
150 if index(upcase(B_DIRECTOR_NAME),trim(upcase(E_EXEC_LNAME_mod2))) > 0 then B_match_last_name = 1; else B_match_last_name=0 ;
151 B_score = compged(upcase(B_DIRECTOR_NAME),upcase(E_EXEC_FULLNAME));
153 /*IF MULTIPLE PEOPLE AT THE SAME FIRM HAVE BOTH A FIRST AND LAST NAME MATCH, THEN CHOOSE THE CLOSEST MATCH*/
154 /*THERE IS ONLY ONE EXECCOMP PERSON WHO MATCHES ON FIRST AND LAST NAME TO MORE THAN ONE BOARDEX PERSON (GIVEN ALL OF THE SAMPLE REQUIREMENT ABOVE)*/
155 /*THIS SORT ENSURES THE CORRECT MATCH IS PRESERVED*/

NOTE: Numeric values have been converted to character values at the places given by: (Line):(Column).
148:36  149:44
NOTE: There were 5171 observations read from the data set WORK.TEMP2.
NOTE: The data set WORK.TEMP2 has 5171 observations and 39 variables.

NOTE: DATA statement used (Total process time):
real time          0.02 seconds
cpu time           0.01 seconds

157 proc sort; by sample_id DESCENDING B_match_last_name DESCENDING B_match_first_name B_score;
NOTE: There were 5171 observations read from the data set WORK.TEMP2.
NOTE: The data set WORK.TEMP2 has 5171 observations and 39 variables.
NOTE: PROCEDURE SORT used (Total process time):
  real time           0.01 seconds
  cpu time            0.02 seconds

proc sort NODUPKEY; by sample_id;

NOTE: There were 5171 observations read from the data set WORK.TEMP2.
NOTE: 76 observations with duplicate key values were deleted.
NOTE: The data set WORK.TEMP2 has 5095 observations and 39 variables.
NOTE: PROCEDURE SORT used (Total process time):
  real time           0.01 seconds
  cpu time            0.02 seconds

data temp2; set temp2 (drop=B_start_date_formatted);
/*CLEAR OUT DATA FOR (LIKELY) BAD MATCHES*/
if B_match_first_name = 0 or B_match_last_name = 0 then B DIRECTOR_NAME = '';
if B_match_first_name = 0 or B_match_last_name = 0 then B DIRECTORID = .;
if B_match_first_name = 0 or B_match_last_name = 0 then B_role = '';

/*GET ALL EXECUTIVE-COMPANY START DATES (EXCLUDES DIRECTOR START DATES)*/
/*THIS DATASET IS A COMBINATION OF 8 DATASETS THAT USE TWO DIFFERENT (MUTUALLY EXCLUSIVE) VARIABLES TO CAPTURE WHETHER THE PERSON WAS ACTUALLY AN EXECUTIVE (AS OPPOSED TO JUST A BOARD MEMBER)*/

NOTE: There were 5095 observations read from the data set WORK.TEMP2.
NOTE: The data set WORK.TEMP2 has 5095 observations and 38 variables.
NOTE: DATA statement used (Total process time):
  real time           0.01 seconds
  cpu time            0.01 seconds

data b_employment_comp; set curr.b_employment (keep = Company_type DIRECTOR_NAME DIRECTORID role start_date_formatted COMPANYID ED_NED ED_NED_SM); where Company_type = 'Quoted' and start_date_formatted ne .;
if ED_NED ne 'ED' and ED_NED_SM ne 'SM' then delete;

NOTE: There were 820467 observations read from the data set CURR.B_EMPLOYMENT.
WHERE (Company_type='Quoted') and (start_date_formatted ne .);
NOTE: The data set WORK.B_EMPLOYMENT_COMP has 481657 observations and 8 variables.
NOTE: DATA statement used (Total process time):
  real time           0.92 seconds
  cpu time            0.93 seconds

proc sort; by directorid COMPANYID start_date_formatted;
NOTE: There were 481657 observations read from the data set WORK.B_EMPLOYMENT_COMP.
NOTE: The data set WORK.B_EMPLOYMENT_COMP has 481657 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
  real time    0.35 seconds
  cpu time     0.48 seconds

174      proc sort NODUPKEY; by directorid COMPANYID;
175
176      /*GET DATE THAT THE CEO JOINED THE COMPANY AS AN EXECUTIVE (NOT JUST A DIRECTOR)*/

NOTE: There were 481657 observations read from the data set WORK.B_EMPLOYMENT_COMP.
NOTE: 252630 observations with duplicate key values were deleted.
NOTE: The data set WORK.B_EMPLOYMENT_COMP has 229027 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
  real time    0.23 seconds
  cpu time     0.38 seconds

178      proc sql;
179      !
180      create table temp3 as select
181      a.*, b.start_date_formatted as B_starting_date_company, b.role as B_starting_role
182      from temp2 as a LEFT JOIN b employment_comp as b
183      on a.B_companyid = b.COMPANYID
184      and a.B_directorid=b.directorid;
NOTE: Table WORK.TEMP3 created, with 5095 rows and 40 columns.

183      !
184      quit;
NOTE: PROCEDURE SQL used (Total process time):
  real time    0.20 seconds
  cpu time     0.34 seconds

184      !
185
186      data temp3; set temp3;
187      if B_starting_date_company = . or B_starting_date_company > E_BECAMECEO then B_hire_type='not available';
188      else if E_BECAMECEO - B_starting_date_company <= 365 then B_hire_type='external hire';
189      else if (E_BECAMECEO - B_starting_date_company) <= 365 then B_hire_type='external heir';
190      else if (E_BECAMECEO - B_starting_date_company) > 365 then B_hire_type='internal';

NOTE: There were 5095 observations read from the data set WORK.TEMP3.
NOTE: The data set WORK.TEMP3 has 5095 observations and 41 variables.
NOTE: DATA statement used (Total process time):
  real time    0.01 seconds
  cpu time     0.01 seconds
proc freq; tables E_hire_type B_hire_type E_hire_type*B_hire_type;
/*GET ALL EXECUTIVE-COMPANY END DATES (EXCLUDES DIRECTOR END DATES)*/
/*THIS DATASET IS A COMBINATION OF 8 DATASETS THAT USE TWO DIFFERENT (MUTUALLY EXCLUSIVE) VARIABLES TO CAPTURE WHETHER THE PERSON
WAS ACTUALLY AN EXECUTIVE
(AS OPPOSED TO JUST A BOARD MEMBER)*/
NOTE: There were 5095 observations read from the data set WORK.TEMP3.
NOTE: The PROCEDURE FREQ printed page 1.
NOTE: PROCEDURE FREQ used (Total process time):
  real time           0.01 seconds
  cpu time            0.03 seconds

proc sort NODUPKEY; by directorid COMPANYID;
/*GET DATE THAT THE CEO LEFT HIS/HER PRIOR EXECUTIVE POSITION*/
NOTE: There were 437324 observations read from the data set WORK.B_EMPLOYMENT_PRIOR.
NOTE: The data set WORK.B_EMPLOYMENT_PRIOR has 437324 observations and 9 variables.
NOTE: PROCEDURE SORT used (Total process time):
  real time           0.30 seconds
  cpu time            0.41 seconds

proc sql;
!
create table temp4 as select a.*, b.end_date_formatted as B_prior_end_date, b.companyid as B_prior_companyid, b.role as B_prior_role, b.COMPANY_NAME as B_prior_COMPANY_NAME from temp3 as a left join b_employment_prior as b on a.B_companyid ne b.COMPANYID and a.B_directorid = b.directorid and a.E_becameceo = b.end_date_formatted;

NOTE: Table WORK.TEMP4 created, with 5689 rows and 45 columns.

quit;

NOTE: PROCEDURE SQL used (Total process time):
real time 0.22 seconds
cpu time 0.30 seconds

/*KEEP MOST RECENT PRIOR JOB OBS*/
data curr.execucomp_boardex_turnover; set temp4;

NOTE: There were 5689 observations read from the data set WORK.TEMP4.
NOTE: The data set CURR.EXEUCOMP_BOARDEX_TURNOVER has 5689 observations and 45 variables.
NOTE: DATA statement used (Total process time):
real time 0.01 seconds
cpu time 0.01 seconds

proc sort; by sample_id descending B_prior_end_date;

NOTE: There were 5689 observations read from the data set CURR.EXEUCOMP_BOARDEX_TURNOVER.
NOTE: The data set CURR.EXEUCOMP_BOARDEX_TURNOVER has 5689 observations and 45 Variables.
NOTE: PROCEDURE SORT used (Total process time):
real time 0.02 seconds
cpu time 0.03 seconds

proc sort nodupkey; by sample_id;

NOTE: There were 5689 observations read from the data set CURR.EXEUCOMP_BOARDEX_TURNOVER.
NOTE: 594 observations with duplicate key values were deleted.
NOTE: The data set CURR.EXEUCOMP_BOARDEX_TURNOVER has 5095 observations and 45 variables.
NOTE: PROCEDURE SORT used (Total process time):
real time 0.01 seconds
cpu time 0.02 seconds

proc contents;

NOTE: The PROCEDURE CONTENTS printed page 2.
NOTE: PROCEDURE CONTENTS used (Total process time):
proc means;
endsas;
NOTE: There were 5095 observations read from the data set CURR.EXECUCOMP_BOARDEX_TURNOVER.
NOTE: PROCEDURE MEANS printed page 3.
NOTE: PROCEDURE MEANS used (Total process time):
  real time 0.00 seconds
  cpu time 0.01 seconds

NOTE: SAS Institute Inc., SAS Campus Drive, Cary, NC USA 27513-2414
NOTE: The SAS System used:
  real time 8.62 seconds
  cpu time 9.31 seconds
Log for Program 6: 04a_add_insider.sas

NOTE: Copyright (c) 2002-2010 by SAS Institute Inc., Cary, NC, USA.
NOTE: SAS (r) Proprietary Software 9.3 (TS1M1)
NOTE: This session is executing on the Linux 3.2.0-38-generic (LIN X64) platform.

NOTE: Updated analytical products:
SAS/STAT 9.3_M1, SAS/ETS 9.3_M1, SAS/OR 9.3_M1
You are running SAS 9. Some SAS 8 files will be automatically converted by the V9 engine; others are incompatible. Please see http://support.sas.com/rnd/migration/planning/platform/64bit.html
PROC MIGRATE will preserve current SAS file attributes and is recommended for converting all your SAS libraries from any SAS 8 release to SAS 9. For details and examples, please see http://support.sas.com/rnd/migration/index.html
This message is contained in the SAS news file, and is presented upon initialization. Edit the file "news" in the "misc/base" directory to display site-specific news and information in the program log.
The command line option "-nonews" will prevent this display.

NOTE: SAS initialization used:
real time 0.01 seconds
cpu time 0.00 seconds

options /*nonotes nosource nodate*/ nocenter nonumber ps=max ls=max; title;
*Define libraries;
libname boardex '/huge/wrds_2015/boardex';
NOTE: Libref BOARDEX was successfully assigned as follows:
   Engine: V9
   Physical Name: /huge/wrds_2015/boardex
   ! *CompanyDetails file and output file;
libname comp '/huge/wrds_2015/comp/sasdata/nam';
NOTE: Libref COMP was successfully assigned as follows:
   Engine: V9
   Physical Name: /huge/wrds_2015/comp/sasdata/nam
   ! *THIS IS WHERE THE COMPUSTAT DATA IS LOCATED;
libname tfn '/huge/wrds_2015/tfn/sasdata/insiders';
NOTE: Libref TFN was successfully assigned as follows:
Engine:        V9
Physical Name: /huge/wrds_2015/tfn/sasdata/insiders

! libname curr ".";
NOTE: Libref CURR was successfully assigned as follows:
Engine:        V9
Physical Name: /ssd/groups/errz/proposal_programs3

/*GET A LIST OF ALL FIRMS IN TFN*/
/*GET TABLE 1 & 2 DATA*/
/*NOTE: FIRMS NAMES IN TFN ARE NOT UNIQUE AT THE NINE-DIGIT CUSIP LEVEL*/
data tfn_firms ; set tfn.table1 (keep = cusip6 cusip2  CNAME secid) tfn.table2 (keep = cusip6 cusip2  CNAME secid);
rename
cusip6 = T_cusip6
cusip2 = T_cusip2
CNAME = T_CNAME
secid = T_secid;
T_cusip = cusip6 || cusip2;
NOTE: There were 13272087 observations read from the data set TFN.TABLE1.
NOTE: There were 9350939 observations read from the data set TFN.TABLE2.
NOTE: The data set WORK.TFN_FIRMS has 22623026 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time       5.62 seconds
      cpu time        5.52 seconds

proc sort NODUPKEY; by T_secid T_CNAME;
NOTE: There were 22623026 observations read from the data set WORK.TFN_FIRMS.
NOTE: 22591040 observations with duplicate key values were deleted.
NOTE: The data set WORK.TFN_FIRMS has 31986 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time       5.48 seconds
      cpu time        11.32 seconds

proc sort NODUPKEY; by T_secid ;
/*GET THE COMPANY NAME AND SECURITY ID FROM TFN*/
NOTE: There were 31986 observations read from the data set WORK.TFN_FIRMS.
NOTE: 3382 observations with duplicate key values were deleted.
NOTE: The data set WORK.TFN_FIRMS has 28604 observations and 5 variables.
proc sql;
create table temp as select 
a.*, b.T_secid, b.T_cname 
from curr.execucomp_boardex_turnover as a 
LEFT JOIN tfn_firms as b 
on a.E_cusip = b.T_cusip;
QUIT;
proc sort; by sample_id T_co_name_score;
proc sort NODUPKEY; by sample_id; /*This deletes 17 observations*/
NOTE: PROCEDURE SORT used (Total process time):
real time 0.01 seconds
cpu time 0.01 seconds

data ceo_trades; set tfn.table1 (keep = OWNER rolecode1 rolecode2 rolecode3 rolecode4 personid secid cusip6 cusip2 cusipx trandate cleanse);
tfn.table2 (keep = OWNER rolecode1 rolecode2 rolecode3 rolecode4 personid secid cusip6 cusip2 cusipx trandate cleanse); where rolecode1 = 'CEO';
NOTE: There were 1481272 observations read from the data set TFN.TABLE1.
NOTE: There were 882876 observations read from the data set TFN.TABLE2.
NOTE: The data set WORK.CEO_TRADES has 2364148 observations and 12 variables.
NOTE: DATA statement used (Total process time):
real time 2.52 seconds
cpu time 2.52 seconds

proc sort NODUPKEY; by secid personid trandate; /*ONLY KEEP ONE TRADE PER DAY*/
NOTE: There were 2364148 observations read from the data set WORK.CEO_TRADES.
NOTE: 1730357 observations with duplicate key values were deleted.
NOTE: The data set WORK.CEO_TRADES has 633791 observations and 12 variables.
NOTE: PROCEDURE SORT used (Total process time):
real time 0.66 seconds
cpu time 1.57 seconds

data all_trades; set tfn.table1 (keep = CNAME OWNER rolecode1 rolecode2 rolecode3 rolecode4 personid secid cusip6 cusip2 cusipx trandate cleanse);
tfn.table2 (keep = CNAME OWNER rolecode1 rolecode2 rolecode3 rolecode4 personid secid cusip6 cusip2 cusipx trandate cleanse);

/*CEO DUMMY */
if rolecode1 in ('CEO') then T_ceo = 1;
else if rolecode2 in ('CEO') then T_ceo = 1;
else if rolecode3 in ('CEO') then T_ceo = 1;
else if rolecode4 in ('CEO') then T_ceo = 1;
else T_ceo = 0;

/*EXECUTIVE DUMMY (EXCLUDES INSIDERS WHO ARE JUST DIRECTORS, BENEFICIAL OWNERS, etc...*/
if rolecode1 in ('AV' 'CEO' 'CFO' 'CI' 'CO' 'CT' 'EC' 'EVP' 'O' 'OB' 'OP' 'OS' 'OT' 'OX' 'P' 'S' 'SVP' 'VP') then T_executive = 1;
else if rolecode2 in ('AV' 'CEO' 'CFO' 'CI' 'CO' 'CT' 'EC' 'EVP' 'O' 'OB' 'OP' 'OS' 'OT' 'OX' 'P' 'S' 'SVP' 'VP') then T_executive = 1;
else if rolecode3 in ('AV' 'CEO' 'CFO' 'CI' 'CO' 'CT' 'EC' 'EVP' 'O' 'OB' 'OP' 'OS' 'OT' 'OX' 'P' 'S' 'SVP' 'VP') then T_executive = 1;
else if rolecode4 in ("AV" "CEO" "CFO" "CI" "CO" "CT" "EC" "EVP" "O" "OB" "OP" "OS" "OT" "OX" "P" "S" "SVP" "VP") then T_executive = 1;
else T_executive = 0;

NOTE: There were 13272087 observations read from the data set TFN.TABLE1.
NOTE: There were 9350993 observations read from the data set TFN.TABLE2.
NOTE: The data set WORK.ALL TRADES has 22623026 observations and 15 variables.
NOTE: DATA statement used (Total process time):
         real time           9.15 seconds
         cpu time            8.50 seconds

proc sort NODUPKEY; by secid personid trandate; /*ONLY KEEP ONE TRADE PER DAY*/

proc sql;
create table temp2 as select a.*, b.personid as T_personid, b.owner as T_owner, b.trandate as T_trandate
from tempb as a LEFT JOIN ceo_trades as b
on a.T_secid = b.secid;
NOTE: Table WORK.TEMP2 created, with 494257 rows and 51 columns.
quit;

proc sql;
data temp2; set temp2;
T_diff_abs = abs(T_trandate - E_becameceo);
T_diff_signed = T_trandate - E_becameceo;
/*KEEP THE TRADE CLOSEST TO BECOMING CEO*/
/*NOTE: THIS CAN STILL INCLUDE MULTIPLE TFN PERSONIDS,
WE USE NAME MATCHING BELOW TO FIND THE BEST MATCH*/
NOTE: Missing values were generated as a result of performing an operation on missing values.
Each place is given by: (Number of times) at (Line):(Column).
445 at 120:13
445 at 120:28
445 at 121:28
NOTE: There were 494257 observations read from the data set WORK.TEMP2.
NOTE: The data set WORK.TEMP2 has 494257 observations and 53 variables.
NOTE: DATA statement used (Total process time):
real time 2.25 seconds
cpu time 1.33 seconds

126 proc sort; by sample_id T_personid T_diff_abs;

NOTE: There were 494257 observations read from the data set WORK.TEMP2.
NOTE: The data set WORK.TEMP2 has 494257 observations and 53 variables.
NOTE: PROCEDURE SORT used (Total process time):
real time 2.98 seconds
cpu time 3.68 seconds

127 proc sort NODUPKEY; by sample_id T_personid;
128

NOTE: There were 494257 observations read from the data set WORK.TEMP2.
NOTE: 475552 observations with duplicate key values were deleted.
NOTE: The data set WORK.TEMP2 has 18705 observations and 53 variables.
NOTE: PROCEDURE SORT used (Total process time):
real time 0.69 seconds
cpu time 0.86 seconds

129 data temp2; set temp2;
130 if index(upcase(T_OWNER),trim(upcase(E_EXEC_FNAME)))> 0 then T_match_first_name = 1; else T_match_first_name=0 ;
131 if index(upcase(T_OWNER),trim(upcase(E_EXEC_LNAME_mod2))) > 0 then T_match_last_name = 1; else T_match_last_name=0 ;
132 T_score = compged(upcase(T_OWNER),upcase(E_EXEC_FULLNAME));
133
134 /*IF MULTIPLE PEOPLE AT THE SAME FIRM HAVE BOTH A FIRST AND LAST NAME MATCH, THEN CHOOSE THE CLOSEST MATCH*/
135 /*THIS SORT ENSURES THE BEST MATCH IS PRESERVED*/

NOTE: There were 18705 observations read from the data set WORK.TEMP2.
NOTE: The data set WORK.TEMP2 has 18705 observations and 56 variables.
NOTE: DATA statement used (Total process time):
real time 0.15 seconds
cpu time 0.14 seconds

136 proc sort; by sample_id DESCENDING T_match_last_name DESCENDING T_match_first_name T_score;

NOTE: There were 18705 observations read from the data set WORK.TEMP2.
NOTE: The data set WORK.TEMP2 has 18705 observations and 56 variables.
NOTE: PROCEDURE SORT used (Total process time):
real time 0.08 seconds
cpu time 0.08 seconds
proc sort NODUPKEY; by sample_id;

NOTE: There were 18705 observations read from the data set WORK.TEMP2.
NOTE: 13610 observations with duplicate key values were deleted.
NOTE: The data set WORK.TEMP2 has 5095 observations and 56 variables.
NOTE: PROCEDURE SORT used (Total process time):
   real time           0.04 seconds
   cpu time            0.05 seconds

data temp2 ; set temp2 /*(keep = OWNER EXEC_FNAME EXEC_LNAME match_first_name match_last_name)*; /*
if T_match_first_name = 0 or T_match_last_name =0 then T_owner = '';
if T_match_first_name = 0 or T_match_last_name =0 then T_personid = .;
if T_match_first_name = 0 or T_match_last_name =0 then T_diff_abs = .;
if T_match_first_name = 0 or T_match_last_name =0 then T_diff_signed = .;
if T_match_first_name = 0 or T_match_last_name =0 then T_trandate = .;

NOTE: There were 5095 observations read from the data set WORK.TEMP2.
NOTE: The data set WORK.TEMP2 has 5095 observations and 56 variables.
NOTE: DATA statement used (Total process time):
   real time           0.01 seconds
   cpu time            0.02 seconds

proc means;

NOTE: There were 5095 observations read from the data set WORK.TEMP2.
NOTE: The PROCEDURE MEANS printed page 1.
NOTE: PROCEDURE MEANS used (Total process time):
   real time           0.01 seconds
   cpu time            0.01 seconds

data temp2 ; set temp2 (drop = T_diff_abs T_diff_signed T_trandate T_match_last_name T_match_first_name);
/*SOMETIMES NEW CEOs STILL FILE USING THEIR FORMER ROLE*/
/*NOW THAT WE HAVE GOOD PERSONID MATCHES, WE CAN LOOK FOR CLOSER MATCHING TO BECAMCEO DATE*/

NOTE: There were 5095 observations read from the data set WORK.TEMP2.
NOTE: The data set WORK.TEMP2 has 5095 observations and 51 variables.
NOTE: DATA statement used (Total process time):
   real time           0.01 seconds
   cpu time            0.01 seconds

proc sql;
create table temp3 as select a.*, b.trandate as T_trandate, b.rolecode1 as T_rolecode1, b.rolecode2 as T_rolecode2, b.rolecode3 as T_rolecode3, b.rolecode4 as T_rolecode4 from temp2 as a LEFT JOIN all_trades as b on a.T_secid = b.secid and a.T_personid = b.personid;

NOTE: Table WORK.TEMP3 created, with 268222 rows and 56 columns.

! quit;

NOTE: PROCEDURE SQL used (Total process time):
real time 2.77 seconds
cpu time 5.19 seconds

! data temp3; set temp3;
T_diff_abs= abs(T_trandate - E_becameceo);
T_diff_signed = T_trandate - E_becameceo;

NOTE: Missing values were generated as a result of performing an operation on missing values.
Each place is given by: (Number of times) at (Line):(Column).
1016 at 160:13 1016 at 160:28 1016 at 161:28
NOTE: There were 268222 observations read from the data set WORK.TEMP3.
NOTE: The data set WORK.TEMP3 has 268222 observations and 58 variables.
NOTE: DATA statement used (Total process time):
real time 1.44 seconds
cpu time 0.77 seconds

proc sort; by sample_id T_diff_abs;
/*KEEP THE TRADE CLOSEST TO BECOMING CEO*/

NOTE: There were 268222 observations read from the data set WORK.TEMP3.
NOTE: The data set WORK.TEMP3 has 268222 observations and 58 variables.
NOTE: PROCEDURE SORT used (Total process time):
real time 1.52 seconds
cpu time 2.10 seconds

proc sort NODUPKEY; by sample_id;
/*OF THE CEO WHO WE WERE ABLE TO MATCH TO TFN, 49.6% (30.6%) [19.6%] OF THEM TRADE WITHIN 30 (7) [1] DAY(S) OF BEING NAMED CEO*/
/*proc freq; tables diff_signed;*/

/*GET ALL EXECUTIVE-COMPANY FIRST TRADE DATES (EXCLUDES DIRECTOR ONLY TRADES, ETC...)*/

NOTE: There were 268222 observations read from the data set WORK.TEMP3.
NOTE: 263127 observations with duplicate key values were deleted.
NOTE: The data set WORK.TEMP3 has 5095 observations and 58 variables.
NOTE: PROCEDURE SORT used (Total process time):
real time          0.41 seconds
cpu time           0.47 seconds

data first_exec_trades; set all_trades; where T_executive = 1;

NOTE: There were 4040833 observations read from the data set WORK.ALL_TRADES.
WHERE T_executive=1;
NOTE: The data set WORK.FIRST_EXEC_TRADES has 4040833 observations and 15 variables.
NOTE: DATA statement used (Total process time):
real time          1.29 seconds
cpu time           1.29 seconds

proc sort; by secid personid trandate;

NOTE: There were 4040833 observations read from the data set WORK.FIRST_EXEC_TRADES.
NOTE: The data set WORK.FIRST_EXEC_TRADES has 4040833 observations and 15 variables.
NOTE: PROCEDURE SORT used (Total process time):
real time          2.38 seconds
cpu time           4.07 seconds

proc sort NODUPKEY; by secid personid;
proc sql;
create table temp4 as select a.*, b.trandate as T_first_trandate_company, b.T_ceo as T_first_rolecode_ceo
from temp3 as a left join first_exec_trades as b
on a.T_secid = b.secid
and b.personid=b.personid;
NOTE: Table WORK.TEMP4 created, with 5095 rows and 60 columns.
quit;
NOTE: PROCEDURE SQL used (Total process time):
data last_exec_trades; set all_trades; where T_executive = 1;

NOTE: There were 4040833 observations read from the data set WORK.ALL_TRADES.
WHERE T_executive=1;
NOTE: The data set WORK.LAST_EXEC_TRADES has 4040833 observations and 15 variables.
NOTE: DATA statement used (Total process time):
real time 1.33 seconds
cpu time 1.33 seconds

proc sort; by secid personid DESCENDING trandate;

NOTE: There were 4040833 observations read from the data set WORK.LAST_EXEC_TRADES.
NOTE: The data set WORK.LAST_EXEC_TRADES has 4040833 observations and 15 variables.
NOTE: PROCEDURE SORT used (Total process time):
real time 2.58 seconds
cpu time 4.10 seconds

proc sort NODUPKEY; by secid personid;

proc sql;
create table temp5 as select
  a.*, b.trandate as T_last_trandate_prior_company, b.secid as T_prior_secid, b.cname as T_prior_cname
from temp4 as a LEFT JOIN last_exec_trades as b
  on a.T_secid ne b.secid
  and a.T_personid=b.personid
  and a.T_becameceo ge b.trandate;

NOTE: Table WORK.TEMP5 created, with 6069 rows and 63 columns.
QUIT;
NOTE: PROCEDURE SQL used (Total process time):
   real time           0.15 seconds
   cpu time            0.28 seconds

! 203
204 /*KEEP ONLY THE LAST JOB THAT WAS LEFT*/
205 data curr.execucomp_boardex_tfn_turnover; set temp5;
206 format T_First_Trandoate_Company date9.;
207 format T_Last_Trandoate_Prior_Company date9.;
208 T_diff = (E_becameceo -T_last_trandoate_prior_company)/365;

NOTE: Missing values were generated as a result of performing an operation on missing values.
   Each place is given by: (Number of times) at (Line):(Column).
3471 at 208:23
NOTE: There were 6069 observations read from the data set WORK.TEMP5.
NOTE: The data set CURR.EXECUCOMP_BOARDEX_TFN_TURNOVER has 6069 observations and 64 variables.
NOTE: DATA statement used (Total process time):
   real time           0.01 seconds
   cpu time            0.02 seconds

proc sort; by sample_id DESCENDING T_last_trandoate_prior_company;

NOTE: There were 6069 observations read from the data set CURR.EXECUCOMP_BOARDEX_TFN_TURNOVER.
NOTE: The data set CURR.EXECUCOMP_BOARDEX_TFN_TURNOVER has 6069 observations and 64 Variables.
NOTE: PROCEDURE SORT used (Total process time):
   real time           0.02 seconds
   cpu time            0.02 seconds

proc sort NODUPKEY; by sample_id;

NOTE: There were 6069 observations read from the data set CURR.EXECUCOMP_BOARDEX_TFN_TURNOVER.
NOTE: 974 observations with duplicate key values were deleted.
NOTE: The data set CURR.EXECUCOMP_BOARDEX_TFN_TURNOVER has 5095 observations and 64 variables.
NOTE: PROCEDURE SORT used (Total process time):
   real time           0.02 seconds
   cpu time            0.02 seconds

proc means;
end;
<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real time</td>
<td>54.51 seconds</td>
</tr>
<tr>
<td>CPU time</td>
<td>1:18.22</td>
</tr>
</tbody>
</table>
Log for Program 7: 05a_hire_type.sas

NOTE: Copyright (c) 2002-2010 by SAS Institute Inc., Cary, NC, USA.
NOTE: SAS (r) Proprietary Software 9.3 (TSIM1)
NOTE: This session is executing on the Linux 3.2.0-38-generic (LIN X64) platform.

NOTE: Updated analytical products:
SAS/STAT 9.3_M1, SAS/ETS 9.3_M1, SAS/OR 9.3_M1
You are running SAS 9. Some SAS 8 files will be automatically converted by the V9 engine; others are incompatible. Please see http://support.sas.com/rnd/migration/planning/platform/64bit.html
PROC MIGRATE will preserve current SAS file attributes and is recommended for converting all your SAS libraries from any SAS 8 release to SAS 9. For details and examples, please see http://support.sas.com/rnd/migration/index.html

This message is contained in the SAS news file, and is presented upon initialization. Edit the file "news" in the "misc/base" directory to display site-specific news and information in the program log. The command line option "-nonews" will prevent this display.

NOTE: SAS initialization used:
real time 0.01 seconds
 cpu time 0.00 seconds

options /*nonotes nosource noday*/ nocenter nonumber ps=max ls=max; title;

*Define libraries;
libname boardex '/huge/wrds_2015/boardex';
NOTE: Libref BOARDEX was successfully assigned as follows:
 Engine: V9
 Physical Name: /huge/wrds_2015/boardex

libname comp '/huge/wrds_2015/comp/sasdata/nam';
NOTE: Libref COMP was successfully assigned as follows:
Engine: V9
Physical Name: /huge/wrds_2015/comp/sasdata/nam

26 !
27 libname tfn '/huge/wrds_2015/tfn/sasdata/insiders';
NOTE: Libref TFN was successfully assigned as follows:
Engine: V9
Physical Name: /huge/wrds_2015/tfn/sasdata/insiders

27 !
28 libname curr '.';
NOTE: Libref CURR was successfully assigned as follows:
Engine: V9

28 !
29
30 /*LOAD EXECUCOMP-BOARDTEX_THOMSON COMBINED DATASET*/
data temp; set curr.execucomp_boardex_tfn_turnover
(keep = _E_Exec_Fullname _E_Coname
_E_Gvkey
_E_Execid
_E_Year
_E_Becameceo
_E_prior_leftco
_E_Joined_Co
_E_Leftco
/*_E_Prior_Coname*/
_B_starting_date_company
_B_prior_company_name
_B_prior_end_date
_T_First_Transdate_Company
_T_prior_cname
_T_Last_Transdate_Prior_Company
_T_personid
sample_id);

31 /*THESE ARE THE EXAMPLES USED IN THE PROPOSAL*/
32 where _E_execid in ('03766' '05777' '44708' '05706');
/*
33 /THIS WAS USED TO GENERATE THE RANDOM SAMPLE OF 50 OBS FOR HAND COLLECTION
34 random_uniform=rand('Uniform');
35 proc sort; by random_uniform;
36 data temp; set temp;
37 random_rank = _N_.;
/*
38 /DEFINE HIRE TYPE BASED ON EXECUCOMP*/
39 E_hire_type = 'n/a';
40 if (E_BECAMECEO = E_JOINED_CO) ne . and (E_BECAMECEO = E_JOINED_CO) <= 730 then E_hire_type = 'ext';
41 else if (E_BECAMECEO = E_prior_leftco) ne . and (E_BECAMECEO = E_prior_leftco) <= 730 then E_hire_type = 'ext';
42 if (E_BECAMECEO = E_JOINED_CO) ne . and (E_BECAMECEO = E_JOINED_CO) > 730 then E_hire_type = 'int';
43 if E_hire_type = 'ext' then E_gap = min(E_JOINED_CO, E_becameceo) - E_prior_leftco)/365;
44 if E_gap ne . and E_gap < 0 then E_gap =0;
/*DEFINE HIRE TYPE BASED ON BOARDEX*/
B_hire_type = 'n/a';
if (E_BECAMECEO - B_starting_date_company) ne . and (E_BECAMECEO - B_starting_date_company) <= 730 then B_hire_type = 'ext';
else if (E_BECAMECEO - B_prior_end_date) ne . and (E_BECAMECEO - B_prior_end_date) <= 730 then B_hire_type = 'ext';
else if (E_BECAMECEO - B_starting_date_company) ne . and (E_BECAMECEO - B_starting_date_company) > 730 then B_hire_type = 'int';
if B_hire_type = 'ext' then B_gap = (min(B_starting_date_company, E_becameceo) - B_prior_end_date)/365;
if B_gap ne . and B_gap < 0 then B_gap = 0;

/*DEFINE HIRE TYPE BASED ON THOMSON*/
T_hire_type = 'n/a';
if (E_BECAMECEO - T_first_trandate_company) ne . and (E_BECAMECEO - T_first_trandate_company) <= 730 then T_hire_type = 'ext';
else if (E_BECAMECEO - T_last_trandate_prior_company) ne . and (E_BECAMECEO - T_last_trandate_prior_company) <= 730 then T_hire_type = 'ext';
if (E_BECAMECEO - T_first_trandate_company) ne . and (E_BECAMECEO - T_first_trandate_company) > 730 then T_hire_type = 'int';
if T_hire_type = 'ext' then T_gap = (min(T_first_trandate_company, E_becameceo) - T_Last_Trandate_Prior_Company)/365;
if T_gap ne . and T_gap < 0 then T_gap = 0;

/*DEFINE COUNT VARIABLES TO IDENTIFY WHEN AT LEAST TWO DATABASES SUGGEST INTERNAL AND THE THIRD DOES NOT DISAGREE*/
if E_hire_type = 'int' then E_count = 1;
else if E_hire_type = 'ext' then E_count = -1;
else E_count = 0;
if B_hire_type = 'int' then B_count = 1;
else if B_hire_type = 'ext' then B_count = -1;
else B_count = 0;
if T_hire_type = 'int' then T_count = 1;
else if T_hire_type = 'ext' then T_count = -1;
else T_count = 0;

/*MAKE DATASET OF OBS WHERE TWO DIFFERENT DATABASES IDENTIFY THE HIRE TYPE AS INTERNAL*/
NOTE: Missing values were generated as a result of performing an operation on missing values.
Each place is given by: (Number of times) at (Line): (Column).
3117 at 63:17  4046 at 64:22  3117 at 65:17  736 at 66:67  2387 at 73:17  3444 at 74:22  2387 at 75:17  506 at 76:79
1019 at 82:17  2576 at 83:22  1019 at 84:17  895 at 85:80
NOTE: There were 5095 observations read from the data set CURR.EXECUCOMP_BOARDEX_TPN_TURNOVER.
NOTE: The data set WORK.TEMP has 5095 observations and 26 variables.
NOTE: DATA statement used (Total process time):
  real time          0.01 seconds
  cpu time           0.01 seconds

data curr.internal; set temp; where sum(E_count, B_count, T_count) lt 2;
NOTE: There were 3575 observations read from the data set WORK.TEMP.
WHERE SUM(E_count, B_count, T_count)<2;
NOTE: The data set CURR.INTERNAL has 3575 observations and 26 variables.
NOTE: DATA statement used (Total process time):
  real time 0.00 seconds
  cpu time 0.01 seconds

103      proc freq; tables E_count B_count T_count;
104
105      /*MERGE IN RA HAND COLLECTED DATA FOR 50 RANDOM OBS*/

NOTE: There were 3575 observations read from the data set CURR.INTERNAL.
NOTE: The PROCEDURE FREQ printed page 1.
NOTE: PROCEDURE FREQ used (Total process time):
  real time 0.01 seconds
  cpu time 0.02 seconds

107      proc sql;
108      
109      create table temp2 as select
110          a.*, b.int_ext, b.gap
111          from temp as a LEFT JOIN curr.test_obs as b
112          on a.sample_id = b.sample_id;

NOTE: Data file CURR.TEST_OBS.DATA is in a format that is native to another host, or the file encoding does not match the session encoding. Cross Environment Data Access will be used, which might require additional CPU resources and might reduce performance.
NOTE: Table WORK.TEMP2 created, with 5095 rows and 28 columns.

111      
112      quit;

NOTE: PROCEDURE SQL used (Total process time):
  real time 0.01 seconds
  cpu time 0.01 seconds

112      
113      /*GET OBS THAT DO NOT HAVE GAPS BASED ON HAND COLLECTION
114      AND DETERMINE HOW THE DATABASES WOULD HAVE CODED THESE OBS*/
115      data no_gap; set temp2; where int_ext ne "" and gap ne . and gap lt 0.083;
116          if E_gap ne . and E_gap < 0.083 then E_gap_dum = 0;
117          if E_gap ne . and E_gap ge 0.083 then E_gap_dum = 1;
118          if B_gap ne . and B_gap < 0.083 then B_gap_dum = 0;
119          if B_gap ne . and B_gap ge 0.083 then B_gap_dum = 1;
120          if T_gap ne . and T_gap < 0.083 then T_gap_dum = 0;
121          if T_gap ne . and T_gap ge 0.083 then T_gap_dum = 1;
NOTE: There were 8 observations read from the data set WORK.TEMP2.
WHERE (int_ext not = ' ') and (gap not = .) and (gap<0.083);
NOTE: The data set WORK.NO_GAP has 8 observations and 31 variables.
NOTE: DATA statement used (Total process time):
real time 0.00 seconds
cpu time 0.00 seconds

proc freq; tables
E_gap_dum
B_gap_dum
T_gap_dum;
/*GET OBS THAT HAVE GAPS BASED ON HAND COLLECTION
AND DETERMINE HOW THE DATABASES WOULD HAVE CODED THESE OBS*/

NOTE: There were 8 observations read from the data set WORK.NO_GAP.
NOTE: The PROCEDURE FREQ printed page 2.
NOTE: PROCEDURE FREQ used (Total process time):
real time 0.00 seconds
cpu time 0.00 seconds

data gap; set temp2; where int_ext ne "" and gap ne . and gap ge 0.083;
if E_gap ne . and E_gap < 0.083 then E_gap_dum = 0;
if E_gap ne . and E_gap ge 0.083 then E_gap_dum = 1;
if B_gap ne . and B_gap < 0.083 then B_gap_dum = 0;
if B_gap ne . and B_gap ge 0.083 then B_gap_dum = 1;
if T_gap ne . and T_gap < 0.083 then T_gap_dum = 0;
if T_gap ne . and T_gap ge 0.083 then T_gap_dum = 1;

NOTE: There were 17 observations read from the data set WORK.TEMP2.
WHERE (int_ext not = ' ') and (gap>0.083);
NOTE: The data set WORK.GAP has 17 observations and 31 variables.
NOTE: DATA statement used (Total process time):
real time 0.00 seconds
cpu time 0.01 seconds

proc freq; tables
E_gap_dum
B_gap_dum
T_gap_dum;
endsas;
NOTE: There were 17 observations read from the data set WORK.GAP.
NOTE: The PROCEDURE FREQ printed page 3.
NOTE: PROCEDURE FREQ used (Total process time):
    real time      0.00 seconds
    cpu time       0.00 seconds

NOTE: SAS Institute Inc., SAS Campus Drive, Cary, NC USA 27513-2414
NOTE: The SAS System used:
    real time      0.06 seconds
    cpu time       0.06 seconds
References


Table 1. Succession Type and Gap Length for Jamie Dimon, James Kilts, Marissa Mayer, and Margaret Whitman (Hand-collected)

<table>
<thead>
<tr>
<th></th>
<th>Transition #1</th>
<th>Transition #2</th>
<th>Transition #3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Jamie Dimon</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company Name</td>
<td>BANK ONE CORP</td>
<td>JPMORGAN CHASE &amp; CO</td>
<td></td>
</tr>
<tr>
<td>Prior Company Name</td>
<td>CITIGROUP INC</td>
<td>BANK ONE CORP</td>
<td></td>
</tr>
<tr>
<td>Became CEO</td>
<td>3/27/00</td>
<td>12/31/05</td>
<td></td>
</tr>
<tr>
<td>Joined Company</td>
<td>3/27/00</td>
<td>7/1/04</td>
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</tr>
<tr>
<td>Left Prior Company</td>
<td>11/2/98</td>
<td>6/30/04</td>
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</tr>
<tr>
<td>Succession Type</td>
<td>external</td>
<td>external</td>
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</tr>
<tr>
<td>Gap Indicator</td>
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<td>0</td>
<td></td>
</tr>
<tr>
<td>Gap Length (years)</td>
<td>1.40</td>
<td>0.00</td>
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<tr>
<td><strong>James M. Kilts</strong></td>
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<td></td>
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<tr>
<td>Company Name</td>
<td>NABISCO HOLDINGS CORP -CL A</td>
<td>NABISCO GROUP HOLDINGS CORP</td>
<td>GILLETTE CO</td>
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<tr>
<td>Prior Company Name</td>
<td>ALTRIA GROUP INC</td>
<td>NABISCO HOLDINGS CORP -CL A</td>
<td>NABISCO GROUP HOLDINGS CORP</td>
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<td>Became CEO</td>
<td>1/1/98</td>
<td>(set to missing)</td>
<td>2/12/01</td>
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<tr>
<td>Joined Company</td>
<td>1/1/98</td>
<td>(set to missing)</td>
<td>2/12/01</td>
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<tr>
<td>Left Prior Company</td>
<td>3/24/97</td>
<td>(set to missing)</td>
<td>12/11/00</td>
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<td>(set to missing)</td>
<td>external</td>
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<tr>
<td>Gap Indicator</td>
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<td>(set to missing)</td>
<td>1</td>
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<td>Gap Length (years)</td>
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<td>(set to missing)</td>
<td>0.17</td>
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<td><strong>Marissa A. Mayer</strong></td>
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<tr>
<td>Company Name</td>
<td>YAHOO INC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior Company Name</td>
<td>GOOGLE INC</td>
<td></td>
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<tr>
<td>Became CEO</td>
<td>7/17/12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joined Company</td>
<td>7/17/12</td>
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</tr>
<tr>
<td>Left Prior Company</td>
<td>7/16/12</td>
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<tr>
<td>Gap Length (years)</td>
<td>0.00</td>
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<td></td>
</tr>
<tr>
<td><strong>Margaret C. Whitman</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Company Name</td>
<td>EBAY INC (PRIVATE)</td>
<td>HEWLETT-PACKARD CO</td>
<td></td>
</tr>
<tr>
<td>Prior Company Name</td>
<td>STRIDE RITE</td>
<td>EBAY INC (PUBLIC)</td>
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</tr>
<tr>
<td>Became CEO</td>
<td>(set to missing)</td>
<td>9/22/11</td>
<td></td>
</tr>
<tr>
<td>Joined Company</td>
<td>(set to missing)</td>
<td>9/22/11</td>
<td></td>
</tr>
<tr>
<td>Left Prior Company</td>
<td>(set to missing)</td>
<td>3/31/08</td>
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<td>Succession Type</td>
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<tr>
<td>Gap Indicator</td>
<td>(set to missing)</td>
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<td></td>
</tr>
<tr>
<td>Gap Length (years)</td>
<td>(set to missing)</td>
<td>3.48</td>
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</tbody>
</table>
Table 2. Firm descriptives
Panel A reports firm characteristics for our sample while Panel B provides information about firm governance. Variable definitions are provided in Appendix A. Column 1 shows information about the prior (old) firm at the date a CEO left that firm. Column 2 shows information about the subsequent (new) firm at the date a CEO arrived at that firm. Column 3 shows information about all S&P 1500 firms pooled across all sample years from 1992-2014. Column 4 reports the p-values for the differences between columns 1 and 2. Column 5 reports the p-values for the differences between columns 2 and 3. P-values are from tests of differences in means (medians) between samples from a two-sided t-test (Wilcox rank-sums test). For binary variables, p-values are from a χ² test. Significance levels are indicated by ***, **, * representing 1%, 5%, and 10%, respectively.

<table>
<thead>
<tr>
<th>Panel A: Firm Characteristics</th>
<th>Old Firms at Time of Departure (1)</th>
<th>New Firms at Time of Arrival (2)</th>
<th>Pooled S&amp;P 1500 (3)</th>
<th>Test of Diff. (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean (Median)</td>
<td>N</td>
<td>Mean (Median)</td>
</tr>
<tr>
<td>Assets</td>
<td></td>
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</tr>
<tr>
<td>Sales</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Book-to-Market</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SD(ROA)</td>
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<td></td>
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</tr>
<tr>
<td>Abnormal Returns</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>SD(Returns)</td>
<td></td>
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</table>

Panel B: Governance Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Old Firms at Time of Departure (1)</th>
<th>New Firms at Time of Arrival (2)</th>
<th>Pooled S&amp;P 1500 (3)</th>
<th>Test of Diff. (p-value)</th>
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<tbody>
<tr>
<td>CEO-Chair Duality</td>
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</tr>
<tr>
<td>Board Side</td>
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<td></td>
</tr>
<tr>
<td>% Outside Directors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blockholder Indicator</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Institutional Ownership</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3. Sample descriptives
This table reports descriptive statistics for the CEOs and firms in our sample. Panel A reports information on the employment gaps experienced by incoming (newly hired) CEOs in our sample. Panel B reports information about the incoming CEOs at the time of hire. Panel C reports compensation and turnover details surrounding incoming CEOs. Panel D reports firm characteristics at the time of hiring CEO. Panel E reports characteristics of the firms that incoming CEOs most recently worked for at the time of departure. Variable definitions are provided in Appendix A.

**Panel A: Gap Characteristics**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>25th</th>
<th>Median</th>
<th>75th</th>
<th>Mean</th>
<th>Std. Dev.</th>
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</thead>
<tbody>
<tr>
<td>Gap Indicator</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Gap Length</td>
<td></td>
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</tr>
</tbody>
</table>

**Panel B: CEO Characteristics**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>25th</th>
<th>Median</th>
<th>75th</th>
<th>Mean</th>
<th>Std. Dev.</th>
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</thead>
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<td>Generalist</td>
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<tr>
<td>Age &gt; 60</td>
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<td>Female</td>
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<tr>
<td>Previous Position-CEO</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>CEO-Chair Duality</td>
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</table>

**Panel C: New Employment Characteristics**

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<tr>
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<th>Median</th>
<th>75th</th>
<th>Mean</th>
<th>Std. Dev.</th>
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</thead>
<tbody>
<tr>
<td>Total Compensation$_{t}$</td>
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<td></td>
</tr>
<tr>
<td>Total Compensation$_{t+1}$</td>
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<tr>
<td>Time-to-Turnover</td>
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**Panel D: New Firm Characteristics**

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<th>N</th>
<th>25th</th>
<th>Median</th>
<th>75th</th>
<th>Mean</th>
<th>Std. Dev.</th>
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<td>Book-to-Market</td>
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</tr>
<tr>
<td>ROA</td>
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</tr>
<tr>
<td>SD(ROA)</td>
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</tr>
<tr>
<td>Abnormal Returns</td>
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<tr>
<td>SD(Returns)</td>
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<td>Board Size</td>
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</tr>
<tr>
<td>% Outside Directors</td>
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<tr>
<td>Blockholder Indicator</td>
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<tr>
<td>% Institutional Ownership</td>
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</table>

**Panel E: Old Firm Characteristics**

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<th>N</th>
<th>25th</th>
<th>Median</th>
<th>75th</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
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<td>Abnormal Returns</td>
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<tr>
<td>NCC_Signed</td>
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</tbody>
</table>
Table 4. Noncompete state enforceability index
This table reports the scores for the noncompetition enforceability index developed by Garmaise (2011) in our extended time period from 1980 to 2013. Scores from 1992 to 2004 were obtained from Garmaise (2011). Higher scores indicate stricter enforcement of noncompete agreements while lower scores indicate lower enforcement levels. The process used to extend the index is explained in detail in Appendix E.

<table>
<thead>
<tr>
<th>State (Years)</th>
<th>Score</th>
<th>State (Years)</th>
<th>Score</th>
</tr>
</thead>
</table>
Table 5. Joint distribution of noncompete constraints and CEO skillset

This table reports information about employment gaps for four types of CEOs: (1) generalists with NCC; (2) generalists without NCC; (3) specialists with NCC; and (4) specialists without NCC. CEOs are generalists if the executive has a general skillset following Custódio, Ferreira, and Matos [2013] or specialists if the executive is not a generalist. NCC_Signed is an indicator variable equal to one if the executive is likely to have signed a noncompete agreement and zero otherwise. Panel A reports the number of observations in our sample. Panel B reports the number (percent) of observations in our sample with employment gaps and the p-value for the difference in percentage of observations with employment gaps. Panel C reports the mean employment gap for CEOs with a gap in our sample. Panel D reports the median employment gap for CEOs with a gap in our sample. P-values are from tests of differences in means (medians) between samples from a two-sided t-test (Wilcoxon rank-sums test). Significance levels are indicated by ***, **, * representing 1%, 5%, and 10%, respectively. Variable definitions are provided in Appendix A.

<table>
<thead>
<tr>
<th>Panel A: Number of Observations</th>
<th>NCC_Signed=1</th>
<th>NCC_Signed=0</th>
<th>Total Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generalist</td>
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<td></td>
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<tr>
<td>Specialist</td>
<td></td>
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<tr>
<td>Total Observations</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B: Number (percent) of Observations with Gap</th>
<th>NCC_Signed=1</th>
<th>NCC_Signed=0</th>
<th>Total</th>
<th>Test of diff. (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generalist</td>
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<tr>
<td>Specialist</td>
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<tr>
<td>Total</td>
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<tr>
<td>Test of diff. (p-value)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel C: Mean Gap Length</th>
<th>NCC_Signed=1</th>
<th>NCC_Signed=0</th>
<th>Mean</th>
<th>Test of diff. (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generalist</td>
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<tr>
<td>Specialist</td>
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<td>Mean</td>
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<tr>
<td>Test of diff. (p-value)</td>
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</table>

<table>
<thead>
<tr>
<th>Panel D: Median Gap Length</th>
<th>NCC_Signed=1</th>
<th>NCC_Signed=0</th>
<th>Median</th>
<th>Test of diff. (p-value)</th>
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</thead>
<tbody>
<tr>
<td>Generalist</td>
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<tr>
<td>Specialist</td>
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<td>Median</td>
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<tr>
<td>Test of diff. (p-value)</td>
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</table>
Table 6. Test for H1A
This table reports the results of our logit regressions examining the likelihood of CEOs experiencing an employment gap. The dependent variable *Gap Indicator* equals one if the executive experiences an employment gap. Significance levels are indicated by ***, **, * representing 1%, 5%, and 10%, respectively. Variable definitions are provided in Appendix A.

<table>
<thead>
<tr>
<th>Dependent Variable: <em>Gap Indicator</em></th>
<th>Without Controls (1)</th>
<th>CEO Controls (2)</th>
<th>Prior Position Controls (3)</th>
<th>All Controls (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
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<tr>
<td><strong>Proxies for Skillset and NCC</strong></td>
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<td>Generalist</td>
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<td>NCC_Generalist</td>
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<tr>
<td>NCC_Specialist</td>
<td>+</td>
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<tr>
<td><strong>CEO Controls</strong></td>
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<td>Female</td>
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<tr>
<td><strong>Prior Position Controls</strong></td>
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<tr>
<td>Prior Position-CEO</td>
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<tr>
<td>Abnormal Returns-Prior Firm</td>
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<tr>
<td>Prior Position-CEO*Abnormal Returns-</td>
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<td>Pseudo R²</td>
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Table 7. Test for H1B
This table reports the results of our Cox semi-proportional hazard model testing the prediction that NCCs are less binding for generalists than for specialists. The dependent variable *Gap Length* equals the length of the employment gap. Significance levels are indicated by ***, **, * representing 1%, 5%, and 10%, respectively. Variable definitions are provided in Appendix A.

<table>
<thead>
<tr>
<th>Dependent Variable: Gap Length</th>
<th>Without Controls</th>
<th>CEO Controls</th>
<th>Prior Position Controls</th>
<th>All Controls</th>
</tr>
</thead>
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<tr>
<td><strong>Proxies for Skillset and NCC</strong></td>
<td>(1)</td>
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<td>(3)</td>
<td>(4)</td>
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<td>NCC_Generalist</td>
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<tr>
<td>NCC_Specialist</td>
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<tr>
<td><strong>CEO Controls</strong></td>
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<td>Age &gt; 60</td>
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<td>Female</td>
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<tr>
<td><strong>Prior Position Controls</strong></td>
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<tr>
<td>Prior Position-CEO</td>
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<tr>
<td>Abnormal Returns-Prior Firm</td>
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<tr>
<td>Prior Position-CEO*Abnormal Returns-Prior Firm</td>
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<tr>
<td>Year-Quarter Fixed Effects</td>
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<td>N</td>
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</table>


Table 8. Statistics for H2A & H2B
Panel A reports information about our sample of CEOs partitioned by whether they experienced an employment gap. Column 3 provides p-values from tests of differences between the gap and no gap samples. P-values are from tests of differences in means (medians) between samples from a two-sided t-test (Wilcoxon rank-sums test). For binary variables, p-values are from a χ² test. Significance levels are indicated by ***, **, * representing 1%, 5%, and 10%, respectively. Panel B reports correlations between key independent and dependent variables. Numbers above (below) the diagonal are Spearman (Pearson) correlations. Correlations significant at a 5% level are in bold. Variable definitions are provided in Appendix A.

<table>
<thead>
<tr>
<th>Panel A: Univariate Statistics</th>
<th>Gap (1)</th>
<th>No Gap (2)</th>
<th>Test of Diff. (p-value) (3)</th>
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<td>Mean (Median)</td>
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<td>Gap Length</td>
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<tr>
<td>Time-to-Turnover</td>
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<td>Age</td>
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<td>Female</td>
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<td><strong>Past Performance</strong></td>
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<tr>
<td>Abnormal Returns-Prior Firm</td>
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<td><strong>Firm Characteristics</strong></td>
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<td>Log(Sales)</td>
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<td>Book-to-Market</td>
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<td>ROA</td>
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<td>Abnormal Returns</td>
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<td>SD(ROA)</td>
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<td>SD(Returns)</td>
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<tr>
<td><strong>Governance Characteristics</strong></td>
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<tr>
<td>CEO-Chair Duality</td>
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<tr>
<td>Board Size</td>
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<td>% Outside Directors</td>
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<tr>
<td>Blockholder Indicator</td>
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<tr>
<td>% Institutional Ownership</td>
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<tr>
<td><strong>Compensation</strong></td>
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<tr>
<td>Total Compensation&lt;br/&gt;&lt;sub&gt;1&lt;/sub&gt;</td>
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<tr>
<td>Total Compensation&lt;br/&gt;&lt;sub&gt;1-1&lt;/sub&gt;</td>
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</table>
Table 8. Statistics for H2A & H2B (continued)

<table>
<thead>
<tr>
<th>Panel B: Correlations</th>
<th>(1)</th>
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<td>3. Total Compensation&lt;sub&gt;t&lt;/sub&gt;</td>
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<td>4. Total Compensation&lt;sub&gt;t+1&lt;/sub&gt;</td>
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</table>
Table 9. Test for H2A
This table reports the results of our regressions of whether CEOs with prior employment gaps have lower compensation. The dependent variable is total compensation or log of total compensation. Panel A uses current year (t) compensation as the dependent variable and panel B uses subsequent year (t+1) compensation as the dependent variable. Significance levels are indicated by ***, **, * representing 1%, 5%, and 10%, respectively. Variable definitions are provided in Appendix A.

<table>
<thead>
<tr>
<th>Panel A: Compensation in Period t</th>
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<td>Dependent Variable: Log(Total Compensation\textsubscript{t+1})</td>
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<td>% Institutional Ownership</td>
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<td>Abnormal Returns-Prior Firm</td>
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<td>Year-Quarter Fixed Effects</td>
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<td>(34)</td>
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<td>R\textsuperscript{2}</td>
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<td>(36)</td>
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</table>

Table 9. Test for H2A (continued)
Table 10. Test for H2B
This table reports the results of our tests examining whether employment gaps are associated with future CEO turnover. Panel A reports the coefficients for a Cox semi-proportional hazard model for the sample of executives with completed tenure at hiring firms. The model includes CEOs who experience forced turnover (Column A), voluntary turnover due to poor matches (Column B), other turnover events (Column C), and all CEO turnover events (Column D). Panel B reports the results from a multinomial logit model for the propensity of experiencing good and bad employment matches. Following Allgood and Farrell (2003), a match is classified as being good (bad) if tenure is greater (less) than 3 years. Significance levels are indicated by ***, **, * representing 1%, 5%, and 10%, respectively. Variable definitions are provided in Appendix A.

<table>
<thead>
<tr>
<th>Panel A: Cox Semi-proportional Hazard Model</th>
<th>Poor Match Quality: Forced turnover subsample</th>
<th>Dependent Variable: Time-to-Turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Controls</td>
<td>All Controls</td>
</tr>
<tr>
<td><strong>Gap Indicator</strong></td>
<td>-</td>
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<tr>
<td><strong>CEO Controls</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age &gt; 60</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Governance Controls</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CEO-Chair Duality</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Board Size</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>% Outside Directors</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Blockholder Indicator</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>% Institutional Ownership</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Past Performance Controls</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Past Abnormal Returns-Current Firm</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Year-Quarter Fixed Effects</strong></td>
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<tr>
<td><strong>N</strong></td>
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</table>
Table 10. Test for H2B (continued)

<table>
<thead>
<tr>
<th>Panel B: Multinomial Logit Model</th>
<th>Dependent Variable: <em>Match Quality</em></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td>Good (1)</td>
</tr>
<tr>
<td></td>
<td>Good (4)</td>
</tr>
<tr>
<td></td>
<td>Good (7)</td>
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</tbody>
</table>

Intercept
Gap Indicator

**CEO**

*Age*
*Age > 60*
*Female*

**Governance**

*CEO-Chair Duality*
*Board Size*
*% Outside Directors*
*Blockholder Indicator*
*% Institutional Ownership*

Year-Quarter Fixed Effects
N

137
Table 11. Test for H3A
This table reports the results of our regressions of whether, conditional on experiencing an employment gap, the length of a CEO’s employment gap is associated with compensation. The dependent variable is total compensation or log of total compensation. Panel A uses current year (t) compensation as the dependent variable and panel B uses subsequent year (t+1) compensation as the dependent variable. Significance levels are indicated by ***, **, * representing 1%, 5%, and 10%, respectively. Variable definitions are provided in Appendix A.

<table>
<thead>
<tr>
<th>Panel A: Compensation in Period t</th>
<th>Dependent Variable:</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Total Compensation(_t)</td>
<td>Log(Total Compensation(_t))</td>
</tr>
<tr>
<td></td>
<td>(1) (2) (3) (4) (5) (6)</td>
<td>(7) (8) (9) (10) (11) (12)</td>
</tr>
<tr>
<td>Intercept</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gap Length</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Log(Gap Length)</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Governance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEO-Chair Duality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Board Size</td>
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<tr>
<td>% Outside Directors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blockholder Indicator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Institutional Ownership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past Performance</td>
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<td></td>
</tr>
<tr>
<td>Abnormal Returns-Prior Firm</td>
<td></td>
<td></td>
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<tr>
<td>CEO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age &gt; 60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log(Sales)</td>
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<tr>
<td>Book-to-Market</td>
<td></td>
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</tr>
<tr>
<td>ROA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abnormal Returns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD(ROA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD(Returns)</td>
<td></td>
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</tr>
<tr>
<td>Year-Quarter Fixed Effects</td>
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<tr>
<td>N</td>
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</tr>
<tr>
<td>(R^2)</td>
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Table 11. Test for H3A (continued)

<table>
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<th>Panel B: Compensation in Period $t+1$</th>
<th>Dependent Variable: $Total\ Compensation_{t+1}$</th>
<th>$Log(Total\ Compensation_{t+1})$</th>
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<tbody>
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<tr>
<td>Gap Length</td>
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<tr>
<td>Log(Gap Length)</td>
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</tbody>
</table>

**Governance**
- CEO-Chair Duality
- Board Size
- % Outside Directors
- Blockholder Indicator
- % Institutional Ownership

**Past Performance**
- Abnormal Returns-Prior Firm

**CEO**
- Age
- Age > 60
- Female

**Firm**
- Log(Sales)
- Book-to-Market
- ROA
- Abnormal Returns
- SD(ROA)
- SD(Returns)

Year-Quarter Fixed Effects
- N
- R²
Table 12. Test for H3B
This table reports results from our tests examining whether employment gaps are associated with future CEO turnover. Panel A reports the coefficients for a Cox semi-proportional hazard model for the sample of executives with completed tenure at hiring firms. The model is tested for CEOs who experience forced turnover (Column A), voluntary turnover due to poor matches (Column B), other turnover events (Column C), and for all CEO turnover events (Column D). Panel B reports the results from a multinomial logit model for the propensity of experiencing good and bad employment matches. Following Allgood and Farrell (2003), a match is classified as being good (bad) if tenure is greater (less) than 3 years. Significance levels are indicated by ***, **, * representing 1%, 5%, and 10%, respectively. Variable definitions are provided in Appendix A.

<table>
<thead>
<tr>
<th>Panel A: Cox Semi-proportional Hazard Model</th>
<th>Dependent Variable: Time-to-Turnover</th>
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</thead>
<tbody>
<tr>
<td>Dependent Variable: Time-to-Turnover</td>
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<td>Poor Match Quality: Forced turnover subsample</td>
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<tr>
<td>Poor Match Quality: Voluntary turnover subsample</td>
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<td>Other subsample</td>
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<td>All turnover sample</td>
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### Table 12. Test for H3B (continued)

#### Panel B: Multinomial Logit Model

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<th>Dependent Variable: Match Quality</th>
<th>With CEO and Governance Controls</th>
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<td>(3)</td>
</tr>
<tr>
<td>Gap Length</td>
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<td>-</td>
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</tr>
</tbody>
</table>

#### CEO

- **Age**
- **Age > 60**
- **Female**

#### Governance

- **CEO-Chair Duality**
- **Board Size**
- **% Outside Directors**
- **Blockholder Indicator**
- **% Institutional Ownership**

- **Year-Quarter Fixed Effects**
- **N**