SPRU Working Paper Series
SWPS 2017-06 (March)

Does Managerial Experience Affect Strategic Change?

Matte Hartog and Frank M. H. Neffke

UNIVERSITY OF SUSSEX

SPRU Working Paper Series (ISSN 2057-6668)

The SPRU Working Paper Series aims to accelerate the public availability of the research undertaken by SPRU-associated people, and other research that is of considerable interest within SPRU, providing access to early copies of SPRU research.

Guidelines for authors

Papers should be submitted to swps@sussex.ac.uk as a PDF or Word file. The first page should include: title, abstract, keywords, and authors' names and affiliations. The paper will be considered for publication by an Associate Editor, who may ask two referees to provide a light review. We aim to send referee reports within three weeks from submission. Authors may be requested to submit a revised version of the paper with a reply to the referees' comments to swps@sussex.ac.uk. The Editors make the final decision on the inclusion of the paper in the series. When submitting, the authors should indicate if the paper has already undergone peer-review (in other series, journals, or books), in which case the Editors may decide to skip the review process. Once the paper is included in the SWPS, the authors maintain the copyright.

Websites

UoS: www.sussex.ac.uk/spru/research/swps

SSRN: http://www.ssrn.com/link/SPRU-RES.html

IDEAS: ideas.repec.org/s/sru/ssewps.html

Research Gate: www.researchgate.net/journal/2057-6668_SPRU_Working_Paper_Series

Does managerial experience affect strategic change?

Matte Hartog

(Harvard University, matte_hartog@hks.harvard.edu)

and

Frank Neffke

(Harvard University, frank_neffke@hks.harvard.edu)

March 2017

Acknowledgements: We thank Juan Alcacer, Ron Boschma, Koen Frenken, Victor Gilsing, Ricardo Hausmann, Rebecca Henderson, Martin Henning, Karl-Johan Lundquist, Philip McCann, Alexander Oettl, David Rigby, Andrés Rodríguez-Pose and the participants at the DRUID 2015 Relevance of Innovation Conference and Harvard Growth Lab Seminar 2016 for valuable comments. We also thank Statistics Sweden for their support. Matte Hartog and Frank Neffke are grateful to the MasterCard Center for Inclusive Growth & Financial Inclusion for their financial support.

Does managerial experience affect strategic change?

Abstract

To what extent is strategic change driven by new managers? We investigate this by analyzing industry switching rates of establishments after new managers have been recruited. We use matched employer-employee data of the workforce of Sweden between 1993 and 2010. Our identification strategy relies on the exogenous departures of managers and a local supply shift instrument to predict the background of a new manager. Hiring new managers as such does not seem to affect strategic change. However, new managers from unrelated industries significantly increase the likelihood that the establishment changes its main activity. Moreover, these activities tend to be closely related to the new manager's prior background. Hence, managers not only influence the strategic direction of the establishment that hired them, but the fact that they tend to steer establishments into industries in which they had previously worked suggests that managerial skills and know-how are to some extent industry specific.

1. Introduction

How important are new managers in determining the strategic direction of their organizations? To answer this question, we explore whether the prior experience of new managers affects a particularly salient strategic decision: the decision to change an establishment's main line of business. In particular, we ask how often, after a change in management, establishments align their main line of business with the new manager's prior work experience. Answering this question is complicated by the fact that new managers are often hired as part of wider restructuring programs. Hence, appointing new managers may be a symptom, not a cause of strategic change. To elicit the causal links between a new manager's background and strategic change, we employ an identification strategy that combines information on forced managerial turnover (due to emigration or the death of an existing manager) with exogenous shifts in the local supply of replacement candidates with a given prior industrial experience. These analyses suggest that there is a strong causal effect of a new manager's background on the direction of strategic change.

The capacity to change course when the economic environment changes is crucial to an organization's survival (Teece et al, 1997; Helfat et al., 2007). In a world in which markets, technologies and competition constantly change, firms need such dynamic capabilities to survive. Teece et al. (2002)

highlight the importance of managers in such change-processes, as agents responsible for sensing and exploiting new opportunities. Similarly, Adner and Helfat (2003) stress the importance of 'dynamic managerial capabilities', i.e., the capacity of managers to change an organization's resource base. Our aim is to assess how much influence new managers have on strategic change by investigating to what extent a change in an establishment's main line of business is the result of an influx of new managers with prior experience in the targeted activity. In other words, following Boeker (1997), we try to link information on the *exact content* of a new manager's prior work experience to the *specific industrial activity* that is targeted in strategic change. By mapping a new manager's specific prior experience onto the exact choice of a new line of business, this research strategy retains a much richer set of observables than comparable studies that have investigated whether changing managers affects a number of unidimensional metrics, like investment or performance. Unlike Boeker (1997), however, our estimation framework aims at deriving causal inferences.

Causality is indeed a key concern raised in the literature on managers' impact on corporate strategy and firm performance (Clougherty et al., 2016). First and foremost, hiring a new manager may be part of a wider corporate strategy. Such strategies, which are not observed by the econometrician, may give rise to a positive correlation between a change in management and various strategic and performance outcomes. For instance, firms that want to change their main line of business may set in motion a number of processes to facilitate this change, only one of which is appointing a new manager. A similar problem occurs when firms hire a new manager in response to performance weaknesses. In this case, managerial turnover may be related to a harsh competitive environment, which would lead to a negative correlation between hiring a new manager and an establishment's performance. To mitigate against such biases, we try to approximate a situation in which managers are assigned to establishments randomly. Like Fee et al. (2013), we do so using a two-step identification strategy. First, we identify cases where managers are replaced for exogenous reasons. In particular, using employer-employee linked data on the entire population of Sweden, we determine which establishments lose a manager because she passes away or because she moves abroad and permanently leaves the country.[1] However, focusing on such forced managerial turnover only resolves the problem that the decision *to* replace an existing manager may be endogenous. It does not resolve the issue that the same may hold for *whom* is hired as a replacement. Therefore, in the second stage of our estimation strategy, we use exogenous variation in the local availability of suitable candidates to replace the old manager. Unlike

[1] Fee et al. (2013) focus on events in which CEOs either pass away or retire.

Fee et al. (2013)[2], this exogenous variation captures variation in what kind of prior skills and know-how these local candidates bring with them.

Our data are derived from Sweden's administrative records as provided by Statistics Sweden (SCB, 2011). The data set covers the full population of individuals, establishments and firms in Sweden between 1995 and 2010. Whereas most papers investigating the role of managers in strategic change, use data on large, publicly traded companies and their CEOs, the choice of this dataset implies that our focus will lie with the upper management layer of small to medium sized establishments.

Somewhat surprisingly, we find that establishments that hire new managers are not necessarily more likely to change their main lines of business. This suggests that management turnover and strategic change are quite unrelated. However, this finding obscures substantial heterogeneity across establishments that has to do with a new manager's prior work experience. In fact, when establishments hire new managers from unrelated industries, we do find them to change their main lines of business more often. Instrumental variable estimation suggests that the causal effect is substantial: a one-standard-deviation increase in relatedness between a manager's prior industry and the establishment's current industry decreases the likelihood that the establishment changes industries with a factor of about 3.5. Moreover, when establishments change their main activity, they are most likely to enter industries that are closely related to the industry from which they recruited the new manager. We interpret this as evidence that new managers have industry-specific skills and know-how that constitute an important factor in strategic change.

Our study contributes to a number of scholarly debates. First and foremost, it relates to the discussion on the impact managers have in their firms. Most studies in this line of research focus on variation in organizational performance (Hambrick and Mason, 1984; Finkelstein and Hambrick, 1996; Bertrand and Schoar, 2003; Adams et al., 2005; Bloom et al., 2013), whereas we study whether the human capital of new managers leads to changes in the activities firms undertake. Moreover, unlike most of the abovementioned literature, which has focused on top managers of large corporations, we focus on the influence of managers in small and medium establishments. Second, by using instruments that exploit forced managerial turnover on the one hand, and shifts in the local availability of candidates with given backgrounds on the other hand, we address important endogeneity concerns that have been raised in the literature on management turnover (Lennox et al., 2012; Nandialath et al., 2014; Clougherty et al., 2016). Third, one way to interpret our findings that new managers guide their

[2] Fee et al. (2013) use population centers and firms in sunny environments as an instrument to identify exogenous variation in the breadth of the local supply of managerial styles.

establishments into activities they understand well is that the mobility of managers diffuses know-how that allows firms to move into new industries. Our study is therefore complementary to the literature on learning-by-hiring, which has shown that the job mobility of inventors and engineers forms a strong conduit for the diffusion of knowledge among local firms (Almeida and Kogut, 1999; Rosenkopf and Almeida, 2003; Song et al., 2003; Tzabbar, 2009).

The structure of this paper is as follows. In Section 2, we review the existing literature on managerial human capital, firm performance and strategic change, and put forward our main hypotheses. Section 3 describes the data and the empirical framework. Section 4 presents the empirical findings. Section 5 concludes and outlines limitations and avenues for future research.

2. Strategic change and managerial human capital

In rapidly changing competitive environments, so called 'dynamic capabilities' (Teece et al., 1997) may serve as a continuing source of competitive advantage (Denrell et al., 2003). Building on Teece et al., (1997), Eisenhardt and Martin (2000) and Zollo and Winter (2002), Helfat et al. (2007) define dynamic capabilities as 'the capacity of an organization to purposefully create, extend or modify its resource base.' The element of intent in dynamic capabilities suggests that, being key decision makers, managers are crucial to an organization's dynamic capabilities (Teece et al., 2002).[3] The importance of managers in strategic change is supported by empirical research that shows how decisions related to strategic change are typically the domain of the top management team of organizations (Child, 1972, Hambrick, 1994).

2.1. Diversification and managerial human capital

Managerial dynamic capabilities (Adner and Helfat, 2003) enable strategic change through a variety of processes, ranging from mergers and acquisitions to joint ventures and the development of new products. In this paper, we follow Boeker (1997) and focus on what can be regarded as a particularly radical type of strategic change: the overhaul of an organization's core business. That is, our object of study, which we will henceforth refer to us strategic change, is the change in an establishment's main line of business.

[3] Helfat et al. (2007, p. 23) indeed note that 'managers often create great value by assembling particular constellations of assets inside an enterprise, because by employing such assets, they frequently can produce highly differentiated and innovative goods and services that consumers want. This process of assembling and orchestrating particular constellations of assets for economic gain is a fundamental function of management'.

The resource-based view (RBV) of the firm (Wernerfelt, 1984; Barney, 1991) states that firms' diversification paths reflect opportunities for putting resources to alternative use when they become idle or underused in current production processes (Penrose, 1959). From its inception, the RBV has given center stage to managerial resources (Penrose, 1959). Managers are the main decision makers in a firm, determining which resources are deployed to which ends (Barney, 1986; Menz, 2012). Moreover, managerial actions can make a firm's human capital less imitable and more firm-specific, and thus more competitive (Denrell et al., 2003; Sirmon et al., 2007). And finally, as already mentioned, managers' ability to lead firms onto new growth paths is a key dynamic capability (Teece and Pisano, 1994).

Adner and Helfat (2003) identify three key elements of dynamic managerial capabilities: managerial cognition, managerial social capital and managerial human capital. Among these, we focus on the last one, managerial human capital. Human capital in general, i.e., the "knowledge, information, ideas, skills, and health of individuals" Becker (2002, p. 3) is a key resource of firms. Moreover, unlike physical capital, which is often designed for one specific task, human capital can typically be applied to a variety of tasks. This fungibility of human capital (Teece, 1982) allows firms to redirect workers' efforts toward new activities. However, human capital is also not as generic as to be applicable to just any task. Consequently, human capital should be an important factor determining the direction of diversification.

The importance of human capital in firm diversification, and, in particular, of the limits to transferring skills from one activity to another, is evident in the fact that new activities are often closely related to a firm's past activities in terms of their overall human capital requirements (Farjoun, 1994; Chang and Singh, 1999; Neffke and Henning, 2013). However, much less is known about the fungibility of *managerial* human capital and on whether this plays a dominant role in determining a firm's diversification path.

2.2. The industry-specificity of managerial human capital

The answer to this question depends to an important extent on how specific managerial human capital is to the activities that are being managed. The specificity of management skills has been the subject of much debate. On the one hand, it is easy to find anecdotes of well-known CEOs who have applied

their skills to a wide variety of industries.[4] Empirical studies corroborate this anecdotal evidence. For instance, Bertrand and Schoar (2003) report that most CEOs and CFOs change jobs across unrelated sectors. Shaver (2015) reports similar findings for Fortune 200 companies in Minneapolis: compared to engineers in these companies, managers seem much more footloose and switch industries frequently. The relative ease with which these executives move from one industry to another suggests that managerial skills are quite independent of the specificities of a firm's exact product mix.

However, such findings pertaining to the upper management echelons of large corporations, contrast starkly to findings that are based on a wider class of management positions. Using data on all employees with social security coverage in Germany, Neffke et al. (2016) find that, when managers switch industries, they typically choose from a small set of industries that are closely related to their previous jobs. Moreover, if managerial skills were quite general, managers should be rewarded mostly for their overall experience and much less so for industry-specific experience. However, Sullivan (2010) shows that managers receive the highest returns to industry tenure of all broad occupations in the U.S. This suggests that industry-specific skills play a different role in management of large corporations compared to smaller firms.

The specificity of managerial skills also features in managerial rent models (Castanias and Helfat, 1991; 2001; Harris and Helfat, 1997). According to these models, firms will only be able to extract rents from their managers if managerial skills are not fully general, but only to a limited extent useful in other firms. Building on these models, Harris and Helfat (1997), interpret their finding that CEOs from outside the industry are paid higher wages and bonuses than industry-insiders as evidence that these executives need to be compensated for their loss of industry-specific skills, and, by implication, that managerial skill requirements differ by industry.

2.3. New managers and strategic change

For a manager's background to play a role in strategic change, it is insufficient that managerial skills are industry specific. It also matters how important managers are in promoting these change-processes. Prior research has shown that managers affect investment decisions, such as divestitures (Weisbach 1995) and acquisitions (Bertrand and Schoar, 2003), as well as leverage (Frank and Goyal, 2007), compensation (Graham et al., 2012), and tax strategies (Bamber et al., 2010). These studies focus on particular strategic decisions and show that these can be explained by CEO fixed effects

[4] For instance, before taking the helm at The Boeing Company, James McNerney had been a top executive at firms as different as Procter and Gamble, McKinsey, GE Financial Services and 3M.

(Bamber et al., 2010; Bertrand and Schoar, 2003; Frank and Goyal, 2007; Graham et al., 2012), management turnover (Bennedsen et al., 2006; Murphy and Zimmerman, 1993; Weisbach, 1995), managerial power (Adams et al., 2005) or by a manager's style and personal characteristics (Bamber et al., 2010; Bertrand and Schoar, 2003).

Instead of studying one-dimensional strategy or performance indicators, in this paper, we follow Boeker (1997) and study the importance of managerial human capital in strategic change by leveraging the fact that human capital has a *content*, part of which relates to prior work experience. We use this fact to gauge the importance of managerial experience by asking whether *what a manager knows* affects *what an establishment produces*. The advantage of this research design is that both outcome variable and information on a manager's human capital (i.e., the manager's prior industry) are of the same high dimensionality.

Following this approach, we would expect that, if managerial human capital were generic, new managers' prior industry experience should not affect the likelihood that an establishment changes its main line of business. In contrast, if managerial skills are at least partly industry-specific, it should be more likely that an establishment's changes its main activity when an outsider takes the helm. In particular, we propose the following hypothesis:

Hypothesis 1: Hiring a manager from an unrelated industry leads to an increase in the likelihood that an establishment changes its main line of business.

Furthermore, if managers influence corporate strategy by steering their establishments into a new industry, we would expect that their choice of a new industry reflects the relevance of their existing skills to that industry. This suggests the following hypothesis:

Hypothesis 2: Conditional on a strategic reorientation taking place, establishments tend to align their main line of business with their new manager's prior work experience.

2.4. Endogeneity and reverse causality

An important empirical challenge is that correlations between strategic change and the appointment of new managers may be spurious. The likelihood of changing industries and the hiring process itself may be driven by unobserved strategic variables. Furthermore, correlations may reflect reverse

causation: firms hire a new manager, because they are changing directions. In this scenario, hiring a new manager would be an *outcome* of strategic change, rather than its *cause*.

In fact, there are two separate aspects to a change in management, both of which may be endogenous. First, firms do not decide to hire a new manager at a random point in time. Second, firms do not hire random managers but select managers with specific skills and characteristics (Finkelstein and Hambrick, 1996).

The decision to hire a new manager may be related to a desire to change course. For instance, new managers are often hired when performance is low (Weisbach, 1988; Fee and Hadlock, 2004). In that case, Ordinary Least Squares (OLS) estimates would overestimate the effect of management turnover on strategic change. However, there are also situations in which estimated effects would be biased downward. For instance, inertia in an establishment's routines or conservative owners may not only be an obstacle to strategic change, but also restrict a manager's actions. If such restrictions lead to frustrations that culminate in a change of management, this management turnover will be correlated with a lack of strategic change. As a consequence, estimated effects of a change in management on a change in strategic orientation would be biased downward. A similar situation arises when establishments with successful business models expand their managerial capacity, but have no reason to change course. In this case, hiring new managers would again be associated with an *absence* of strategic change.

Biases in the estimated effect of the background of a newly appointed manager on strategic change may have similarly ambiguous signs. If hiring a manager from an unrelated industry is part of a wider strategy to abandon the current main line of business, hiring unrelated managers should lead to higher industry-switching rates, *even if the manager herself does not influence the process*. For instance, when a manager is replaced because of an organization's low performance, firms are more likely to hire outsiders (Parrino, 1997; Huson et al., 2001). Even in less extreme cases, where managers do influence the decision to switch to new lines of business, the bias stemming from omitting unobserved strategic variables will lead to an overestimation of the effect of managerial experience.[5] However, the effect of the manager's prior experience may also be underestimated in OLS regressions. For instance, managers from unrelated industries may find it hard to embark on change processes, because they

[5] Note, however, that the problem is *not* that managers are replaced intentionally. After all, the fact that firms themselves are apparently convinced that hiring a manager from an unrelated industry supports their reorientation strategy suggests that there is a causal link between the two. Instead, endogeneity arises when firms undertake additional actions that favor industry switching that are unobserved and, therefore, cannot be controlled for.

lack the trust and authority to lead a firm into a new direction. Another reason why estimated effects may be downward biased is measurement error. In particular, it is hard to quantify exactly how well a manager's skills and experience fit an industry. As a consequence, we expect that the relatedness between a manager's prior job and the establishment's current industry will be subject to measurement error. Such measurement error will bias effect estimates towards zero.

To deal with the endogeneity issues associated with the decision to appoint a new manager, scholars have exploited the death (Johnson et al., 1985; Bennedsen et al., 2006; Salas, 2010) and retirements (Denis and Denis, 1995; Weisbach, 1995) of managers. Under these circumstances, the need to hire a new manager is arguably exogenous. However, the choice of *which* manager to hire is still endogenous. To our knowledge, Fee et al. (2013) are the only authors that address not just endogeneity in the decision to hire but also in the selection of the new recruit. These authors first identify exogenous CEO departures related to deaths and natural retirements, and then exploit variation in the local supply pool of potential CEO replacements to predict what kind of new CEO will be hired. Using this two-sided identification strategy, they find that hiring new CEOs has a causal effect on asset growth, leverage and capital spending. As we will explain in greater detail below, we take a similar approach to investigate the impact of new managers on the likelihood that an establishment switches industries.

3. Methodology

3.1. Data

Our data are based on Sweden's administrative records as provided by Statistics Sweden (SCB, see: SCB, 2011). These data cover the entire Swedish population and all economic establishments between 1995 and 2010. We focus on strategic change occurring in the period from 2002 to 2008[6] in private-sector establishments that meet a number of criteria. First, we establishments must have at least five employees. This not only removes freelancers and self-employed workers from the sample, but also helps identifying takeovers more accurately. The reason for the latter is that establishments often change tax identifiers in takeovers. SCB corrects such changes whenever a disappearing establishment's workforce is reallocated as a whole or in large part to a new establishment identifier. However, such flow-based corrections are not very reliable for very small establishments. Second, we exclude establishments with 200 employees or more. This not only removes outliers, but also ensures

[6] Occupational information is available from 2001 onwards. The year 2001 is used to construct our instrument and the years 2009 and 2010 are required to observe whether or not an establishment changes industries.

that an establishment doesn't have too many managers that dilute a new manager's influence.[7] Finally, to avoid that early-stage experimentation by young organizations drives the results in our analysis, we focus on strategic change in more mature organizations by requiring that establishments are at least two years old.

The final sample consists of 60,495 establishments. As not all establishments exist in all years, the total number of establishment-year observations is 267,399. The median employment in these establishment is 12 employees. Most establishments are active in retail, followed by wholesale activities, business services and construction. A full breakdown of these establishments by high-level sector is provided in Table A1 of Appendix A.

To identify the management of these establishments, we rely on detailed occupation codes.[8] Unfortunately, occupation codes are missing for about 25% of all workers between 2001 and 2008. Consequently, we will not capture all changes in management. Moreover, to focus on the most influential managers in an establishment, we only study newly-recruited managers who are paid at least the median wage of the establishment's management in the preceding year. Most managers, about 15%, are managers of small enterprises in whole and retail trade, hotels and restaurants, transport and communications. The second largest groups consists of directors and chief executives (14%), followed by production and operations managers. Table B1 of Appendix B provides a breakdown of the different types of newly hired managers in our sample.

3.2. Strategic change: changing the main line of business

Our variable of interest is strategic change, which we measure as a change in an establishment's main line of business. To be precise, we define strategic change as a change in the first three digits of an establishment's industry code.[9] At the 3-digit level, the industry classification consists of 220 different

[7] Although such establishments are important in terms of numbers of employees, they account for just 1% of all establishments in Sweden. Given that our analyses are carried out at the establishment level, removing these large establishments does not significantly alter the total number of observations in this study.

[8] These are classified according to the Swedish Standard Classification of Occupations, which is based on the International Standard Classification of Occupations from the International Labor Organization.

[9] Industries are reported at the 5-digit level of the Swedish Standard Industrial Classification 2002 (SNI2002), the Swedish implementation of the European NACE Rev. 1.1 classification. Because the years 1995-2000 are used to calculate the skill relatedness among industries, a concordance between the Swedish SNI92 and SNI2002 industry classifications was created and used in the analysis.

industries. These industry codes reflect an establishment's main activity as determined by Statistics Sweden and Sweden's tax authorities.[10]

If one were to classify the most common switches in our data (see Table C1 of Appendix C for the top 20), four "archetypes" stand out. First, a large share of the top 20 industry switches consist of sales-related establishments that change their product mix, or customer base (i.e., from retail to wholesale). The prevalence of these switches mostly reflects that almost 30% of all establishments in our data are in wholesale or retail industries. A second common transition involves a move along the value chain. For instance, many car dealers shift their focus to after-sales services by moving into car repair. Similarly, establishments in land transport (e.g., trucking and passenger transport) often either become transport agencies (e.g., packaging) or start offering transport related services (e.g., operating parking lots and bus or train terminals).[11] A third common switch represents a change in output. For instance, construction establishments often move away from constructing complete buildings to focusing on installation jobs. Similarly, some machinery establishments change the type of machines they produce. Finally, a fourth dominant switch involves a move into or out of software consulting and supply.

To provide a more complete description of industry switches, Figure 1a depicts the phenomenon as a network. A node in this network represents an industry, which is color-coded by the broad sector to which it belongs. Edges connect nodes that display a high tendency for establishment switches. To be precise, we calculate the following edge-strength for each pair of industries:

$$ES_{ij} = \frac{s_{ij} \sum_{i \neq j} \sum_{j \neq i} s_{ij}}{\sum_{j \neq i} s_{ij} \sum_{i \neq j} s_{ij}}, \quad \textbf{(1)}$$

where S_{ij} is the number of establishments that switch from industry i to industry j. This quantity follows the same logic as the skill-relatedness index we will describe in the next subsection and can be interpreted as the factor by which the observed number of switches exceeds a benchmark in which establishments switch industries randomly. The width of an edge reflects its strength, whereas its color corresponds to the node from which the edge originates, i.e., it assumes the color of the

[10] Industry codes are determined according to the following procedure. New establishment must declare their main line of business to the Swedish tax authorities. Afterwards, this industry code is altered when Statistics Sweden determines that there has been a substantial change in the establishment main activity, relying, among other things, on questionnaires and information provided by the tax authorities.

[11] Also the move from architectural and engineering consultants to downstream construction activities can be regarded as a move within the value chain.

establishment's old industry. To prevent the graph from becoming cluttered, we only depict edges for strongly overrepresented switches.[12]

Figure 1a shows that industry switching is not random: many strong links connect industries in the same broad sector (i.e., they connect nodes of the same color). Moreover, the "archetypal" switches described before also feature in the network. For instance, there are several instances of switches within the pink retail and wholesale clusters. Likewise, movements along the value chain are apparent in the large numbers of manufacturing industries (in dark blue) connecting to wholesale industries (in pink).[13] Moreover, various changes in manufactured output are evident from the strong interconnectedness of industries in the manufacturing sector (different shades of blue). Finally, the position of software consultancy and supply industry as a hub connecting many industries stands out.

To illustrate the importance of software consultancy and supply in the establishment-switching network, Figure 1b shows the ego network for this industry.[14] Software consultancy and supply acts as origin or destination, not only for establishments in various types of business services, but also for computer manufacturers, publishing agencies, stock-market related activities, education and others. One explanation is that these switches reflect a change in the level of codification of the services that are provided. For instance, tax advisers may codify part of their know-how and focus on selling software solutions instead of tax services. In reverse, software producers may shift their focus toward implementation trajectories and after-sales services.

Overall, this suggest that many establishments that switch industries move into activities related to their old activities. This is not unexpected, given that a radical break with the past would be very costly. Moreover, we will not observe strategic change perfectly. On the one hand, strategic change may involve the closure of entire establishments or the creation of new ones, which will not be picked up in our analysis. On the other hand, some reported industry switches may not require profound organizational changes. However, many of the observed industry switches at least seem to imply a substantial refocusing by establishments. Moreover, because measurement issues should make it *harder* to detect the influence of new managers on strategic change, if anything, such difficulties would mean that any effects we do observe are conservative estimates of the actual effects.

[12] We only show the top 579 edges in terms of ES_{ij}, corresponding to an average of three edges per node. Note that because the network is not based on the total number of switches, but rather on the degree of overrepresentation of switches, some industry combinations listed in Table C1 of Appendix C do not appear in the figure.

[13] Another example, are horticultural activities are connected to the manufacturing industry of "vegetables," a food processing industry. In turn, several food processing industries are connected to wholesale of food or restaurants.

[14] To focus on the most important connections, we only show links that represent at least two switches and for which $S_{ij} > 2$.

Figure 1a: The activity-switching network

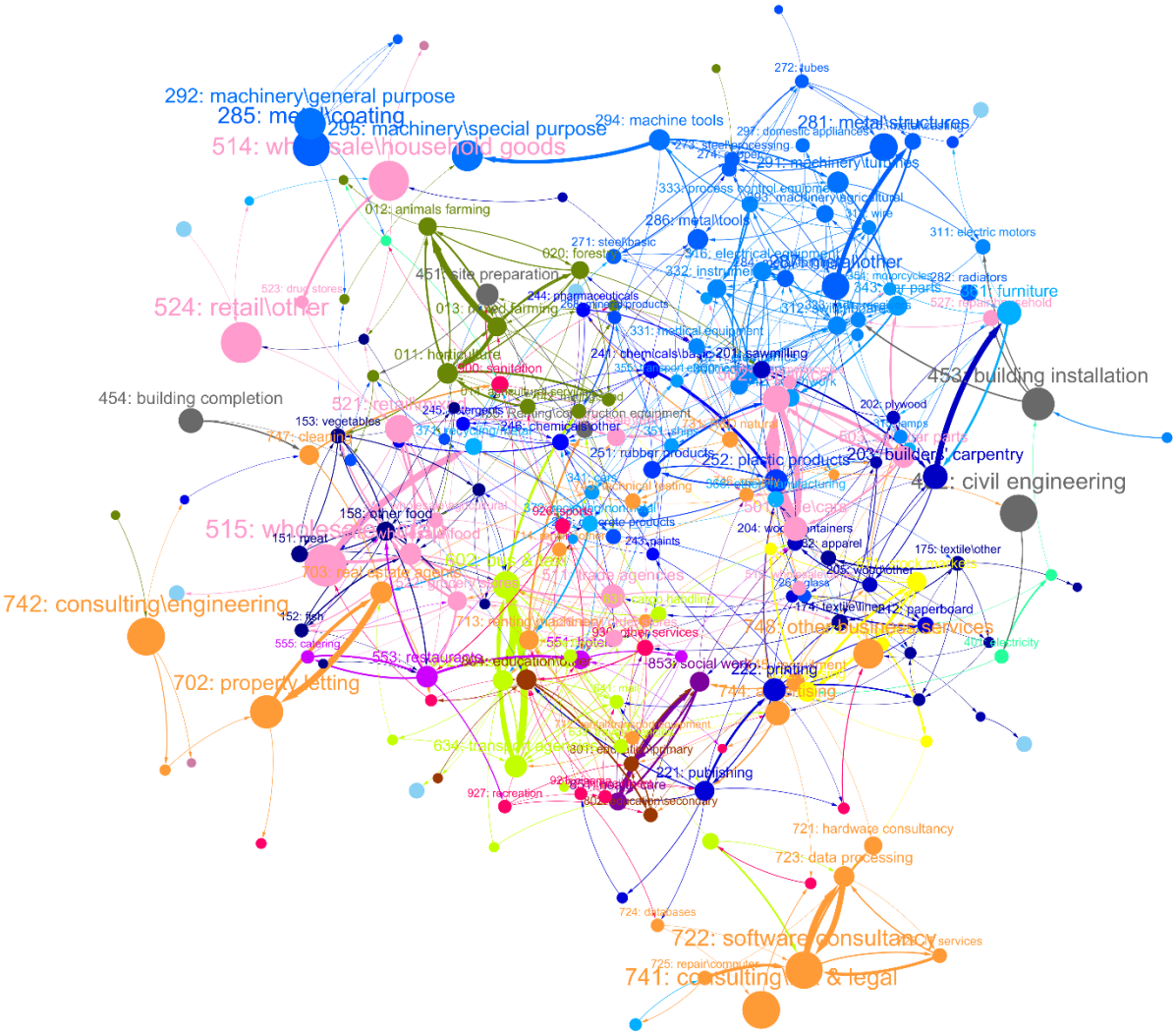
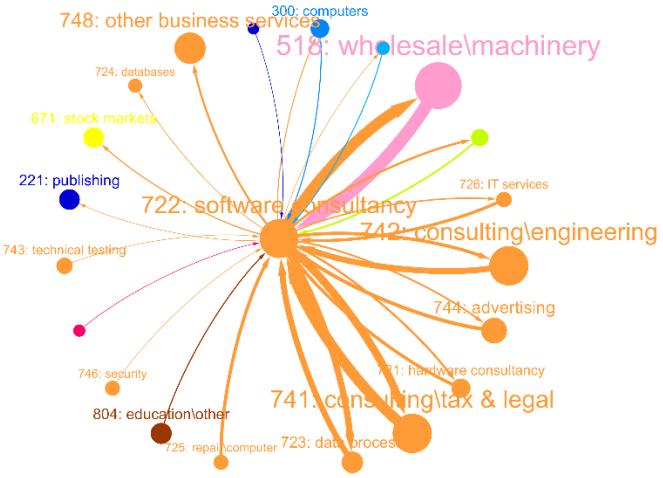


Figure 1b: Switches involving the *software consultancy and supply* industry



3.3. Relatedness between establishment and new manager

To assess the fit between a manager's prior experience and an establishment's main line of business, we estimate the relatedness between the industry in which the manager previously worked and the industry of the establishment. As we are interested in the fit in terms of a manager's human capital, we use an indicator of skill relatedness proposed by Neffke and Henning (2013) and developed further by Neffke et al. (2016). This indicator uses inter-industry labor-flows to assess industries' skill relatedness, assuming that, on average, workers will try to minimize human capital obsolescence when switching jobs. Hence, workers would move between industries that require similar skills, implying that labor flows will reflect similarities in skill requirements. In particular, Neffke at al. (2016) propose the following measure of skill relatedness:

$$SR_{ij} = \frac{F_{ij}}{\sum_{i\neq j} F_{ij} \sum_{j\neq i} F_{ij} / \sum_{i\neq j} \sum_{j\neq i} F_{ij}} = \frac{F_{ij} \sum_{i\neq j} \sum_{j\neq i} F_{ij}}{\sum_{i\neq j} F_{ij} \sum_{j\neq i} F_{ij}} \qquad (\mathbf{2})$$

The denominator in the first expression can be interpreted as the expected number of workers who switch from industry i to industry j if workers choose destination industries at random, with a probability proportional to the destination industry's total worker-inflow. We measure inter--industry relatedness in 1995 to 2000, the period before the first establishments in our sample switch industries.[15] Appendix D describes this procedure in detail.

3.4. Identification strategy

In section 2.4 we identified two potential sources of endogeneity: the decision-to-recruit and the selection of a given job candidate. To account for both types of endogeneity, we apply an identification strategy that consists of two components. First, we identify a situation in which a new manager is hired for arguably exogenous reasons, namely when an establishment faces the unexpected loss of one of its current managers. Second, we exploit a source of exogenous various in the local supply of suitable candidates to instrument the skill relatedness between a new manager's prior experience and the establishment's own industry.

[15] We reserve the year 2001 for the creation of the educational fit measure, as described in the next section.

Death of a manager

We identify situations in which the decision to recruit a new manager is exogenous to an establishment's wider strategy, by focusing on establishments whose manager permanently disappears from the data set.[16] Because the administrative records record all individuals working or living in Sweden, disappearances from our data either reflect that workers pass away or that they emigrate. Ideally, we would exclude the latter. Given that restructuring processes may negatively affect managers' job satisfaction and career prospects, they may increase the probability that a manager seeks employment elsewhere, which may result in a higher emigration probability. To decrease the likelihood that disappearances of managers are due to emigration, we exclude managers born outside Sweden. In spite of the ambiguity in this instrument, we will refer to the disappearance of a manager from the administrative records as the "death" of the manager as a shorthand notation for "death or permanent emigration." We will assume that, after conditioning on a number of establishment characteristics, this "death" of a manager is exogenous to strategic choices in an establishment.[17]

Shifts in the local supply of managers with related experience

To address the endogeneity in the choice of a particular new manager, we exploit exogenous variation in the availability of candidates with given experience profiles on the local labor market. We extract this exogenous variation from two sources: local graduation rates and establishment closures. We use this information to construct two "shift-share" instrument as introduced by Bartik (1991) and subsequently used in various applications in labor economics (Card, 2007; Moretti, 2010; Faggio and Overman, 2014).

Graduate supply shift

For our first instrument, we follow Neffke (2017), who uses the fact that Sweden's administrative records provide information on individuals' education in terms of detailed fields of study.[18] Because local graduation rates may be endogenous to the local demand for skills, observed graduation rates may be endogenous to local economic conditions. Instead of actual graduation rates, the approach,

[16] That is, managers who do not reappear by 2011, the last year in which we observe individuals.

[17] Indeed, the empirical analyses will show that controlling for selection effects does not lead to changes in estimated effects, in spite of the fact that the instrument is highly significant in first stage regressions. This suggests that endogeneity in the decision-to-hire plays no important role.

[18] Following Neffke (2017), we define about 500 different educational tracks as combinations of a 4-digit educational field and a 1-digit educational level identifier.

therefore, uses the predicted number of graduates in a municipality, by interacting the historical composition of graduates in the municipality with the growth of an educational track outside the municipality.

Let G_{emt} be the number of graduates G from educational track e in municipality of residence m in year t. Furthermore, let a dot (".") represent a summation over the omitted category, such that $G_{e.t} = \sum_m G_{emt}$ represent the total number of graduates from track e in the whole of Sweden. Finally, let $sh_{emb} = \frac{1}{6}\sum_{t=1990}^{1995} \frac{G_{emt}}{G_{e.t}}$ represent the historical share of municipality m in Sweden's total number of graduates from education e, averaged over the base-period 1990 to 1995. The *predicted* number of graduates from education e in municipality m and year t can now be derived from the total number of graduates from track e in year t *outside municipality* m, with m*'s* historical share of such graduates:

$$\hat{G}_{emt} = \frac{sh_{emb}}{(1-sh_{emb})} \times (G_{e.t} - G_{emt}) \quad (3)$$

$\hat{G}_{emt}$ represents the increase in the supply of workers with a given educational background we would expect based purely on secular trends in an education's number of graduates and the historical importance of the municipality as a source of such graduates in Sweden in the early 1990s. As such, it is unlikely to be affected by year-on-year changes in local economic conditions in the 2000s.

For our purposes, we need to convert this information about the local availability of workers with a given educational background into information on the availability of job candidates for management positions with a given industrial background. To do so, we need to know which educational degrees are suited for management jobs in a given industry.

Let $E_{eio2001}$ be the number of workers with degree e employed in industry i and occupation o in the year 2001. We estimate the "educational fit" of education e to occupation-industry combination (o, i) as:

$$S^{e}_{io2001} = \frac{E_{eio2001}/E_{.io2001}}{E_{e..2001}/E_{...2001}} \quad (4)$$

Where a '.' once more represents a summation over the omitted subscript's set. $S_{eio2001}$ measures how overrepresented workers with educational track e are in occupation o and industry i. This index runs from 0 to 1 when tracks are underrepresented in the occupation-industry combination and from 1 to infinity if they are overrepresented. We now use this information to count how many predicted

graduates are suited for management positions (denoted as occupation μ) in industry i in municipality m and year t:

$$\widehat{G}_{i\mu mt} = \sum_e \widehat{G}_{emt} * I\left(S^e_{i\mu t} > 1\right) \quad (5)$$

where $I(S^e_{i\mu t} > 1)$ is an indicator function that evaluates to 1 if its argument is true. After aggregating $\widehat{G}_{iomt}$ to the level of Sweden's 110 labor market areas, the resulting variable, $\widehat{G}_{iort}$, counts the number of predicted graduates in a local labor market that would make suitable managers for industry i. By summing $\widehat{G}_{j\mu mt}$ over all industries related to industry i:

$$\widehat{G}_{i\mu rt} = \sum_j \widehat{G}_{j\mu rt} * I(SR_{ij} > 1) \quad (6)$$

we arrive at the number of predicted graduates that can hold management positions in industries related to industry i. To express this number as a *relative* local shift in the supply of managers in related industries, we divide the measure in equation (6) by the total number of existing workers with similar skills:

$$GRAD_{irt} = \widehat{G}^{rel}_{i\mu rt} \Big/ WP^{rel}_{i\mu rt} \quad (7)$$

where $WP^{rel}_{i\mu rt}$ is constructed in the same way as $\widehat{G}^{rel}_{i\mu rt}$, except that instead of using the predicted graduates, $\widehat{G}_{emt}$, in equation (3), we use the number of local *employees* with education e in municipality m.

$GRAD$ acts as an instrument for the relatedness between a manager's prior industry and the establishment's current industry even if recent graduates themselves typically do not get managerial positions straight away. To see this, consider the following example. The southern-Swedish city of Lund has historically played an important role in physics education in Sweden. Moreover, this year, the number of graduates from physics programs outside Lund has risen substantially. We can therefore infer that the Lundian labor market will experience a growth in graduates with physics degrees. From equation (4), we know that workers with physics degrees often end up working as managers in the automobile industry. Even if it may take a while before the recent graduates will move into these

positions, their increased availability puts pressure on wages of existing workers in automobile plants. In as far as this pressure is passed up the hierarchy, it should become somewhat easier to poach a manager away from such plants. As a consequence, there will be an exogenous increase in the likelihood that motorcycle producers – which are skill related to car manufacturers – hire new managers from a skill-related industry. In contrast, for unrelated industries, link banks, the greater availability of managers with an automotive background results in an exogenous *decrease* in skill relatedness of new managers.

Establishment closures and mass layoffs

Our second instrument is derived from information on establishment closures and mass layoffs. The idea behind this second instrument is that establishment closures and mass layoffs expand the local availability of workers with certain prior work experience. To identify closures and mass layoffs, we follow the definitions in Hethey-Maier and Schmieder (2013) and Gathmann et al. (2014). An establishment closure occurs when an establishment that had at least 10 employees ceases to exist. A mass layoff occurs when an establishment does not close down, but loses at least 500 employees.[19]

Let the number of workers displaced from a job in occupation o, industry i and labor market area r between year t and $t+1$ be denoted as H_{iort}. In analogy to equation (6), the expansion in locally available managers from industries related to industry i can be calculated as:

$$\boldsymbol{H^{rel}_{i\mu rt} = \sum_j H_{j\mu rt} * I(SR_{ij} > 1)} \quad (8)$$

Once again, we express this supply shift relative to the total number of similar workers currently employed:

$$\boldsymbol{DISP_{irt} = H^{rel}_{i\mu rt} / WQ^{rel}_{i\mu rt}} \quad (9)$$

where $WQ^{rel}_{i\mu rt}$ reflects the number of workers in management occupations in industries related to industry i in region r and year t.

[19] To make sure that the acquisition of an establishment or part of an establishment by another firm is not mistaken for a closure or mass layoff, we require that the largest outflow of workers from the establishment to a single recipient establishment is less than 30% and that less than 70% of workers are absorbed by the largest three recipients.

4. Results

Establishment survival and death of a manager

Do establishments that hire new manager change industries more often than those that don't? Table 1 summarizes the differences between the two in terms of their survival. Establishments that hire new managers have lower failure rates, but are also more likely to change owners. This suggest new managers may be hired to help the acquisition of establishments by other firms. However, most importantly from this paper's perspective, we find that hiring a new manager makes it slightly more likely that an establishment changes its main line of business.

Table 1: Managerial recruitment and establishment outcomes

	Recruit new manager?					
	No			*Yes*		
Survive						
Survival in current form	173,620	96%	84%	19,846	96%	79%
Industry switching	6,388	4%	3%	850	4%	3%
Total Survival	*180,008*	*100%*		*20,696*	*100%*	
Exit						
Exit by failure	3,502	13%	2%	274	6%	1%
Exit by take-over	22,822	87%	11%	4,319	94%	17%
Total Exit	*26,324*	*100%*		*4,593*	*100%*	
Total	**206,322**		**100%**	**25,289**		**100%**

Establishments in this table are those that do not exit between *t* and *t + 1*. Hence, 'not recruiting a manager' implies that firm are still alive in *t+1* but have not recruited a new manager. The Survive and Exit categories are measured in *t + 2*.

Because establishments differ by a variety of characteristics, we repeat the analysis of Table 2 in a multinomial regression framework that allows us to condition the analysis on a number of control variables. In particular, we control for the size of the establishment's workforce, the growth of this workforce in the past two years, the establishment's age, whether or not it is part of a multi-establishment firm, the age of its workforce, the share of women among the 50% best-paid managers, the share of such managers with college degrees and year dummies. These variables are described in greater detail in Appendix E and will be used as control variables in all regression models that follow. Results for the main variable of interest, a dummy that represents the hiring of a new manager, are shown in Table 2. Essentially, all differences highlighted in Table 1 are confirmed to be also statistically significant in this regression framework.

Table 2: Multinomial logistic regression of establishment outcomes on managerial recruitment

		(2)	
	Exit by failure	*Exit by take-over*	*Industry switching*
New manager	0.669***	2.022***	1.182***
	(0.044)	(0.043)	(0.046)
cst.	0.348***	0.000	0.12***
	(0.055)	(0.000)	(0.002)
Unconditional probability	0.04	0.11	0.03
# obs	231,621	231,621	231,621

*Significant at 90%; **Significant at 95%; *** Significant at 99%; Multinomial logistic regression, with establishment survival as a reference category. Included are year fixed effects and control variables listed in Appendix E. Coefficients are relative risk ratios, standard errors – clustered at local industry - in parentheses.

Our main concern is that the results in Tables 1 and 2 reflect endogeneity in the decision-to-hire, in the recruitment process itself, or in both. As explained in section 3.4, we use the exogenous variation in the decision to hire a new manager that arises when establishments are confronted with the unexpected departure ("death") of a manager. This occurs in 740 of all 60,495 establishments. Table 3 shows the consequences of such events in terms of an establishment's survival. First, the likelihood that an establishment exits almost doubles after a manager deceases, rising from 4% to 8.0% when comparing establishments with and without managers who pass away. Second, establishments are 1.5 times more likely to be acquired by other firms following the death of a manager. Third, the likelihood of changing industries rises from 3% to 4%.

Table 3: Impact of death of manager on establishment outcomes

		Death of manager				
		No			*Yes*	
Survive						
Survival	217,534	96%	82%	543	96%	73%
Industry switching	8,036	4%	3%	28	4%	4%
Total Survival	225570	100%		571	100%	
Exit						
Exit by failure	11,376	28%	4%	59	35%	8%
Exit by take-over	28,944	72%	11%	110	65%	15%
Total Exit	40320	100%		169	100%	

Total	**265,890**	**100%**	**740**	**100%**

Once again, we repeat these analyses using a multinomial logistic regression that assesses the impact of the death of a manager on the likelihood that the establishment exits due to failure or a take-over, or that it switches industries (Table 4). The reference category is composed of establishments that survive without changing industries. Confirming the results in Table 3, relative risk ratios indicate that establishments that lose one of their managers are about 2.5 times as likely to exit due to failure and twice as likely to be taken-over. The impact on industry switching is close to the 25% increase reported in Table 3, but only statistically significant at the 10% level. Given that the death of a manager should be an exogenous event, these parameter estimates represent causal effects.

Table 4: Multinomial logistic regression of establishment outcomes on managerial death

	Exit by failure	*Industry switching*	*Exit by take-over*
Death manager	2.447***	1.274*	1.947***
	(0.342)	(0.248)	(0.221)
cst.	0.604**	0.013***	0.122***
	(0.057)	(0.002)	(0.015)
Unconditional probability	0.04	0.03	0.11
# obs	266,630	266,630	266,630

*Significant at 90%; **Significant at 95%; *** Significant at 99%; Robust standard errors in parentheses. Reference category is survival. Included are year fixed effects and control variables (see Appendix E).

The death of a manager is also a strong predictor of the recruitment of new managers. Of the establishments that experience the death of a manager and do not exit the same year (648 in total), 143 recruit a new manager. At 22%, this ratio is twice as large as the 11% we observe for establishment where no managers pass away, suggesting that a manager's death is a strong predictor for the hiring of new managers.[20]

Because (linear) Least Squares models are more versatile than (nonlinear) limited dependent variable models, we rely on Linear Probability Models in the remainder of the paper.[21] Table 5 shows

[20] This foreshadows that the death of a manager is a strong instrument for the decision-to-hire. Similarly, the regression results in Table 4 can be thought of as reduced-form estimates in an instrumental variables framework.

[21] In particular, LPMs can be easily expanded to Heckman sample selection models and IV estimators. Moreover, LPMs can handle large numbers of industry fixed effects with which nonlinear models would struggle. See Angrist and Pischke (2008) for a discussion of the benefits of using LPMs instead of nonlinear estimation models.

the effect of recruiting a new manager on the likelihood of industry switching in a two-stage least squares (2SLS) model. To facilitate comparisons, we also provide outcomes of the corresponding LPM in column (1). In line with the results reported in Table 1 establishments that recruit new managers are slightly more likely to switch industries. However, once we instrument the recruitment of new managers with the manager-death dummy in Model 2, this effect is no longer significant.

Table 5: Impact of managerial recruitment on industry switching of establishments

	(1) *OLS*	*(2)* *2SLS*
Recruitment manager	0.007***	0.073
	(0.002)	(0.087)
cst.	0.008*	0.005
	(0.004)	(0.005)
R^2	0.006	-0.005
First stage		
Death of manager		0.100***
		(0.015)
cst.		0.077**
		(0.002)
Kleibergen-Paap Wald rk F statistic		40.09
# obs	200,704	200,167

*Significant at 90%; **Significant at 95%; *** Significant at 99%; Included are year fixed effects and control variables (see Appendix E). Standard errors – clustered at local industry - in parentheses.

Strategic change

The loss of statistical significance in the 2SLS model of Table 5 can be attributed to an inflation of the standard errors, not a lowering of point estimates. Given the strength of the instrument, the massive loss in efficiency is somewhat unexpected. One reason for the absence of significant causal effects of recruiting a new manager is that the probability that an establishment changes its industrial orientation may depend on the *kind* of manager that is hired. Recruiting managers with a background that is unrelated to the establishment's present activities may steer an establishment into a new direction, whereas hiring a manager with a highly related background may not.

This seems plausible indeed. For establishments that do not switch industries, the mean relatedness of a new manager's prior experience to the establishment's industry is 0.59, which is twice as high compared to establishments that do switch industries (0.34). Table 6 tests the effect of

recruiting a manager with unrelated experience by analyzing the impact of the skill relatedness between a manager's previous and the establishment's original industry, denoted as "*SR* – man", on the likelihood that an establishment changes industries. All models have the same control variables as before.

The OLS model in column (1) of Table 6 shows that the more related a new manager's prior experience is to an establishment's industry, the less likely it is that the establishment changes industries. However, this relatedness can only be assessed if establishments hire a new manager. Therefore, there is a concern that the endogeneity in the decision-to-hire introduces a sample-selection bias. To correct for this, column (2) reports a Heckman selection model (Heckman, 1979), in which the death of a manager is used as an instrument for the decision-to-recruit, i.e., for being selected into the sample. In spite of the strength of the instrument, results are all but indistinguishable. This suggests that the decisions of establishments to hire new managers does not introduce endogeneity biases.

However, a concern is still that new recruits are not selected randomly. That is, a manager's prior experience is unlikely to be exogenous to the decision to change industries. Model 3 therefore instruments managerial relatedness with the labor supply shift instruments presented in section 3.4. The point estimate in the IV regression remains negative, but, somewhat unexpectedly, doubles vis-à-vis the OLS regressions. However, due to the relatively large standard errors, which are clustered at the same region-industry level at which instruments were constructed, this estimate is significant only at the 10% level. Given that the Kleibergen-Paap statistic is well above 10, instruments are quite strong. Therefore, the increase in point estimates is unlikely to be attributable to weak instruments. Moreover, the insignificant Hansen J-statistic does not indicate any significant violations of the exclusion restriction. In other words, we cannot reject the null hypothesis that our instruments are valid. Moreover, when we expand the IV estimates with a Heckman correction in Model (4), results are all but unchanged. With both sources of endogeneity accounted for, Model (4) represents our preferred specification.

To explore the validity of our identification strategy further, we run two more tests. First, we include the relatedness of other newly-recruited workers in Model (5). Because we don't want to drop establishments who hire only a manager, we interact this variable with a dummy variable that evaluates to one if the establishment hires additional employees, and to zero otherwise. The rationale behind adding these variables is that reverse causation would mean that managers are hired *after* an establishment decided it wants to change course. In that case, it is likely that not only the manager,

but also other employees will be hired from industries with suitable human capital profiles. However, adding the skill relatedness of other hires does not change the effect of the manager's skill relatedness.

Model (5) is not a perfect test, however, because in many cases, establishments hire no other workers, in which case we set skill-relatedness to zero, weakening the effect of the variable that captures other hires' skill relatedness. To deal with this issue, we also look at establishments that hire new workers for whom we don't expect any influence on strategic change. In particular, we look at establishments that hire new workers in elementary occupations, e.g., cleaners and building caretakers, and who earn below the median wage among their peers in the establishment. We interpret these analyses as placebo tests.

Model (6) and (7) present the effect of the skill relatedness of newly hired elementary workers in an OLS and a Heckman 2SLS model. In the endogenous OLS regression, relatedness of new hires in elementary occupations is negatively related to the likelihood of switching industries, but the effect is much weaker than the effect for managers. Moreover, once we instrument this variable, this effect becomes insignificant. Although the placebo test seems to confirm the soundness of the IV strategy, there are some caveats to this conclusion. First, the sample in the placebo test consists of different establishments than our main sample. This may limit comparability. Second, the graduate supply-shift instrument had the wrong sign in the IV's first stage regression for the placebo sample. We therefore dropped this instrument, and as a result IV estimates may have become less precise. Consequently, we cannot exclude that the reason the placebo test was passed is that the test was too weak.

Another potential worry is that establishments that belong to larger firms are less affected by managerial turnover than standalone establishments. In Model (8) we therefore repeat our analysis for single-establishment firms. Although, due to the smaller sample size, effects are somewhat less accurately measured, the estimated effect of a manager's skill relatedness is virtually indistinguishable from the one in the full sample.

Measurement error

In spite of the consistent evidence in support of hypothesis 1, the fact that the IV coefficients in Table 6 imply a downward bias vis-à-vis OLS estimates is puzzling. After all, reverse causality would lead to upward biases in OLS estimates in these estimates. The implied downward biases should therefore either result from the theoretical reasons discussed in section 2 related to strategic inertia, or from measurement error.

Table 6: Impact of relatedness of new manager on industry switching of establishments

	(1) OLS	(2) OLS, HC	(3) 2SLS	(4) 2SLS HC	(5) 2SLS HC	(6) OLS unskilled	(7) 2SLS HC unskilled	(8) 2SLS HC stand alone
SR – man.	-0.033***	-0.033***	-0.080*	-0.083*	-0.083*	-0.019***	-0.019	-0.100*
	(0.004)	(0.004)	(0.044)	(0.044)	(0.047)	(0.003)	(0.063)	(0.054)
IMR		0.093**		0.100***	0.098**	0.101	0.101	0.124**
		(0.038)		(0.038)	(0.038)	(0.254)	(0.258)	(0.056)
other hires?					-0.002			-0.001
(y/n)					(0.007)			(0.009)
SR(other)					-0.013			-0.012
					(0.013)			(0.018)
cst.	0.025*	-0.149**	0.065*	-0.120	-0.111	-0.089	-0.130	-0.091
	(0.015)	(0.073)	(0.037)	(0.077)	(0.08)	(0.266)	(0.343)	(0.114)
Kleibergen-Paap			35.59	35.10	32.45		13.79	27.33
Hansen J			0.159	0.128	0.129		10.138***	0.237
R^2	0.020	0.020	0.007	0.006	0.007	0.011	0.011	-0.022
# obs	17,257	17,199	17,257	17,199	17,199	15,029	15,029	7,954
FIRST STAGE REGRESSIONS								
DISP			5.597 ***	5.683***	5.291***		1.606***	6.771***
			(1.142)	(1.138)	(1.071)		(0.367)	(1.367)
GRAD			1.699***	1.700***	1.567***		-0.763**	1.795***
			(0.245)	(0.246)	(0.241)		(0.309)	(0.329)
cst.			0.679***	0.421	0.404		-0.162	0.425
			(0.041)	(0.267)	(0.270)		(0.857)	(0.342)

*Significant at 10%; **Significant at 5%; *** Significant at 1%. Included are year fixed effects and control variables (see Appendix E). Null hypothesis Kleibergen Paap rk LM statistic: model is underidentified. Null hypothesis Hansen J: overidentification restrictions are valid. SR - man.: skill relatedness of manager to establishment. IMR is the Inverse Mills Ratio. Standard errors, clustered at labor market region-industry level, in parentheses.

To gauge how much of the downward bias in OLS estimates is due to measurement error, we instrument a manager's skill relatedness with a second variable that assesses how relevant a manager's prior experience is in the establishment's old industry, but that doesn't resolve any reverse causality issues. The first source of measurement error resides in mismeasurement of inter-industry relatedness. [22] To correct for this, we construct an alternative relatedness measure based on the distance between industries in the classification hierarchy. That is, the relatedness between two industries is given by how many leading digits they share in the classification system. The correlation of this variable with skill relatedness is 0.23. Because the construction of the NACE classification is based on a wholly different logic and methodology than skill relatedness, instrumenting skill relatedness with classification-based relatedness should rid the coefficients of the error in the measurement of skill relatedness.

The second source of measurement error derives from the fact that, given that human capital is accumulated over a lifetime, just looking at the previous industry in which a manager worked does not adequately describe her entire work experience. To address this measurement error, we also instrument skill relatedness to the previous job with the classification-based-relatedness to the penultimate industry in which a manager worked. This way, we correct for both sources of measurement error at once.

Tables 7 shows how estimates change when skill relatedness is instrumented with different proxies for how relevant a manager's prior experience is to the establishment's current industry. Model (1) repeats our preferred OLS model with the Heckman correction. Model (2) instruments skill relatedness with classification-based relatedness. The coefficient rises by about 30%, suggesting that skill-relatedness is indeed imperfectly measured. However, once we instrument skill-relatedness with the NACE-relatedness to the manager's penultimate job in Model (3), the coefficient almost triples. This finding suggests that simply proxying the content of a manager's human capital by her previous industry introduces severe measurement errors.

Correcting for all measurement error yields estimates that are very close to the IV estimates in Table 6, which are based on the supply-shift instruments. This suggests that the difference between IV and OLS coefficients in Table 6 can be wholly attributed to the attenuation bias caused by errors-in-variables. If we repeat the error-correction exercise for our placebo group of elementary workers, we find a similar pattern. Models (5) to (7) of Table 7 show that the effect estimate of skill relatedness

[22] See Neffke et al. 2016 for a discussion on the problem of measurement error in relatedness measures.

also increases in this group of workers, reaching effect sizes that are close to the ones for managers. Given the insignificant IV estimates in column (7) of Table 6, this suggests that there is a strong (reverse) effect of establishment switching on the hiring of workers in elementary jobs. It is not obvious why this reverse causation channel should affect workers with low-level jobs more strongly than managers. One possibility is that the establishment in the management sample differ too much from the ones in the elementary-occupations sample to be comparable. In that case, effect heterogeneity could explain the observed discrepancies. Yet, we also cannot exclude that our instrument does not work well in the placebo test. Given that we cannot assess the severity of this issue, we regard the placebo test as somewhat inconclusive.

Table 7: Instrumental regressions on measurement error

	(1) OLS HC managers	(2) 2SLS HC manager	(3) 2SLS HC managers	(4) OLS HC elementary	(5) 2SLS HC elementary	(6) 2SLS HC elementary
SR – man.	-0.033***	-0.042***	-0.090***	-0.019***	-0.022***	-0.077***
	(0.004)	(0.004)	(0.009)	(0.003)	(0.003)	(0.017)
IMR	0.093**	0.094**	0.102**	0.101	0.104	0.575
	(0.038)	(0.038)	(0.043)	(0.254)	(0.254)	(0.614)
st.	-0.149 *	-0.142*	-0.123	-0.089	-0.131	-0.725
	(0.073)	(0.073)	(0.082)	(0.266)	(0.342)	(0.827)
R^2	0.020	0.020	0.004	0.011	0.0110	-0.0095
# obs	17,199	17,199	14,825	15,029	15029	7222
		First stage	*First stage*		*First stage*	*First stage*
NACE – man.		0.333***			0.363***	
		(0.002)			(0.002)	
NACE – man (penult.)			0.155***			0.088***
			(0.003)			(0.005)
Constant		0.013	0.117		-0.478	-1.045
		(0.934)	(0.248)		(0.372)	(1.037)
Kleibergen-Paap		27191	1969		37340.55	350.15

*Significant at 90%; **Significant at 95%; *** Significant at 99%; Robust standard errors – clustered at local industry - in parentheses. Included are year fixed effects and control variables (see Appendix E). SR(man.) stands for the relatedness of the manager to the industry of the establishment he is recruited into

Direction of diversification

So far, we have shown that managers that are hired from unrelated industries tend to lead to more strategic change. Are establishments that hire such managers also more likely to move into activities that are related to the new manager's background? To study this, we create for each diversifying

establishment that recruited a new manager a vector that corresponds to the full list of 219 potential diversification targets (i.e., industries). The industry that was ultimately chosen by the establishment is assigned a score of 1 in this vector, whereas all other industries get a score of 0. We then regress these vectors on the relatedness of the new manager as well as of the establishment's original industry to each potential target industry.

Table 8 reports results. Model (1) shows that establishments are more likely to shift into industries that are related to their original activities. What is more, Model (2) shows that they are also more likely to diversify into industries that are related to the new manager's prior background. Model (3) shows that when estimating both effects simultaneously, they both remain positive and significant. This confirms hypothesis 2: although establishments typically do not switch to radically different industries, they tend to move into industries that are closely related to the new manager's prior industry.

Table 8: Impact of relatedness establishment and new manager on switching into target industry

	(1) OLS	(2) OLS	(3) OLS
SR – man.	0.0163***		.0109***
	(0.000)		(0.001)
SR – est.		0.0165***	0.011***
		(0.001)	(0.001)
cst.	0.011***	0.011***	0.013***
	(0.000)	(0.000)	(0.000)
# obs	78,320	71,940	71,940
R^2	0.012	0.012	0.016
Industry dummies?	No	No	No

*Significant at 90%; **Significant at 95%; *** Significant at 99%; Standard errors in parentheses, clustered at the establishment firm level. Sample: all establishments that switch industries and recruited a new manager.

5. Conclusion

We have assessed the influence of newly hired managers on strategic change by linking the likelihood that an establishment changes its main line of business to the new manager's prior work experience. Using matched employer-employee data for Sweden, we find that establishments that hire managers from unrelated industries are more likely to switch industries than those who hire managers from related industries. Estimated effects are substantial: a one-standard-deviation decrease in the relatedness between the manager's previous industry and the establishment's own industry raises the probability that the establishment will change industries by a factor of 3.5. We use a two-stage

identification strategy to address the endogeneity in the decision-to-hire and in the new manager's background. We argue that the estimated effects are causal, given that tests on the validity of instruments, robustness checks and a placebo test support this view, although the latter may lack statistical power. In fact, the main source of bias turns out not to be reverse causality, but measurement error. Finally, the new manager's prior background also affects the direction of strategic change: establishments tend to move predominantly into industries that are closely related to the old industry the new manager worked in.

These findings suggest not only that managers have an important influence on strategic change, but also that their know-how is to some extent specific to an industry. Such industry specificities in managerial human capital are at odds with the career moves of highly visible CEOs. The fact that managers at the head of large firms often switch across seemingly unrelated industries may imply that industry-specific managerial skills are less important in large firms than in the small and medium-sized establishments in our paper.

A number of caveats apply. First, because our skill relatedness measure cannot be decomposed into individual skills, we cannot pinpoint which capabilities and managerial practices make two industries related and which of them play a role in strategic change. Efforts to merge surveys on managerial practices (e.g., Bloom and Van Reenen, 2010) to employer-employee linked databases may help shed light on this issue in the future. Second, we did not probe into the functional form of the association between a new manager's relatedness and industry switching. However, successful strategic change may require that there is an optimal cognitive distance (Nooteboom et al., 2007) between a manager's prior industry and the establishment's current industry. Finally, the strategic change we studied was quite radical, namely, a change that involved an establishment to change its main line of business. This approach overlooks instances of more gradual strategic change, where new managers first widen the product mix of an establishment before abandoning existing activities. A fruitful way forward would be to merge matched employer-employee with manufacturing surveys or international trade data that record an establishment's full product mix or export portfolio.

Finally, we did not address the question of whether new managers are recruited as part of larger teams. Hoetker and Agarwal (2010) found that in the dissolution of firms in the disk drive industry, know-how was more effectively transferred by acquiring entire firms than by hiring individual displaced employees. Such acquisitions, in which entire teams are hired, give firms access to what Hoetker and Agrawal call the "template" of a firm, or what Nelson and Winter (1982) called a firm's "routines." However, in spite of these limitations, we believe this study has shown that linking the

human capital of managers to the direction of change in establishments and firms is a fruitful way to study processes of strategic change.

References

Adams, R.B., Almeida, H. and Ferreira D. (2005) Powerful CEOs and their impact on corporate performance. Review of Financial Studies 18, pp. 1403-1432.

Adner, R, Helfat, C. (2003) Corporate Effects and Dynamic Managerial Capabilities. Strategic Management Journal 24, pp. 1011 – 1026.

Almeida P, Kogut B (1999) Localization of knowledge and the mobility of engineers. Management Science 45(7): 905–917.

Angrist, J. D., Pischke, J. S. (2008). Mostly harmless econometrics: An empiricist's companion. Princeton university press.

Bamber, L., Jiang, J. and Wang, I. (2010) What's my style? The influence of top managers and their personal backgrounds on voluntary corporate financial disclosure. The Accounting Review 85, pp. 1131–1162.

Barney, J.B. (1986) Organizational Culture: Can It Be a Source of Sustained Competitive Advantage? Academy of Management Review 11 (3), pp. 656 - 665.

Barney, J.B. (1991) Firm resources and sustained competitive advantage. Journal of Management 17, pp. 99 – 120.

Bartik, T.J. (1991) Who Benefits From State and Local Economic Development Policies? Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

Becker, G. (2002) The Age of Human Capital. Stanford: Hoover Institution.

Bennedsen, M, Perez-Gonzalez, F., Wolfenzon, D. (2006) Do CEOs matter? Available at <Http://www. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1293659.>

Bernard, A.B., Redding, S., Scott, P. (2010) Multiple-Product Firms and Product Switching. American Economic Review 100 (2), pp. 444-448.

Bertrand M. and Schoar A. (2003) Managing with Style: The Effect of Managers on Firm Policies. Quarterly Journal of Economics 118 (4), pp. 1169-1208.

Bloom, N., Van Reenen, J. (2010) Why Do Management Practices Differ across Firms and Countries? The Journal of Economic Perspectives 24 (1), pp. 203 - 224.

Bloom, N, Eifert, B., Mahajan, A., McKenzie, D., Roberts, J. (2013) Does Management Matter? Evidence from India. Quarterly Journal of Economics 128 (1), pp. 1 - 51.

Boeker, W. (1997) Executive Migration and Strategic Change: The Effect of Top Manager Movement on Product-Market Entry. Administrative Science Quarterly 42 (2), pp. 213 - 236.

Card, D. (2007) How Immigration Affects US Cities. CReAM Discussion Paper, No. 11/ 07.

Castanias, R.P and Helfat, C.E. (1991) Managerial Resources and Rents. Journal of Management 17 (1), pp. 155-171.

Castanias, R.P and Helfat, C.E. (2001) The managerial rents model: Theory and empirical analysis. Journal of Management 27 (06), pp. 661-678.

Chang, S., Singh, H. (1999) The impacts of modes of entry and resource fit on modes of exit by multibusiness firms. Strategic Management Journal 20 (11), pp. 1019 - 1036.

Child, J. (1972) Organizational Structure, Environment and Performance: The Role of Strategic Choice. Sociology 6 (1), pp. 1 - 22.

Clougherty, J.A., Duso, T., Muck, J. (2016) Correcting for Self-selection Based Endogeneity in Management Research: Review, Recommendations and Simulations. Organizational Research Methods 19 (20), pp. 286 - 347.

Denis, D.J. and Denis, D.K. (1995) Performance Changes Following Top Management Dismissals. The Journal of Finance 50 (4), pp. 1029-1057.

Denrell, J., Fang, C., Winter, S.G. (2003) The Economics of Strategic Opportunity. Strategic Management Journal 24 (1), pp. 977 – 990.

Eisenhardt, K.M., Martin, J.A. (2000) Dyanmic Capabilities: What are They? Strategic Management Journal 21, pp. 1105 – 1121.

Faggio, G. and Overman, H. (2014) The effect of public sector employment on local labour markets. Journal of Urban Economics 79, pp. 91-107.

Farjoun, M. (1994) Beyond industry boundaries: Human expertise, diversification and resource - related industry groups. Organization Science 5 (2), pp. 185 - 199.

Fee, C.E., Hadlock, C.J. (2004) Management turnover across the corporate hierarchy. Journal of Accounting and Economics 37 (1), pp. 3 - 38.

Fee, C.E., Hadlock, C.J., Pierce, J.R. (2013) Managers with and without Style: Evidence Using Exogenous Variation. Review of Financial Studies 26 (3), pp. 567-601.

Finkelstein, S. and Hambrick, D.C. (1996) Strategic Leadership: Top Executives and Their Effects on Organizations. St. Paul, MN: West Publishing Company.

Frank, M.Z., Goyal, V.K. (2007) Corporate Leverage: How Much Do Managers Really Matter?. SSRN working paper. Available at:<http://ssrn.com/abstract=971082.>

Gathmann, C., Ines, H., Schonberg, U. (2014) Spillover Effects in Local Labor Markets: Evidence from Mass Layoffs. Available at <https://www.econstor.eu/handle/10419/100378>

Graham, J.R., Li, S., Qiu, J. (2012) Managerial Attributes and Executive Compensation. Review of Financial Studies 25 (1), pp. 144-186.

Hambrick, D.C and Mason, P.A. (1984) Upper Echelons: The Organization as a Reflection of Its Top Managers. Academy of Management Review 9 (2), pp. 193 - 206.

Hambrick, D.C., Cho, T.S., Chen, M. (1996) The Influence of Top Management Team Heterogeneity on Firms' Competitive Move. Administrative Science Quarterly 41 (4), pp. 659 - 684.

Harris, D. and Helfat, C. (1997) Specificity of CEO Human Capital and Compensation. Strategic Management Journal 18 (11), pp. 895-920.

Heckman, J.J. (1979) Sample Selection Bias as a Specification Error. Econometrica 47 (1), pp. 153 - 161.

Helfat, C.E., Finkelstein, S., Mitchell, W., Peteraf, M.A., Singh, H., Teece, D.J., Winter, S.G. (2007) Dynamic Capabilities. Understanding Strategic Change in Organizations. Malden: Blackwell Publishing.

Hethey-Maier, T., Schmieder, J.F. (2013). Does the Use of Worker Flows Improve the Analysis of Establishment Turnover? Evidence from German Administrative Data. Schmollers Jahrbuch 133 (4), pp. 477-510.

Hoetker, G., Agarwal, R. (2007) Death Hurts, But It Isn't Fatal: The Postexit Diffusion of Knowledge Created by Innovative Companies. Academy of Management Journal 50 (2), pp. 446 - 467.

Huson, M.R., Parrino, R. Starks, L.T. (2001) Internal Monitoring Mechanisms and CEO Turnover: A Long-Term Perspective. The Journal of Finance 56 (6), pp. 2265 - 2297.

Johnson, B., Magee, R., Nagarajan, R., Newman, H. (1985) An analysis of the stock price reaction to sudden executive death: Implications for the management labor market. Journal of Accounting and Economics 7, pp. 151–174.

Lennox, C.S., Francis, J.R., Wang, Z. (2012) Selection Models in Accounting Research. The Accounting Review 87 (2), 589 - 616.

Menz, M. (2012) Functional Top Management Team Members A Review, Synthesis, and Research Agenda. Journal of Management 38 (1), pp. 45 - 80.

Moretti, E. (2010). Local Multipliers. American Economic Review Papers and Proceedings 100 (2), pp. 1–7.

Murphy, K.J. and Zimmerman, J.L. (1993) Financial performance surrounding CEO turnover. Journal of Accounting and Economics 16 (1-3), pp. 273-315.

Nandialath, A.M., Doston, J.P., Durand, R. (2014) A Structural Approach to Handling Endogeneity in Strategic Management: The Case of RBV. European Management Review 11 (1), pp. 47 - 62.

Neffke, F., Henning, M. (2013) Skill relatedness and firm diversification. Strategic Management Journal 34 (3), pp. 297 - 316.

Nooteboom, B., Van Haverbeke, W., Duysters, G., Gilsing, V., Van Den Oord, A. (2007) Optimal cognitive distance and absorptive capacity. Research Policy 36 (7), pp. 1016 - 1034.

Shaver M. (2015) Building a Headquarters Economy: Managers, Mobility, and Minneapolis' experience. mimeo.

Neffke, F. and Henning, M. (2013) Skill relatedness and firm diversification. Strategic Management Journal 34 (3), pp. 297 - 316.

Neffke, F., Otto, A., Weyh, A. (2016) Inter-industry labor flows. Papers in Evolutionary Economic Geography 16.06.

Neffke, F. (2017) Coworker Complementarity. CID Working Paper No. 79.

Nelson, R.R. and Winter, S.G. (1982) An evolutionary theory of economic change. Cambridge, MA: Belknap.

Parrino, R. (1997) CEO turnover and outside succession A cross-sectional analysis. Journal of Financial Economics 46 (2), pp. 165 - 197.

Penrose, E.G. (1959) The Theory of the growth of the firm. New York: Wiley.

Rosenkopf, L., Almeida, P. (2003) Overcoming Local Search Through Alliances and Mobility. Management Science 49, pp. 751 - 766.

Salas, J.M. (2010) Entrenchment, governance, and the stock price reaction to sudden executive deaths. Journal of Banking & Finance 34 (3), pp. 656-666.

SCB. 2011. Longitudinell integrationsdatabas för sjukförsäkrings- och arbetsmarknadsstudier (LISA) 1990-2009. Arbetsmarknads- och utbildningsstatistik 2011:4. Statistiska centralbyrån/Statistics Sweden.

Sirmon, D.G., Hitt, M.A., Ireland, D.R. (2007), Managing Firm Resources in Dynamic Environments to Create Value: Looking Inside the Black Box. Academoy of Management Review 32 (1), pp. 273 - 292.

Song, J., Almeida, P., Wu, G. (2003) Learning - by - Hiring: When Is Mobility More Likely to Facilitate Interfirm Knowledge Transfer? Management Science 49 (4), pp. 351 - 365.

Sullivan, P. (2010) Empirical evidence on occupation and industry specific human capital. Labour economics 17 (3), pp. 567-580.

Teece, D.J. (1982) Towards an economic theory of the multiproduct firm. Journal of Economic Behavior and Organization 3, pp. 39 - 63.

Teece, D. and Pisano, G. (1994) The dynamic capabilities of firms: an introduction. Industrial and Corporate Change 3 (3), pp. 537-556.

Teece, D., Pisano, G., Shuen, A. (1997) Dynamic Capabilities and Strategic Management. Strategic Management Journal 18, pp. 509-533.

Teece, D.J., Pierce, J.L., Borner, C.S. (2002) Dynamic Capabilities, Competence, and the Behavioral Theory of the Firm. In: Augier M. and March J.G. (eds) The Economics of Change, Choice, and Structure: Essays in the Memory of Richard M. Cyert. Cheltenham: Edward Elgar.

Tzabbar, D. (2009) When Does Scientist Recruitment Affect Technological Repositioning? Academy of Management Journal 52 (5), pp. 873 - 896.

Weisbach, M. (1995) CEO turnover and the firm's investment decisions. Journal of Financial Economics 37 (2), pp. 159 - 188.

Wernerfelt, B. (1984) A resource-based view of the firm. Strategic Management Journal 7, pp. 171 – 180.

Zollo, M., Winter, S.G. (2002) Deliberate Learning and the Evolution of Dynamic Capabilities. Organization Science 13, pp. 339 – 351.

Appendix A

Table A.1: Number of establishments per industry in sample

Industry	Number of establishments	Share
Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	11336	16.00%
Wholesale trade and commission trade, except of motor vehicles and motorcycles	8609	12.15%
Other business activities*	7854	11.08%
Construction	7626	10.76%

Hotels and restaurants	4701	6.63%
Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	3379	4.77%
Manufacture of fabricated metal products, except machinery and equipment	2969	4.19%
Computer and related activities	2578	3.64%
Land transport; transport via pipelines	2484	3.51%
Health and social work	1939	2.74%
Manufacture of machinery and equipment	1649	2.33%
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	1400	1.98%
Supporting and auxiliary transport activities; activities of travel agencies	1374	1.94%
Publishing, printing and reproduction of recorded media	1353	1.91%
Real estate activities	1244	1.76%
Education	1092	1.54%
Recreational, cultural and sporting activities	1041	1.47%
Manufacture of food products and beverages	942	1.33%
Manufacture of furniture	639	0.90%
Renting of machinery and equipment without operator and of personal and household goods	555	0.78%
Manufacture of electrical machinery and apparatus	467	0.66%
Other service activities	454	0.64%
Manufacture of other non-metallic mineral products	418	0.59%
Manufacture of medical, precision and optical instruments, watches and clocks	410	0.58%
Activities auxiliary to financial intermediation	361	0.51%
Manufacture of chemicals and chemical products	360	0.51%
Manufacture of motor vehicles, trailers and semi-trailers	349	0.49%
Post and telecommunications	344	0.49%
Research and development	289	0.41%
Manufacture of textiles	242	0.34%
Manufacture of other transport equipment	234	0.33%
Sewage and refuse disposal, sanitation and similar activities	221	0.31%
Other mining and quarrying	215	0.30%
Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction excluding surveying	202	0.29%

Manufacture of basic metals	190	0.27%
Electricity, gas, steam and hot water supply	165	0.23%
Insurance and pension funding, except compulsory social security	158	0.22%
Manufacture of radio, television and communication equipment and apparatus	136	0.19%
Mining of metal ores	131	0.18%
Mining of uranium and thorium ores	109	0.15%
Recycling	106	0.15%
Activities of membership organizations	100	0.14%
Water transport	98	0.14%
Air transport	84	0.12%
Manufacture of office machinery and computers	79	0.11%
Manufacture of wearing apparel; dressing and dyeing of fur	72	0.10%
Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	38	0.05%
Mining of coal and lignite; extraction of peat	25	0.04%
Manufacture of coke, refined petroleum products and nuclear fuel	17	0.02%
Manufacture of tobacco products	10	0.01%
Collection, purification and distribution of water	6	0.01%
Public administration and defence; compulsory social security	6	0.01%
Total	70860	100%

* These activities include advertising, accounting, legal, and other business services.

Appendix B

Table B.1: Types of recruited managers in sample

Type of manager	# new managers	share
Managers of small enterprises (selected industries)[23]	11,258	15%
Directors and chief executives	10,860	14%
Production and operations managers (selected industries)[23]	7,339	9%
Production and operations managers (education)	6,390	8%
Production and operations managers, n.e.c.	5,301	7%
Managers of small enterprises (business services)	4,962	6%

[23] Namely: wholesale and retail trade, hotels and restaurants, transport and communications.

Managers of small enterprises (health and social work)	4,881	6%
Managers of small enterprises, n.e.c.	3,905	5%
Production and operations managers (health and social work)	3,897	5%
Production and operations managers (public administration)	3,880	5%
Other	12,103	20%
Total	74,776	100%

Appendix C

Table C.1: Top 20 most common industry switches of all establishments

	Old industry	New industry	# switches
1	Other retail sale of new goods in specialized stores	Retail sale in non-specialized stores	155
2	Sale of motor vehicles	Maintenance and repair of motor vehicles	67
3	Wholesale of household goods	Wholesale of non-agricultural intermediate products, waste and scrap	64
4	Wholesale of machinery, equipment and supplies	Software consultancy and supply	61
5	Architectural and engineering activities and related technical consultancy	Building of complete constructions or parts thereof; civil engineering	57
6	Other retail sale of new goods in specialized stores	Wholesale of household goods	55
7	Software consultancy and supply	Wholesale of machinery, equipment and supplies	53
8	Wholesale of machinery, equipment and supplies	Wholesale of household goods	52
9	Legal, accounting, book-keeping and auditing activities; tax consultancy; market research and public opinion polling; business and management consultancy; holdings	Software consultancy and supply	51
10	Building of complete constructions or parts thereof; civil engineering	Building completion	46
11	Manufacture of other special purpose machinery	Manufacture of other general purpose machinery	44
12	Wholesale of non-agricultural intermediate products, waste and scrap	Wholesale of machinery, equipment and supplies	43
13	Building of complete constructions or parts thereof; civil engineering	Building installation	41
14	Other retail sale of new goods in specialized stores	Wholesale of non-agricultural intermediate products, waste and scrap	38
15	Other land transport	Other supporting transport activities	38
16	Wholesale of household goods	Wholesale of machinery, equipment and supplies	38
17	Manufacture of other special purpose machinery	Treatment and coating of metals; general mechanical engineering	37
18	Software consultancy and supply	Legal, accounting, book-keeping and auditing activities; tax consultancy; market research and public opinion polling; business and management consultancy; holdings	37
19	Other land transport	Activities of other transport agencies	36
20	Wholesale of household goods	Other retail sale of new goods in specialized stores	36

Appendix D

We calculate skill relatedness between industries annually using labor flows in the Swedish labor force for the period 1995 to 2000. We define the labor force in year t as all people aged 18 to 65. Furthermore, industries are defined at the 3-digit level (220 in total). Skill relatedness is now calculated as:

$$SR_{ijt} = \frac{F_{ijt}}{(F_{.jt}F_{i.t})/F_{..t}} \quad \text{(D 1)}$$

where F_{ijt} is the labor flow from industry i to industry j in year t. Labor flows are summed over the omitted category when the index i or j is replaced by a dot: $F_{i.} = \sum_j F_{ij}$, $F_{.j} = \sum_i F_{ij}$ and $F_{..} = \sum_{i,j} F_{ij}$. The term $(F_{i.}F_{.j})/F_{..} = F_{i.}\frac{F_{.j}}{F_{..}}$ reflects the expected labor flows from i to j if j receives workers from i in the same proportion as its share in total labor flows. SR_{ijt} values higher than 1 reflect that two industries are skill-related, and values between 0 and 1 reflect they are unrelated. Because this measure is highly skewed, we map SR_{ijt} onto the interval [-1, 1):

$$\widetilde{SR}_{ijt} = \frac{SR_{ijt}-1}{SR_{ijt}+1} \quad \text{(D 2)}$$

Industry i is now skill related to industry j if $\widetilde{SR}_{ijt} > 0$. Subsequently, for every industry pair, we average $\widetilde{SR}_{ijt}$ over all years between 1995 and 2000:

$$M\widetilde{SR}_{ij} = \frac{1}{5}\sum_{t=1995}^{2000} \widetilde{SR}_{ijt} \quad \text{(D 3)}$$

Finally, we symmetrize the measure so that $S\widetilde{SR}_{ij} = S\widetilde{SR}_{ji}$:

$$S\widetilde{SR}_{ij} = \frac{M\widetilde{SR}_{ij}+M\widetilde{SR}_{ji}}{2} \quad \text{(D 4)}$$

which is the measure we use in the analyses.

Appendix E

The control variables are as follows.

- The size of the establishment reflected by the number of employees (measured in logs).

Larger establishments with many managers are more likely have a manager who dies than smaller establishments. Moreover, it may also be more costly for them to change industries, which would lead to a negative correlation between size and strategic change.

- The age of the establishment measured in number of years.

Older establishments may be less likely to recruit new managers and switch industries due to vested interests and large fixed investments.

- Whether or not the establishment is part of a multi-establishment firm (if multiple establishments share the same firm identifier with the establishment in question).

Establishments that are part of larger firms may be less likely to recruit external managers as they can draw on the labor pool within the organizations. New managers may also have less influence on strategic change as such decisions may taken by the headquarters rather than the establishment's management.

- Employment growth of the establishment in the past two years.

Fast-growing establishment may be more likely to recruit new managers, to manage the inflow of new employees, and less likely to change course given the success of their current business model.

- The age distribution of the workforce of the establishment (the number of workers between 18 and 30, 31 and 40, 41 and 50, 51 and 60, 61 and 64, and higher than 65 – as well as the mean age of workers in the establishment, and the mean age of the top managers).

Establishments that have an older workforce in general, and older managers in particular, may be more likely to recruit new managers because existing managers at a higher age are more likely to pass away or retire. At the same time, such establishments may be less flexible in shifting towards new activities as their workforce may have more acquired more industry-specific skills and therefore be less open for change.

- The share of women of the top managers.

- The educational level of the top managers, reflected by the amount of those with at least a college degree.

Establishments with better-educated managers may be more likely to attract new managers, as these establishments may perform better. They may also be more likely to shift into new activities as better-educated managers may have a wider know-how to draw upon and use in new activities.

Recent papers in the SPRU Working Paper Series:

March

Coworker Complementarity. Frank Neffke

February

Technical Skills, Disinterest and Non-Functional Regulation: Energy Efficiency Barriers Viewed in an Ecosystem of Energy Service Companies. Hanna-Liisa Kangas, David Lazarevic and Paula Kivimaa

Employment Effects of Innovations over the Business Cycle: Firm-Level Evidence from European Countries. Bernhard Dachs, Martin Hud, Christian Koehler, and Bettina Peters

Policy Democracy: Social and Material Participation in Biodiesel Policy-Making Processes in India. Evelien de Hoop and Saurabh Arora

January

A Typology of European Research Universities. Differentiation, Layering and Resource Distribution. Benedetto Lepori, Aldo Geuna and Valerio Veglio

December

Why Researchers Publish in Non-Mainstream Journals: Training, Knowledge Bridging, and Gap Filling. Diego Chavarro, Puay Tang, and Ismael Ràfols

November

Multicriteria Mapping Manual - Version 2.0. Josie Coburn and Andy Stirling

Lost in Space? NASA and the Changing Public-Private Eco-system in Space. Mariana Mazzucato and Douglas K. R. Robinson

October

Open Innovation: Revealing and Engagement in Open Data organisations. Franz Huber, Francesco Rentocchin and Thomas Wainwright

September

The Triple Challenge for Europe: The Economy, Climate Change and Governance. Jan Fagerberg, Staffan Laestadius and Ben Martin

Serendipity: Towards a Taxonomy and a Theory. Ohid Yaqub

Suggested citation:
Matte Hartog and Frank Neffke (2017). *Does Managerial Experience Affect Strategic Change?* SPRU Working Paper Series (SWPS), 2017-06: 1-40. ISSN 2057-6668. Available at: www.sussex.ac.uk/spru/swps2017-06

SPRU – Science Policy Research Unit
University of Sussex
Falmer, Brighton, BN1 9SL,United Kingdom
SWPS Website: www.sussex.ac.uk/spru/research/swps
SPRU Website: www.sussex.ac.uk/spru
SPRU Twitter: @SPRU