AN EMPIRICAL ANALYSIS OF POST-MERGER ORGANIZATIONAL INTEGRATION

Valerie Smeets, Aarhus University

Kathryn Ierulli, University of Chicago

Michael Gibbs, University of Chicago & IZA

June 2014

We study post-merger organizational integration using linked employer-employee data covering the universe of Danish workers and firms from 1980-2006. Integration is primarily implemented by re-assigning high-skilled workers, especially in R&D and management, rather than large-scale mixing of workforces. Mixing of workforces is biased towards new establishments set up after merger rather than those previously existing. Turnover is high for workers in both target (acquired) and acquiring firms, but new hiring yields stable total employment. Employees of the target firm have higher turnover and reassignment, but these are mitigated if the target's organization is larger relative to the acquiring firm. These patterns indicate the importance of human capital and knowledge sharing, and are consistent with the brokerage view of networks in organizations. The findings suggest either that organizational integration is highly costly, that it can be achieved reasonably well by focusing on a subset of key employees, or both.

JEL: D22, G34, J21, L23, M5, M10

1. INTRODUCTION

A merger is a dramatic event for firms and employees, for it requires integration of two organizations. There is a large economics literature on mergers, but it offers little evidence on how integration is accomplished.[1] In this paper we present evidence on integration, using Danish matched employer-employee data to construct a sample of mergers. The specific aspect of integration that we focus on is physical collocation of the workforces of the merged firms. The data are particularly well suited to study this aspect of integration, because they identify the physical location where each employee works. Thus is it possible to observe when workers are reassigned following a merger, under what circumstances employees of both firms mix in the same workplaces, and what the consequences are.

Our results are the following: First, there is surprisingly little overall integration, defined here as the reassignment of employees to work with new colleagues from the other firm. Three years after a merger, only about 8% of surviving employees from the acquiring firm, and 15% from the target firm, have moved to a workplace that was in the other firm before merger, or that was set up after the merger. The rest remains in workplaces that existed in their firm prior to merger, where most of their colleagues are from their pre-merger firm. Second, the merged firm chooses certain types of employees to mix with employees from the other firm – particularly those who are highly skilled, managers and those in R&D, presumably to share knowledge and coordinate between organizations. Third, we find relatively high turnover in the acquiring firm and even more turnover in the target firm, but on average the size of the combined firm remains stable due to new hiring. Fourth, post-merger integration depends on the relative size of the merging workforces. The larger the target workforce is relative to the acquiring workforce, the more are target workers shielded from turnover or reassignment to acquiring firm establishments.

One interpretation of our results is that, consistent with practitioner observations, organizational integration is difficult, and mergers are implemented in ways that mitigate these costs. An alternative interpretation is that integration can be achieved without large-scale integration of the two workforces. Instead, integration is achieved by reconciling policies and coordinating across groups without much need to disturb day-to-day operations.

This paper contributes to the literature by highlighting the question of integration costs in mergers, providing new evidence on how firms integrate after mergers, and suggesting an approach for further research on these questions. The findings also have broader relevance for the literature on the economics of organization because post-merger integration is one interesting example of the issue of coordination within firms.

---

[1] The importance of integration to merger success is often mentioned in the business press and management literature. For example, the 2010 Pricewaterhouse Coopers annual survey of post-merger integration argues that emphasis on careful integration improves the odds of success in a merger. They find that "the key integration challenges … are motivation of employees, alignment of cultures, organization and processes as well as IT systems."

2. ECONOMICS OF ORGANIZATIONAL INTEGRATION

In this section we present a brief literature review, followed by a discussion of the costs and benefits of post-merger integration. First, our definition of merger: we do not distinguish between mergers and acquisitions. The former refers to a combination of two firms that are relatively equal (in size, market share, or value). The latter term is used more when a larger firm buys a smaller and less powerful firm. Usually the acquiring firm is larger, though this is not always the case. Most of the research outside of finance and accounting does not distinguish between acquiring and target firms, or between mergers and acquisitions.

In this paper we use the terms acquiring and target to refer to two firms that merge together, because our data provides a natural definition of which firm is legally buying the other[2]. However, we are relatively agnostic about the relative power of the two firms (though we use a measure for this, Dominance, below). Since Denmark had almost no hostile takeover attempts during our sample period (Solomon 2010), we ignore the distinction between friendly and hostile transactions.

2.1. Prior Literature

There is a large literature on mergers in economics, accounting and finance (see the surveys by Andrade, Mitchell and Stafford 2001; Pautler 2001, 2003). Topics include returns to shareholders of both firms, and the effects of mergers on profit, product quality, R&D intensity, market share, and productivity. Returns to shareholders tend to be positive, with most of the gains accruing to target shareholders. Many potential motives for merging have been proposed, but empirical evidence is inconclusive on which are most common or create the most value. Mergers tend to occur in waves and to cluster within industries, suggesting they are often driven by exogenous shocks such as technological or regulatory change.

At the level of workforces pre- and post-merger, target workers tend to fare worse than acquiring workers in wages and employment (Brown and Medoff 1988; Margolis 2006). However, Ouimet and Zarutskie (2010) find that target employees have higher wage growth than acquiring employees, especially when the target workforce is the more skilled of the two. Kubo and Saito (2011) study Japanese mergers and find that total employment decreases while wages increase. Gugler and Yurtoglu (2004) find that European mergers lead to reductions in employment, compared to little effect in the US. They attribute this to relatively rigid labor markets in Europe. However, their sample includes only 5 Danish mergers in a sample of 646, and Denmark's labor market is quite flexible, as discussed below.

A recent merger literature exploits matched employer-employee datasets, similar to ours, to study the effects of mergers. Benedetto (2006) finds increased turnover after a merger. Pesola (2011) and Lehto and Böckerman (2008) find high turnover of manufacturing workers acquired by a foreign company. Kwon and Meyersson-Milgrom (2009) find higher turnover for workers losing occupational status after a

---

[2] As will be explained later in section 3, in our data the acquiring firm is the firm whose identification code is used by the combined firm after the merger. More details about this definition are available in section 3, as well as in Appendix A.

merger, and conclude that workers may prefer status over wages. Davis et al (2008) study private-equity transactions, and find that target firms had declining growth both before and after acquisition, but after a few years employment grew more rapidly than firms in a control group. Siegel and Simons (2010) analyze effects on establishment-level productivity. They find that establishments tend to downsize but increase productivity, so mergers appear to sort workers to more efficient use. Maksimovic, Phillips and Prabhala (2011) find substantial restructuring after mergers of manufacturing firms, including selling and closing of establishments. Target establishments increase productivity, especially when the acquiring firm has higher productivity itself.

Put together, these last three papers' results suggest the importance of key human capital and knowledge sharing in mergers (see also Matsusaka 1993; Ouimet and Zarutskie 2010). However, these studies do not identify whether the benefits arise through extensive integration, or by using a few key employees to share knowledge between workforces.

Despite this substantial body of research on mergers, there is almost no evidence concerning post-merger integration. An exception is Kole and Lehn's (2000) case study of USAir's acquisition of Piedmont Aviation. USAir extended its higher pay levels and less strict work rules to Piedmont, in order to "buy labor peace." Kole and Lehn conclude that desire for internal equity to reduce conflict between the merging workforces may be a substantial integration cost. The only survey on integration that we are aware of is Pautler (2003), which primarily discusses reports by consulting firms. He references academic studies only to provide evidence consistent with or related to practitioner conclusions. It is interesting to note that the economics literature focuses almost exclusively on the benefits of mergers, whereas Pautler finds that practitioners emphasize the costs – particularly of organizational integration. Our focus in the next subsection is primarily on the costs of mergers, given that they have been less explored in the economics literature.

2.2. Benefits and Costs of Integration

There is very little theory on the degree of organizational integration after merger. Clearly there are benefits or the merger would not have been undertaken, but there are costs as well. The benefits and costs of merger may or may not depend on the degree to which workforces integrate.

There are many potential benefits of mergers, only some of which require integration. First, there may be economies of scale, which generates efficiencies, some of which may reduce headcount or wages. To the extent that such efficiencies are the motive, a merger may be a negative experience for many employees. This would not have many implications for mixing workforces, beyond possibly reducing the merged firm's headcount.

Second, the acquiring firm may have purchased the target in order to improve its operations. In this case, we would expect management post-merger to be led mostly by the acquiring firm's team. We would also expect those with key knowledge – high-skill workers, such as those in R&D – to benefit from

the merger and be likely to stay after merger, and also to mix and thereby share knowledge and methods across firms. However, improving the target's operations would tend to cause turnover to disproportionately affect target workers if they were underperforming prior to merger.

Third, there may be gains from knowledge sharing between the firms. These can arise in several ways, including economies of scope in product design, synergies in production, cross-selling to customers from the other firm, sharing technology, and improving production methods. If knowledge sharing is important, certain employees may benefit by playing a key role in a merger; e.g., possessing knowledge the merged firm wants to share, working in a position that can benefit from new knowledge, or facilitating the exchange of ideas.

Therefore, we expect that in the case of merging for synergies, high-skill workers will benefit from merger and low-skill workers will benefit less, if at all. This implies workers with less firm-specific human capital, less education, and less tenure will be more likely to leave the firm after merger. We would also expect that managers will be disproportionately from the acquiring firm.

We turn now to costs of integration. Organizational integration is likely to create several types of costs: the difficulty of changing formal and informal policies; the negative effects of those changes on productivity; and the possibility of factions and favoritism between the two workforces.

First, it is likely to be costly to undergo changing of explicit structures and policies, for at least one firm and possibly for both. Structures must be reconciled, including business units, geographical locations, hierarchies, functions, reporting relationships, and job titles. Compensation systems and human resource policies must be made consistent. This process would tend to favor the acquiring firm, assuming they favor their own rules and codes. If they take over the merged entity, any turnover rising from dissatisfaction will tend to be target workers.

Second, implicit policies and intangible assets must also be reconciled. The two firms will differ in hiring criteria and corporate culture. Crémer, Garicano and Prat (2007) view culture as a specialized code; i.e., language or jargon, between employees that facilitates coordination. They argue that a firm's ability to broaden its scope to create synergies (e.g., through unrelated merger) is limited by the need for common code across the two workforces. That code can be developed, but takes time and possibly turnover and training of a new workforce.

A special case of implicit policies is the fact that employees have implicit contracts with their original firm, on the basis of which they provide effort, invest in skills, and have expectations about career prospects. Firm-specific human capital is an example of this implicit contracting. When a merger occurs, the value of firm-specific capital may change, and this may increase turnover if it is suddenly less valuable. This effect may differ by acquiring or target status; one can easily imagine acquiring workers' firm-specific human capital being relatively more valuable than that of target workers after merger. Productivity arises in part from firm-specific human capital, including social networks with colleagues to aid problem solving and learning (Garicano 2000, Ichniowski and Shaw 2009). When the merged firm

changes policies and mixes the two workforces together, some of that human capital will depreciate in value or be lost entirely, and new investments may be required. For example, if the acquiring firm imposes its production methods, target workers who are forced to change lose the value of their knowledge of old methods. Similarly, as organizations mix, an employee's network of colleagues becomes less useful, and he or she must invest in new contacts and new relationships in order to work effectively.

Third, integration might generate conflict between the workforces. The merged firm must choose how much weight to give each side's policies in structuring the new organization. The side whose policies are favored loses less, as its human capital, authority, and networks are likely to remain intact. Each workforce has an incentive to use its power to implement its own policies, rather than those of the other workforce, and to act with favoritism towards its own members (Prendergast and Topel 1996).

All of these formal and informal systems may need to be changed following a merger. The greater the extent of integration, the more change will be required for the merger to succeed. For example, Weber and Menipaz (2003) surveyed employees in merging firms to assess cultural fit, and found that mergers with better fit had stronger financial performance.

2.3. Empirical Questions

We now state our empirical research questions. Previous studies found that acquiring employees fare better than target employees in wages and employment. By definition the acquiring firm takes control of the target. It seems likely that it will impose more of its policies on the target. Favoritism would only magnify any disadvantage for target workers. All of our analyses distinguish acquiring from target workers.

Benefits and costs of integration suggest four research questions: the effects of merger on firm size and workforce composition, whether mergers of equal or unequal sized firms differ; the extent and methods used for workforce integration; and the role of employees with key human capital in implementing the merger.

Size and Composition of Post-Merger Firm

Our first question: what are the effects of merger on firm size and workforce composition? Prior studies tend to find that mergers lead to a decline in the size of the total workforce, though the evidence is mixed. The theoretical effect of a merger on workforce size is ambiguous. If the firm is merging for economies of scale, it may be able to eliminate workers, but growth from being more efficient could cause the workforce to grow. The merged firm faces the choice of integrating existing workers, or replacing them with new hires that lack firm-specific human capital, productive social networks, etc. A potential advantage of new hires is that they may be easier to integrate into the new firm than target workers. The merged firm can choose its recruitment criteria and training, and new hires do not belong to an existing workforce and so are less likely to affiliate with one side or the other, or engage in favoritism. The litera-

ture has focused on turnover much more than new hiring. We analyze the composition of the merged workforce in terms of acquiring, target and new hires.

Mergers of Equals and Unequals

The second question: is a merger of equally-sized firms more difficult, as practitioners argue (O'Reilly 1998, Pautler 2003)? A potential reason is suggested by the literature on ethnic conflict and assimilation (e.g., Montalvo and Reynal-Querol 2005; Caselli and Coleman 2010). Conflict is more likely when two groups are of similar size. When one group is relatively small, resisting integration with the larger group is less likely to succeed, and the smaller group is more likely to assimilate. Similar logic may apply inside a merging firm. If one firm is relatively small, it is likely that the policies of the larger firm will be adopted or imposed. The smaller firm may resist, but is less likely than the larger firm to win political battles. The smaller workforce may be more cooperative, or its workers might exit. To study these questions we define the variable *Dominance*: the fraction of the workforce that worked in the employee's firm at the time of merger. This is calculated for both workforces; Dominance of the target workforce equals one minus Dominance of the acquiring workforce. We examine whether Dominance affects post-merger turnover for acquiring and target workers. Dominance values closer to 0.5 for both acquiring and target workers – mergers between equals – might indicate greater potential for conflict. Dominance that is larger for one firm (usually the acquiring), and therefore smaller for the other, might indicate that the larger firm is more likely to have managerial power and implement its own policies after merger.

Extent and Method of Workforce Integration

The third question: to what extent does the merged firm mixes the two sets of employees, by reassigning them to locations with employees from the other firm? If integration is costly the firm may try to realize the benefits of a merger through methods that avoid integration. A large amount of mixing implies substantial integration. By contrast, a small amount suggests two possibilities. One is that merging firms use low levels of integration, to avoid integration costs. An alternative is that integration does not require collocation, but can be reasonably achieved by common policies, communication, and mixing only a few key employees. We provide the first available empirical evidence on this issue.

We define two types of mixing. *Hard Mixing* refers to reassignment of an employee to an establishment that was in the other firm before the merger. *Soft Mixing* refers to reassignment to a new establishment created after the merger. These terms are designed to reflect the presumption that soft mixing may be less difficult for an employee than hard mixing. All colleagues in a new establishment will also be soft mixing, whereas an employee who hard mixes is a minority in an existing establishment consisting of employees from the other firm who already work together. Relatively more hard than soft mixing would be consistent with one firm imposing its organization on the other, and focusing on the integration of employees from the other firm who possess key human capital. Soft mixing might result if the merged firm

grows and moves into new locations.[3] An alternative use of soft mixing is to "reboot" the organization, starting a new establishment from scratch with employees from both firms. This might reduce conflict, make it easier to change policies, and lower integration costs.

Importance of Key Human Capital

Our fourth question: do workplace reallocations (mixing) have a relationship to workers' occupations and human capital? A motive for many mergers is to share knowledge. A small literature in economics analyzes social networks inside firms (Jackson 2008). Ichniowski and Shaw (2009) view a firm as a collection of "experts developing connective capital." They emphasize a case where skills are dispersed throughout the workforce, so many employees develop networks. That view would suggest that high rates of mixing are needed to get the benefits of integration. An alternative view comes from organizational sociology (Burt 2005) and models of knowledge hierarchies (Garicano 2000): a small number of workers become brokers or experts at solving problems and sharing knowledge. According to this view, integration may be possible by mixing a small number of workers who possess knowledge to share, or are good at communication or coordination. What kinds of skills or knowledge are most valuable for integration? Pautler (2003) concludes that high-skilled employees, managers, and those in R&D or Sales, are key to integration (especially in technology or human-capital intensive industries). Managers have experience coordinating functions and business units. R&D engineers possess knowledge about product design necessary to achieve economies of scope or share improvements in production methods. Salespeople have relationships (a form of intangible capital) with important customers. High-skilled employees might act as brokers or experts, since they are likely to possess intangible knowledge that can benefit the other firm.

3. DATA AND SUMMARY STATISTICS

We employ a dataset of mergers in Denmark that is unique for our purposes, as it includes information on post-merger organizational integration. The sample period is from 1980 to 2001. Beginning in the late 1980s, the rate of mergers increased, which has been attributed to restructuring of industries as a result of integration of European economies, and increasing international trade (Rasmussen, undated). This is similar to the waves of mergers seen in Europe and the US during this period (Gugler, Mueller and Weichselbaumer 2011). Despite this, our sample is relatively evenly divided over time. This is probably because we only study within-country mergers, due to the inability to observe establishments outside of Denmark.

The Danish regulatory environment for mergers is similar to the US, with no significant unusual provisions (Jensen and Reinholt 2011). Governance has also evolved over time towards greater alignment with the "Anglo-Saxon" model used in the US and UK. However, some features of Danish governance

---

[3] However, Denmark is a small country, with most of the economy is located in a small area surrounding Copenhagen, so that is less likely in our data.

during this time (and still today) reflect Nordic or German approaches (Gomard 1990; Solomon 2010). Shareholders rights are less strong than in the US and UK for several reasons. Dual classes of shares with different voting rights are common, which tends to reduce the ability of institutional investors to implement change. Some companies are run by foundations, which ostensibly are run as non-profits intended to serve social purposes (though research suggests that they perform similarly to for-profit Danish firms). Danish firms have a supervisory board that is similar to the German model. Employees have the legal right to elect one-third of the members of this board. For these reasons, hostile takeovers have been very rare in Denmark.

We constructed the sample using matched employer-employee data from the central registers of the Danish government statistical agency Statistics Denmark, covering all individuals and firms from 1980 to 2001.[4] We know each worker's employer in November, so the data are annual snapshots at that date. These data have several useful features. They allow accurate identification of mergers and physical workplaces. Workers can be followed as they stay, exit, or transfer within the firm after merger. Gender, age, education, and compensation are included; labor market experience and firm tenure are easily calculated. Occupations are coded using International Standard Classification of Occupation (ISCO) codes that are standard in several European datasets of this kind. However, occupation data are only available from 1993 onward, and are most complete from 1995, so occupation analyses use a more limited sample.

Unlike many datasets of this type, establishments are unique physical work locations, such as an office, store, or factory. They therefore provide a good measure of which employees work in close proximity. Statistics Denmark provides the primary industry of each establishment. We define the industry of the firm as the modal industry, measured by total employment across establishments.

Our initial sample consists of firms with 5 or more employees involved in a merger from 1980 to 2001. We are able to identify 2,631 mergers using establishment and firm identification numbers (see Appendix A for details). Our sample includes three types of mergers: single acquisitions where firm A acquires firm B (2003 cases); multiple acquisitions where firm A acquires firms B, C, D, etc. (433 cases); and joint mergers where firms A and B merge to create a new firm C (195 cases).

We add the following restrictions. First, we keep only mergers for which *acquiring* and *target firms* were clearly identified. This was obvious for single and multiple mergers, where a firm absorbs one or multiple firms. However, identifying acquiring firms was impossible in the case of mutual mergers, which we therefore exclude. Second, we exclude multiple mergers because the dynamics of organizational integration are likely to be substantially different in those cases.[5] Third, to study the dynamics of employees pre- and post-merger, we require data from at least two years before to three years after the merger. This limits our sample to firms involved in mergers taking place from 1982 through 1998, and active

---

[4] Many papers use these data; e.g., Christensen et al (2005), Bennedsen et al (2007), Lentz & Mortensen (2008).

[5] In previous versions of this paper we assumed that the larger firm was the acquirer in joint mergers, and included those in the sample. We also included multiple mergers. Our results were robust to including or excluding all of these types of observations.

in a 6-year window. Fourth, to ensure mergers do not overlap in time, we exclude cases where a firm went through more than one merger during that window of time. Finally, we keep only mergers between private firms active in private industries, as state-owned firms and firms in public industries may exhibit very different behaviors. The final sample consists of 595 mergers, or 30% of the single merger cases.[6]

We do not study merger motives as there are few relevant proxies, but do control for several merger characteristics. One is whether the merger is related (primary industry of the firms is the same) or unrelated. A related merger is more likely to be motivated by desire for economies of scope. Both can benefit from knowledge sharing, but it is of interest to see if there are differences in integration. We also control for partial mergers, in which part of a firm merges with another firm, but part is spun off. These might involve cherry-picking to maximize benefits or minimize costs of implementing the merger. Finally, we control for workforce size in case integration costs are non-linear with respect to size.

Characteristics of the 595 mergers are summarized in Table 1. Denmark has a large service sector, so nearly half of firms are in retail, hotels or restaurants. Manufacturing comprises about a third of the sample. About 10% are partial mergers, (typically, the acquiring firm merged with some establishments from the target firm, with the other establishments remaining independent of the merged firm). About 81% are related mergers (both firms have the same modal 4-digit industry), and 19% unrelated.

Acquiring firms have on average 4-5 times as many establishments as target firms. Acquiring workforces are about 6 times larger than target workforces. Our measure of relative workforce size is *Dominance*, the fraction of the merged workforce that came from that employee's firm. The average Dominance of acquiring workers, about 70%, implies that the average for target workers is about 30%. Not surprisingly, acquiring firms tend to dominate target firms. There is, however, substantial variation. The data even include a small number of mergers with more target workers than acquiring workers.

Finally, Table 1 shows turnover in the 2 years prior to merger. Turnover is generally high in Denmark due to Danish "flexicurity" labor market institutions that reduce turnover costs for both workers and firms (Westergaard-Nielsen 2002). In our sample 25.5% of acquiring workers and 31.4% of target workers leave during the first year after merger (and even more from t = −1 to t = 0). By contrast, firms with similar size and industry but not involved in a merger have lower turnover, respectively 24.3% and 26.5% for firms similar to acquiring and target firms. Target firms have more turnover than acquiring firms. Both have higher turnover in the year before we define the merger. This reflects that mergers occur throughout the calendar year, but our data are fiscal-year-end snapshots. Thus mergers actually occurred sometime in the 12 months preceding what we call merger date t = 0, so our data understates organizational change to that extent. Of course, this is a limitation of most merger studies, which typically use annual data. Turnover 2 years before merger is not very different from that of non-merging firms.

---

[6] Private industries are agriculture, manufacturing, retail, hotels and restaurants, construction, transport, finance, real estate, and R&D activities.

Table 2 examines worker characteristics one year before the merger, compared to employees of control groups for each type. Control groups were created using the universe of Danish firms as the potential comparison group for our acquiring and target firms. Control firms were identified as the closest match in firm size, active in the same year and industry (3-digit) as acquiring and target firms, and privately owned.[7] In the top panel of the table we see that acquiring workers are better paid than target workers by a small amount (about $2 per hour). Both target and acquiring employees are about 35% female, have average age of 35, average schooling of 11 years, and tenure of a bit more than 4 years. There are few differences between our sample and control groups. There are some small differences between the sample and column 5, which shows characteristics of employees of all non-merging firms of five or more employees for the period 1980-2001. The differences in column 5 – slightly lower pay, age, tenure, and experience – seem attributable to the larger percentage of small firms in the non-merging data.

The second half of Table 2 is occupational distributions (see Appendix B for occupation definitions). As we lack occupation information for the entire period, our sample here is smaller with 195 mergers. Workers are classified in Manager, R&D, Sales, Support, Production, and Other occupations. While only one occupation is significantly different between target and acquiring firms, the patterns are suggestive. Acquiring firms have more managers, 6.1% compared to 5%, and the difference is significant. There are also more managers in acquiring firms than in control groups. There are more R&D workers in target than acquiring firms, 8% to 7% (although the difference is insignificant), and both have more R&D workers than control groups. Sales and Support are also found more in acquiring and target firms than in non-merging firms, but differences between target and acquiring firms are smaller.

4. RESULTS

4.1. Firm Size and Workforce Composition

We now turn to analysis of post-merger job moves. If the purpose of the merger is to enjoy economies of scale we might expect turnover, unless the merged firm grows enough to maintain the current workforce. Whether it grows or not, we expect the firm to have a preference for its current workforce over new hires, to retain firm-specific human capital (from both firms), and avoid turnover and hiring costs. For these reasons, overall employment, rates of exit, and new hiring are of interest. Figure 1a plots the average number of establishments, while 1b-d plot the average number of employees, for the combined firm from 2 years before to 3 years after merger. These are divided into those from acquiring and target firms, plus establishments or employees added after the merger. Firm size stayed roughly constant over the 6-year

---

[7] The advantage of this approach is that it allows us to match as closely as possible on observables, without making any assumptions. An alternative is propensity score matching to create control groups. We also tried that technique and it did not affect our results. Details of the matching procedures, and summary statistics of control groups computed using propensity score matching, are in the online appendix available at http://faculty.chicagobooth.edu/michael.gibbs/research/papers/Mergers_appendix.pdf.

merger window: the average number of establishments declined slightly while the average number of employees remained at about 230. Mergers are often characterized as being motivated by downsizing, but the sample period was not a period of dramatic restructuring in Denmark. The fact that the size of the merged firm's workforce does not decline will be of interest for interpreting some findings below.

While the number of establishments stayed roughly constant, there was some shutting down of both acquiring and target establishments. These were replaced by creation of one new establishment in the average merger. A similar story holds for employment, but the creative destruction is more pronounced. We see high turnover of acquiring and target workers in the three years after merger. Roughly 45% of acquiring and 55% of target workers are gone after three years. However, these were replaced with new hires, so that half the workforce was new by the end of year 3. This reflects the high turnover in Denmark's labor market, but presumably also indicates some restructuring during implementation of the merger.

These patterns may obscure heterogeneity in merger types. As a quick check, Figures 1c-d provide plots similar to 1b for large and small mergers.[8] The basic story remains. Both large and small mergers have approximately constant total employment over time, high turnover of acquiring and target workers, and new hires comprising roughly half the workforce after 3 years. Similar conclusions apply to the number of establishments, or if we divide the sample into related and unrelated mergers (neither comparison is shown). It is remarkable that few differences in post-merger restructuring are evident when comparing mergers of varying size, or that are related or unrelated.

4.2. Worker Transitions and Reallocations

If the purpose of the merger is to share knowledge, the firms need some method of organizational integration. As discussed above there are two issues to consider. The first is the method used – the choice between mixing employees by reassignment to an establishment in the other firm (hard mixing) or by reassigning workers from both to a new establishment (soft mixing). The second issue is the extent of collaboration between the workforces after merger. If integration is difficult or costly, the firm might choose less dramatic ways to achieve knowledge sharing, avoiding mixing (especially hard mixing) and strategically assigning a small fraction of workers to the task of achieving integration.

Table 3 sheds light on these issues by summarizing job moves after the merger. Employees who do not exit are classified into Not mixing (remain employed in an establishment that was in their firm at the time of merger) or mixing (hard or soft). The majority of day-to-day colleagues of non-mixers are from their original firm, so disruption to those employees is likely to be relatively slight. Mixers have a high fraction of colleagues who are not from their original firm, especially if they hard mix.

---

[8] We use median employment size at merger (73 workers) as the cut-off point.

Because acquiring and target firms have different structures (acquiring firms are larger and have more establishments), we also report "predicted values." These assume that, conditional on switching establishment, employees are reassigned to other establishments randomly, with odds equal to the fraction of employees in those other establishments. For example, if workers are more likely to be reassigned to larger rather than smaller establishments, target workers will mix more on average. This is a purely mechanical effect and, by comparing actual and predicted transitions, we are able to assess whether or not this is what we are capturing. We calculate these predicted values over all possible establishment changes: hard and soft mixing, plus changing establishments within the employee's original firm.[9]

The most striking observation in Table 3 is that mixing rates are not high. Of those who remain after 3 years, roughly 92% of acquiring workers and 85% of target workers have not mixed. This is an important observation because it implies that gains from integration are achieved not by creating one seamless organization out of the two workforces, but instead by reassigning some few employees to work with colleagues from the other firm.[10] In this sense, the merger may have little day-to-day effect on the jobs of most workers. Below we examine what types of workers are given those reassignments.

We start to see some differences between the workforces when we examine those who change establishments. First, target workers are more likely to mix than are acquiring workers. Total mixing after three years is over 15% for target workers, compared to about 8% for acquiring. Much of this appears to be driven by the fact that target firms have fewer and smaller establishments, as predicted values suggest that acquiring workers were expected to hard mix less than target workers. Second, there is less hard mixing, and more soft mixing, than expected for both groups. For example, acquiring workers have 6.5% odds of soft mixing after 3 years, compared to 2.6% expected. They have 1.2% odds of hard mixing, compared to 3.3% expected. Similar results occur for target workers – there is less hard mixing, and more soft mixing, for both acquiring and target workers than would be expected if reassignments were random.

This is an interesting observation, telling us something about how merging firms implement integration. It seems that setting up new organizational units, instead of combining existing ones, increases the gains or decreases the costs of integration. Hard mixing sends an employee across firms into an existing group that might resist change. That mixing employee will probably have to adopt most of the policies and procedures of the existing group, and may face pressure to fit in rather than push for changes. The firm may find it easier to make changes by soft mixing, since it has a chance to start the organizational unit from scratch. In a new establishment, no employees are incumbents or minorities trying to assimilate into an existing group.

---

[9] Details of the procedure used to compute predicted values are in Appendix C.

[10] Alternatively this finding could imply that integration is largely possible via communication and coordination without collocation. Certainly there must be some truth to this. However, most organizations go to some lengths to locate employees together unless there is a compelling business reason for different locations, suggesting that physical proximity improves collaboration and coordination. Urban economics finds a similar effect, in which more densely populated cities tend to have higher rates of innovation, suggesting that even collaboration across firms is enhanced by physical proximity (Carlino 2001).

The bottom panel presents statistics on moves between establishments for related and unrelated mergers, defined at the 4-digit level. Since our focus is on integration, we concentrate on the numbers for hard and soft mixing. The patterns are similar to what we found before: acquiring workers do not mix much, and when they do, the firm relies on soft mixing. Target workers mix much more often, and are especially likely to hard mix. There is, however, a different pattern between related and unrelated mergers. Unrelated mergers have higher rates of mixing for target workers (a noteworthy 17.7% hard mix), and lower rates for acquiring workers than the sample as a whole. Unrelated mergers seem to have stronger effects for mixing target workers and not mixing acquiring workers than does the sample as a whole. However, it is notable that almost all mixing rates are lower than would be implied by extensive physical integration of the two workforces. Related mergers, in contrast, are the majority of the sample, and so have a somewhat less marked difference in hard mixing between the acquired and target firms. Nevertheless, in all cases, hard mixing is less than predicted and soft mixing is more than predicted.

4.3. Characteristics of mixers, Non mixers, Exits and New Hires

Table 4 describes the characteristics of employees by their status three years after merger. Compared to Non mixers, hard mixers are more likely to be male, have less tenure though similar ages, are slightly better educated, and in a higher wage percentile (especially target workers). Soft mixers look similar to hard mixers but exhibit smaller differences in term of tenure, gender and education with respect to Non mixers. Workers who exit are younger, less educated, have less experience and tenure, and lower pay. Firms appear to retain skilled workers, mixing the most skilled of that group, and replace those less skilled with new hires (who are even younger, less experienced, and paid less). These findings are interesting because they are consistent with the view that a motive for mergers is to share knowledge within the new firm, and that high human capital workers most embody that knowledge (Matsusaka 1993; Ouimet and Zarutskie 2010). We discuss this result more in the next section.

In the lower half of Table 4, we examine occupation distributions and mixing status three years after merger. Among acquiring workers, 12.6% of hard mixers are managers, compared to 4.1% of non-mixers. For soft mixing the proportion of acquiring managers, 3.4%, is much closer to non-mixers. If we look at target workers, we find the opposite: more target managers soft mix. Acquiring managers are redeployed to target workplaces, suggesting that some supervision from the acquiring company may be required there. The firm tends to send target managers to newly created establishments, possibly to share specific capital or knowledge, or to redeploy more talented target managers.

A large fraction of R&D workers, both acquiring and target, hard mix. For acquiring workers, 21.7% of hard mixers are from R&D, while they only account for 10.7% of non-mixers. The effect is even stronger for target workers, where R&D accounts for 31.3% of hard mixers. This may indicate that physical integration is particularly important for R&D workers to create synergies, and share knowledge.

For the other occupation groups, fewer patterns emerge. Acquiring workers in Sales and Support occupations have a lower share of mixers than Non mixers. Target sales workers are subject to more reallocation than acquiring Sales workers. It is also interesting that Support and Production occupations comprise the highest share of exits. High exit and mixing rates for Support workers could mean that those workers are more likely to be redundant post-merger, or most easily replaced by new hires.

4.4. Competing Risks

In Tables 5a-c we use competing risk models to estimate the effect of worker and firm characteristics on the probability that the worker experiences one of these transitions: hard mixing, soft mixing, or exit.[11] The baseline in the estimations is remaining in an establishment from one's pre-merger firm. The models predict much higher rates of exit than mixing. Partially, this is to be expected given the high level of turnover in Denmark. It is also not surprising, as prior research found high levels of turnover as a result of merger.

Multinomial probits are used for the competing risk models (Jenkins 2008).[12] To allow the time workers are at risk to play a role, we use a non-parametric baseline by creating duration-interval-specific dummy variables, one for each spell at risk. All specifications include industry and year fixed effects. Tables report marginal effects instead of coefficients for ease of interpretation. To quantify practical significance of marginal effects, for variables of interest we discuss the implied effect of a change in that variable (by one standard deviation, and from the 25th to 75th percentile) on the odds of a risk in absolute and percentage terms.

The first result in Table 5a is the protective effect of Dominance on the probability of transition, particularly for target workers. A more dominant (relatively larger) target workforce at merger implies less mixing to acquiring or new establishments and fewer exits for target workers. This effect is found after controlling for firm size and the number of establishments each pre-merger firm owns. The marginal effect on hard mixing for target workers is 8.1% percent (–0.081 in the first row, column 4). The standard deviation of Dominance is 0.241, so a one standard deviation increase in Dominance for target workers decreases the probability of hard mixing by $0.081 \cdot 0.241 = 0.0195$, which is almost 2%. The predicted rate of hard mixing for target workers is 3.7%, so a 2% fall in probability amounts to a 54% relative decline in the rate of hard mixing, a very large relative effect. A change in Dominance from the 25th to 75th percentile (0.542 – 0.205) yields a 74% fall in the predicted value of hard mixing. Similarly, a one standard de-

---

[11] We only estimate competing risks for the first transition of each worker. For example, a worker might mix in year 2, then move back to his original establishment in year 3. Including multiple moves would create too many competing risks for feasible estimation or meaningful interpretation. Fortunately only a small fraction of workers make multiple moves. The share of workers with more than one move during a 3-year period is 2.1%, while over a 10-year period it is 12.0%.

[12] We also estimated multinomial logits for the competing risk models; those assume independence of irrelevant alternatives (Greene 2002). We use multinomial probits because our data do not satisfy the IIA assumption. Note, however, that our results were similar when using multinomial logits.

viation increase in target Dominance yields a 0.87 percentage point, or 67% decrease, in predicted soft mixing, and a 2.2 percentage point or 9.8% reduction in predicted exits. Since we expect that post-merger transitions might be risky and difficult from the worker's point of view, and probably from the point of view of the firm as well, it is notable that Dominance reduces the probability of these events for target workers.

Dominance is not as strongly related to post-merger transitions for acquiring workers. There is a significant reduction in hard mixing, but no effect on soft mixing or exits. Since Dominance of the acquiring firm is on average about 70%, we might not expect large marginal effects of Dominance for acquiring workers. The fact that we see strong effects for target workers, in contrast, suggests that small increases in power from a relatively small base translate into large effects in outcomes for those workers.

Looking at other firm characteristics, there are few significant variables. Related merger is a dummy variable indicating whether the firms are in the same 4-digit industry.[13] Our expectation was that post-merger transitions might vary, since firms in the same industry might experience economies of scale by merging, while those in different industries might exhibit economies of scope. However, there are no significant differences between related and unrelated mergers in transitions. Both types of mergers seem to require similar levels of mixing and turnover. Similarly, the dummy variable for partial mergers (which might indicate that the acquiring firm cherry-picked establishments of particular value or ease of integration) is positive and significant for acquiring workers who soft mix, but insignificant in all other cases.

Pre-merger turnover, which may proxy for the extent of firm turbulence before merger, has positive and significant effects for acquiring and target workers on soft mixing and exit rates, but not on hard mixing.[14] Having more pre-merger establishments decreases the probability of exit and increases the probability of soft mixing for target workers. Since a small change in number of establishments is more significant in proportional terms for target firms, it seems reasonable that the effect is larger than for acquiring workers. Merger size (number of employees) only affects acquiring workers; the effect is small.

Effects of worker characteristics are estimated in the lower part of Table 5a. Older, more experienced, and more tenured workers are less likely to exit the firm, with all exhibiting statistical significance. This is consistent with previous findings that as workers age, their rate of turnover slows down (Topel and Ward 1992). Women in target firms are less likely to hard mix, consistent with Table 4.

We saw in Table 4 that workers who mix, particularly from the target firm, tend to be in higher wage percentiles and are slightly more educated. However, wages are correlated with educational attainment. For this reason in Table 5a we use wage residuals as an estimate of unobserved ability, computed

---

[13] We use modal industry for each pre-merger firm, defined with respect to the number of workers. We experimented with using 2- and 3-digit industries. We also computed the share of workers active in the same major industry to capture related mergers in a continuous way. None of our results were affected by the type of variable chosen.

[14] As noted, annual data implies measurement error in job transitions. For example, pre-merger turnover may be understated, since mergers are observed at the end of October. Similarly, if employees mix and leave the firm soon thereafter, the extent of mixing is understated.

from OLS estimation of individual wages controlling for years of education, gender, merger size, industry fixed effects, years, and quadratics for age, experience, and tenure. In these results, workers with high wage residuals are more likely to exit the firm. Additionally, target workers with high wage residuals are more likely to engage in hard mixing. It appears that the effect of unmeasured ability on transition probabilities is bimodal – some workers, particularly target workers, with high unmeasured ability will be more likely to experience transitions in the newly merged firm, while others will end up leaving the firm[15].

The results in Table 5a suggest that firm structure and merger characteristic variables do not matter much for post-merger transitions. The exceptions are Dominance, which reduces the number of workplace transitions for target workers; and pre-merger turnover, which indicates that firms experiencing volatility see it continue after merger. As far as worker characteristics, the interesting result is that turnover is lower for workers with more observable ability (education, tenure and experience), but higher for those with more unobservable ability (wage residual). These findings provide mixed evidence on the role of high human capital workers in implementing a merger. We explore this question more in Table 5c below.

Table 5b repeats these analyses, but for up to ten years post-merger, to see whether long-term effects are different from three-year effects.[16] Again, Dominance matters for target workers, significant reducing hard mixing, soft mixing, and exit. The magnitudes and significance of coefficients are not very different than the three-year estimates in Table 5a. Acquiring workers again experience a negative effect of Dominance on hard mixing, and the marginal effect is similar to the three-year estimate. Pre-merger turnover is positive and significant for soft mixing and exit in both groups, as before.

The effects of worker characteristics are also comparable in the three- and ten-year estimates: age, experience, and tenure all are negatively related to the probability of exit; schooling reduces exit for acquiring but not target workers; females are less likely to hard mix when they come from target firms. Again, wage residuals increase the probability of exit for acquiring and target workers, and increase hard mixing for targets, and the magnitudes of marginal effects are similar to the three-year estimates.

Overall, the effects of firm and worker characteristics are durable and persist up to ten years after merger. As in the three-year estimates in Table 5a, Dominance and pre-merger turnover, as well as age-related variables and unmeasured ability, have significant effects on workers' post-merger transitions. The persistent impact of these variables on transitions over a ten-year period argues that these are not fleeting effects which appear at merger and dissipate quickly. Rather, they fundamentally influence the long-term fate of workers in merged firms. Moreover, the fact that the effects are similar in magnitude at three and ten years suggests that most restructuring occurs quickly.

---

[15] Exits may reflect the fact that either some target workers will have better outside options and leave the firm to pursue them or that some target workers were overpaid before the merger and therefore fired afterwards.

[16] The sample criterion required data availability for a minimum of 3 years after merger (more years would have reduced the sample size). Therefore in Table 5b data are truncated for some mergers – those that occurred less than 10 years before the last year in the sample, or where the firm disappeared from the sample for some other reason (shut down, was itself acquired) in years 4-10 after the merger.

Tables 5a and 5b provide mixed evidence on the role that skilled workers play in mergers. In Table 5c we conduct similar estimations, adding dummy variables to see if certain occupations are more or less likely to mix. We chose occupations that seemed especially relevant for mergers (e.g., Pautler 2003), either because they might play a role in coordination (Managers, R&D), possess knowledge and skills that are important for the merged firm (R&D, Sales), or be a source of efficiencies by eliminating redundancies (Support). We combine Production and Other occupations as the base case.

Recall that occupation data are only available for 1993 on, and most complete from 1995. As the panel is shorter and the sample size smaller, it is striking that the marginal effects are quite comparable between Tables 5a and 5c. For example, the effect of Dominance on hard and soft mixing is approximately the same, for both acquiring and target workers. Although the marginal effect on hard mixing for targets is a bit smaller, a one standard deviation increase is $-0.066 \cdot 0.242 = -0.016$, or a reduction of 42% of the predicted value, nearly the same as the effect in Table 5a. The other marginal effects of Dominance are about the same as in Table 5a, save exits for targets. Other marginal effects on firm variables are not significant, except pre-merger turnover increasing exits for acquiring and target workers. Similar observations apply to effects of worker characteristics, compared to Table 5a. We regard the stability of marginal effects in the face of occupational controls and smaller sample sizes as evidence that employee skills play an important role in post-merger integration.

Now consider the effects of occupational classifications. The occupations denoted by dummy variables turn out to have significantly higher hard mixing rates than the omitted occupations. The marginal effect for target employees of hard mixing is almost ten times larger than the effects for acquiring employees. In addition, the effects for high-human capital occupations – managers and R&D – are substantially larger than those for support or sales. High human capital occupations are more likely to be involved in integration (hard mix), and the effect is more pronounced for target workers than acquiring workers. In fact, if a target worker is a manager or in R&D, the marginal effect of occupation – ignoring the impact of the other variables – is large enough that the predicted probability of hard mixing is nearly fully accounted for. Similarly, for acquiring workers, the effect of occupation accounts for half to two-thirds of the predicted probability.

These large occupation effects suggest that post-merger transitions are deliberate on the part of the firm, consequential for careers, and explainable by the structure of the merging firms and the types of workers that management inherits. Many papers have documented that target workforces are disadvantaged when mergers take place; we link the target's population outcomes to Dominance and its protective effect on shielding workers from post-merger transitions. Similarly, some studies have examined the role of human capital in mergers; we find that this is concentrated in certain occupations.

4.5. Wages and Exit Rates by Type of Transitions

As mentioned above, mixing (especially hard mixing) may lead to high variance in outcomes, but potentially high rewards if the employee is successful in the new role. To investigate this further, Table 6 presents the mean and variance of wage level, wage growth, and exits for three types of job trajectories: not mixing, hard mixing, and soft mixing. Three years post-merger, mixing is associated with higher wage levels than not mixing. In most of the cases, the variance of wages is also higher for mixing. This is true for both acquiring and target workers. Of course, wage data are only available for employees who remain with the firm. If mixing is a difficult position for an employee, turnover might increase. For that reason, Table 6 also includes exit rates, measured one year after mixing occurred.

Turning to wage growth, the mean and variance are also higher for mixers. Acquiring and target groups exhibit some different patterns. For acquiring workers, hard mixing leads to higher mean and variance growth than does soft mixing or not mixing. This may indicate that acquiring firms send employees with high management human capital or skills to target establishments in order to foster integration, and that this corresponds to pay raises (with slightly more risk).

Target firms display different patterns. Hard mixing leads to slightly higher wage growth than not mixing, and higher variance in wage growth. On the other side, soft mixing leads to the highest gains in wage growth, with high variance as well. One interpretation is that the firm tries to learn about target workers' ability by mixing and allocates the best to highly-paid positions. It may also be that selection is made with respect to how easily target workers can integrate. Target workers who mix may end up in a managerial position and see their wage increased, as we saw in Table 4. This could be because the firm finds it easier to integrate target workers into newly created establishments.

Finally, exit patterns in Table 6 are consistent with the view that mixing is risky, particularly for target workers. Exit rates are not very different for non-mixers and mixers from the acquiring firm. By contrast, among target workers, exit rates are substantially higher for mixers than for non mixers.

It is not surprising that acquiring and target employees have different consequences from hard versus soft mixing. It seems reasonable that acquiring firms reward those who can spread their culture and methods, and that target workers who are repositioned have to prove themselves (in skills, integration or both) in order to be given more responsibility. Finally, new establishments may especially benefit from receiving target managers since changing the culture and expectations is not necessary in a new plant.

4.6. Robustness Checks

A variety of robustness checks were performed in this project. In earlier versions we used a broader definition of mergers. First, we included "joint" mergers in which firms A and B merged to form a company with a new identifier C. In those cases the acquiring firm is not clearly defined, but we assumed that it was the larger of the two firms. Second, the initial sample also included publicly owned firms, and mergers in public sector industries. Third, we did some analyses extending the sample to 2005

– for which the data are only partially complete.[17] None of these changes in sample altered our general conclusions.

Other econometric methods were used in earlier versions. Our initial analyses of exits used simple probits for turnover at 1 and 3 years after merger. We also fit duration models (complementary log-log form) for turnover and mixing. Those models used a set of covariates similar to those used in the multinomial probits presented. The general conclusions were essentially the same as described above.

Analyses similar to Tables 5a-c were conducted with several variations to check for consistency of conclusions (available in the online appendix, see footnote 6). We split the sample into firms with sizes above and below median, and found no evidence that large and small firms vary systematically in post-merger outcomes for acquiring and target workers. We ran similar analyses dividing the sample into related and unrelated mergers (not shown). Once more, results were similar, with no important substantive differences.

5. CONCLUSION

A merger is an interesting topic for study in organizational research, because two organizations suddenly become one. The methods, timing, and extent of integration provide important clues to broader questions about organizational design, since they reflect various tradeoffs between benefits from merger and costs of integration, which are not as yet well understood. We provide the first systematic evidence on integration, which we hope will stimulate other researchers to analyze this topic theoretically and empirically.

We find no evidence that post-merger workforce dynamics vary across industry or size of merging firms. That may be in part because our data do not provide good proxies for merger motive. The post-merger restructuring is substantial. Most of it occurs in the first three years, and effects persist for ten years.

As in prior research, turnover rises as a result of the merger. A large fraction of employees leave the merged firm, from both sides. The increase in turnover is significantly larger for target workers. Despite high turnover from both workforces, average total employment remains stable. Therefore firms are replacing employees that possessed firm-specific capital with new hires.

This paper provides some of the first evidence on integration of the merging workforces. We measure integration by physical collocation ("mixing") of employees from both firms in the same workplace. We distinguish two types of mixing. Hard mixing occurs when an employee is transferred to an establishment that existed in the other firm before the merger. Soft mixing occurs when an employee is transferred to an establishment that is created after the merger, so that all employees in that unit, from both workforces, have been transferred as a result of the merger.

---

[17] While this extended sample length, it proved to be somewhat problematic as the data after 2001 present issues with respect to the way occupational information is reported, as many more workers have a missing occupation code. We therefore decided to stick to our current sample, which runs until 2001.

An interesting finding is that merging firms do not mix their workforces extensively. Only 5-15% of workers end up mixing. We observe significantly more soft mixing than hard mixing, relative to predicted values based on random reassignment. Target workers are more likely to mix than are acquiring workers. They are particularly more likely to hard mix. This finding is not due to relative size of the two firms, as we adjust for this in calculating predicted values.

Workers who mix, and presumably play important roles in post-merger integration, tend to come from certain types of jobs. Those who are employed in R&D and management occupations have a higher propensity to hard mix, and target employees have higher likelihoods than acquiring employees. Target workers who are highly skilled (measured by wage residuals) are also more likely to hard mix.

We also analyzed the effect of Dominance – an employee's workforce size, relative to the other firm at the date of the merger – on outcomes. Dominance is negatively correlated with both turnover and mixing. The larger (more Dominant) a firm is at the time of the merger, the lower is turnover and mixing for employees from that firm. This finding holds for both acquiring and target employees, but is especially marked for targets.

Finally, soft and hard mixing appear to be high risk / high reward job assignments. Workers who mix have higher average wage growth, but also higher variance in wage growth and higher subsequent exit rates, compared to those who do not mix. These patterns are similar across acquiring and target firms, suggesting that mixing is inherently difficult regardless of which firm the employee is from.

Putting these findings together, post-merger integration of workforces is limited, and focused on certain types of employees. Some of those mixing employees appear to have key knowledge or relationships that will be valuable to the newly-merged firm (R&D, salespeople, and those with high levels of human capital). Other mixing employees appear to be those who are able to implement change and coordinate well (managers). Target employees have much higher mixing rates than do acquiring workers, but the higher the Dominance of their firm, the less they mix.

One interpretation of these results is that extensive integration of workforces is not necessary to reap the benefits of a merger. Synergies might arise from a small set of employees. Changes that affect the bulk of the workforce might be small, or involve changes in policies that can be coordinated by managers. To the extent that this is correct, this interpretation also provides interesting evidence for network / broker views of organizations.

An alternative interpretation is that integration is costly and difficult, so merging firms do not do widespread mixing. Instead, they focus on employees for which the integration benefits are highest. They then allow or encourage turnover of many employees (especially from the target firm). Those workers are replaced by new hires that do not have firm-specific human capital, but may be easier to integrate. Indeed, the high turnover of incumbent employees who are then replaced, and the finding that Dominance affects employee outcomes, are difficult to explain with the first interpretation. Dominance could also explain the common observation that a high fraction of mergers do not seem to perform well. The evidence that mix-

ing is a high risk / high reward assignment is consistent with this view, but could also be consistent with the alternative interpretation.

It is impossible to choose between these two interpretations with our evidence. In fact both are likely to have some validity. Further research with more direct evidence on integration costs, methods, and the extent of conflict (or lack of it) between merging workforces would be welcome.

Regardless of interpretation, the differential effects of the merger on the target workforce compared to the acquiring workforce, and the role of high (low) Dominance in reducing (strengthening) those effects for target workers, suggest that acquiring firms are more likely to implement their own policies, systems and culture than those of target firms. If that is so, it is certainly not surprising. Acquiring firms tend to be larger. By definition they are usually the firm that initiated the merger, and they also tend to have a stronger role in executive management and governance after the merger. These are likely to put workers from the target firm at some disadvantage, as their firm-specific human capital and understanding of the culture lose value as a result of the merger.

While we tentatively conclude that integration is costly, we recognize that other factors matter that we cannot address here. Are mergers of equals less likely to succeed, and if so is that because integration is more difficult due to the parity in numerical power? Do merging firms replace incumbent workers with new hires to avoid conflict, or to clear out low-productivity employees? Further research may illuminate these questions.

Our approach using mixing may be a fruitful method to study integration in other datasets. We go beyond distinguishing between acquiring and target workers, to considering the relative size of each workforce. We analyze new types of job moves beyond turnover that are proxies for the worker's role in integration: soft and hard mixing. Finally, we are able to consider effect of the worker's occupation on their role in integration.

Future work on mergers remains full of promise. In these days of information technology, integration must also be happening with email, networks, Skype, and other technologies. As communication technologies advance, the need for integration may alter substantially. It would also be interesting to see how formal policies, systems, and practices change as a result of merger. Finally, we would like to be able to examine mergers with pre- and post-merger financial and accounting measures that would enable a link between merger conditions and subsequent profitability.

REFERENCES

Andrade, Gregor, Mark Mitchell, and Erik Stafford (2001). New Evidence and Perspectives on Merger. Journal of Economic Perspectives 15(2):103-120.

Bennedsen Morten, Meisner-Nielsen Kasper, Perez-Gonzalez Francisco and Daniel Wolfenzon (2007). Inside the Family Firm: The Role of Families in Succession Decisions and Performance. Quarterly Journal of Economics, 122(2):647-691.

Benedetto, Gary (2006). The Effects of Mergers on Worker's Earnings and Employment. Working paper, US Census Bureau.

Brown, Charles and James Medoff (1988). The Impact of Firm Acquisition on Labor. In Alan J. Auerbach (ed.), Corporate Takeovers: Causes and Consequences. Chicago: University of Chicago Press, 1988.

Burt, Ronald (2005). Brokerage & Closure: An Introduction to Social Capital. Oxford: Oxford University Press.

Carlino, Gerald (2001). Knowledge Spillovers: Cities' Role in the New Economy. Business Review, Quarter 4, Federal Reserve Bank of Philadelphia.

Caselli, Francesco and William John Coleman II (2010). On the Theory of Ethnic Conflict. Working Paper, London School of Economics.

Christensen, Bent Jesper, Rasmus Lentz, Dale Mortensen, George Neumann and Axel Werwatz (2005). On the Job Search and the Wage Distribution. Journal of Labor Economics, 23:31-58.

Cogman, David and Jacqueline Tan (2010). A Lighter Touch for Postmerger Integration. McKinsey Quarterly, January.

Crémer, Jacques, Luis Garicano and Andrea Prat (2007). Language and the Theory of the Firm. Quarterly Journal of Economics, February: 373-407.

Davis, Steven, John Haltiwanger, Ron Jarmin, Josh Lerner and Javier Miranda (2008). Private Equity and Employment. The Global Economic Impact of Private Equity Report 2008. Geneva: World Economic Forum.

Garicano, Luis (2000), Hierarchies and the Organization of Knowledge in Production, Journal of Political Economy, 108(5):874-904.

Gomard, B. (1990). Possible Defensive Measures Against Stock Exchange Raids in Denmark. In Defensive Measures Against Hostile Takeovers in the Common Market. J.M.M. Maeijer & K. Geens, ed. Amsterdam: Kluwer.

Greene, William (2002). Econometric Analysis, 5th ed. New York: Prentice Hall.

Gugler, Klaus, Dennis C. Mueller and Michael Weichselbaumer (2011). The Determinants of Merger Waves: An International Perspective. International Journal of Industrial Organization, in press.

Gugler, Klaus and B. Burcin Yurtoglu (2003). The Effects of Mergers on Company Employment in the USA and Europe. International Journal of Industrial Organization, 22:481-502.

Ichniowski, Casey and Kathryn Shaw (2009). Connective Capital as Social Capital: The Value of Problem-Solving Networks for Team Players Within Firms. Working paper, NBER.

International Labor Organization [ILO] (2011). Alphabetical Index of Occupational Titles.

Jackson, Matthew (2008). Social and Economic Networks. New York: Princeton University Press.

Jenkins, Stephen (2008). Survival Analysis with Stata, Module EC968. University of Essex.

Jensen, Steen and Lisa Reinholt (2011). Denmark. In The International Comparative Legal Guide to Mergers & Acquisitions 2011. London: Global Legal Group.

Kole, Stacey and Kenneth Lehn (2000). Workforce Integration and the Dissipation of Value in Mergers: The Case of USAir's Acquisition of Piedmont Aviation. In Mergers and Productivity: Steven Kaplan, ed. Chicago: University of Chicago Press.

Kubo, Katsuyuki and Takuhi Saito (2011). The Effect of Mergers on Employment and Wages: Evidence from Japan. Working paper, Waseda University.

Kwon, Illoong and Eva Meyersson-Milgrom (2009). Status in the Workplace: Evidence From M&A. Working paper, Stanford University.

Lehto, Eero and Petri Böckerman (2008). Analysing the Employment Effects of Mergers and Acquisitions. Journal of Economic Behavior & Organization, 68:112-124.

Lentz, Rasmus and Dale T. Mortensen (2008). An Empirical Model of Growth Through Product Innovation. Econometrica, 76:1317–73

Margolis, David (2006). Compensation Policy, Human Resource Management Practices, and Takeovers. In Alex Bryson (ed.), Making Linked Employer-Employee Data Relevant to Policy Analysts, London: Department of Trade and Industry.

Maksimovic, Vojislav, Gordon Phillips and N.R. Prabhala (2011). Post-Merger Restructuring and the Boundaries of the Firm. Journal of Financial Economics, 102(2): 317-343.

Matsusaka, John (1993). Takeover Motives During the Conglomerate Merger Wave. RAND Journal of Economics, 24(3):357-379.

Montalvo, Jose G. and Marta Reynal-Querol (2005). Ethnic Polarization, Potential Conflict, and Civil Wars. American Economic Review, 95(3):796-816.

O'Reilly, Charles (1998). Cisco Systems: The Acquisition of Technology is the Acquisition of People. Case HR-10, Graduate School of Business, Stanford University.

Ouimet, Paige and Rebecca Zarutskie (2010). Mergers and Employee Wages. Working paper, UNC Chapel Hill.

Pautler, Paul (2001). Evidence on Mergers and Acquisitions. Working paper, Bureau of Economics, Federal Trade Commission.

Pautler, Paul (2003). The Effects of Mergers and Post-Merger Integration: A Review of Business Consulting Literature. Working paper, Bureau of Economics, Federal Trade Commission.

Pesola, Hanna (2011). Labour Mobility and Returns to Experience in Foreign Firms. Scandinavian Journal of Economics, 113(3):637-664.

Prendergast, Canice and Robert Topel (1996). Favoritism in Organizations. Journal of Political Economy , 104(5):958-978.

Pricewaterhouse Cooper [PWC] (2010). European Post-Merger Integration Survey. Published online at www.pwc.ch.

Rasmussen, Soren Hein (undated). Fusioner I Erhvervsliv og Landbrug (Mergers in Industry and Agriculture). Statistics Denmark.

Schmidt, Jeffrey (2002). Making Mergers Work: The Strategic Importance of People. New York: Towers Perrin.

Siegel, Donald S. and Kenneth L. Simons (2010). Evaluating the Effects of Mergers and Acquisitions on Employees: Evidence From Matched Employer-Employee Data. Strategic Management Journal 31:903-916.

Solomon, Jill (2010). Corporate Governance and Accountability, 3rd. ed. New York: Wiley Publishers.

Topel, Robert H., and Michael P. Ward (1992). Job Mobility and the Careers of Young Men. Quarterly Journal of Economics, 107(2):439-479.

Weber, Yaakov and Ehud Menipaz (2003). Measuring Cultural Fit in Mergers and Acquisitions. International Journal of Business Performance Management 5(1):54-72.

Westergaard-Nielsen, Niels (2002). 20 Years of Labour Market Policies in Denmark. In Ilmakuunas, S. and E. Koskela (eds.), Towards Higher Employment, Helsinki: Government Institute for Economic Research.

Table 1: Merger Characteristics

	%
Modal 1-digit industry at merger	
Retail, hotels & restaurants	45.0
Manufacturing	32.3
Construction & transport	11.6
Finance, real estate & R&D	9.9
Agriculture	1.2
Partial merger	10.4
Related merger	
1-digit	90.4
2-digit	85.0
3-digit	81.7
4-digit	81.2

	Mean	std. dev.
# of Establishments	6.7	(22.3)
Acquiring	5.5	(22.3)
Target	1.2	(0.7)
# of Employees	221.5	(642.9)
Acquiring	189.7	(630.5)
Target	31.8	(61.7)
% Dominance of Acquiring workforce	70.6	(22.1)
Pre-merger turnover		
Acquiring $t = -1$ to $t = 0$	27.5	(15.5)
Acquiring $t = -2$ to $t = -1$	24.0	(18.5)
Target $t = -1$ to $t = 0$	37.9	(17.9)
Target $t = -2$ to $t = -1$	29.3	(20.5)
N		595

Table 2 - Workforce Characteristics of Acquiring and Target Firms Pre-Merger

	Acquiring Firms	Target Firms	Control Group for Acquiring	Control group for Target	All Firms
	Mean	Mean	Mean	Mean	Mean
Hourly wage (DK kroner)	159.2	149.5*	155.1	154.2	142.5
	(43.9)	(39.5)	(40.4)	(87.1)	(55.9)
% Female	35.5	35.1	34.3	35.4	34.9
	(24.4)	(27.3)	(24.2)	(26.2)	(29.6)
Age	35.0	34.7	35.0	34.5	32.9
	(5.7)	(6.6)	(5.6)	(6.7)	(7.0)
Experience	11.2	11.0	11.0	10.5	9.4
	(4.3)	(4.0)	(4.1)	(4.5)	(4.6)
Tenure	4.3	4.1	4.2	4.1	3.3
	(2.6)	(2.8)	(2.5)	(2.8)	(2.7)
Years of schooling	11.1	11.1	11.0	10.9	10.9
	(1.0)	(1.0)	(0.9)	(1.0)	(1.0)
N	595	595	595	595	644,425
Managers	6.1	5.1	4.6	5.3	4.1
	(6.0)	(7.1)	(4.4)	(7.1)	(7.2)
R&D workers	7.0	7.9	6.4	6.1	4.1
	(14.0)	(17.5)	(12.3)	(13.0)	(11.6)
Sales workers	13.8	13.1	12.0	8.2	7.7
	(16.6)	(19.0)	(15.2)	(12.3)	(13.8)
Support workers	23.5	22.1	19.5	20.3	20.4
	(18.9)	(20.0)	(14.3)	(17.8)	(20.8)
Production workers	31.3	33.5	36.5	37.8	34.3
	(27.9)	(30.2)	(27.7)	(29.2)	(30.9)
Other wokers	2.4	2.1	1.8	2.0	3.2
	(5.3)	(4.2)	(3.4)	(4.3)	(7.6)
Missing occupation	15.7	16.2	19.2	20.3	26.2
	(20.5)	(21.7)	(21.8)	(22.7)	(25.2)
N	195	195	195	195	186,786

Means and strandard deviations. The third and fourth columns report summary statistics for control group firms. We use the universe of Danish firms as the potential comparison group for our acquiring and target firms. This allows us to match on observables, as closely as possible, without making any assumptions. The control firms were identified as the closest match in term of firm size and number of plants, active in the same year and the same industry (at the 3 digit level) than the acquiring and target firms, and privately owned. We also used propensity score matching technique to identify the control group firms. The results were not affected. For more details, see the online appendix at http://faculty.chicagobooth.edu/michael.gibbs/research/papers/Mergers_appendix.pdf. The fifth column reports the summary statistics for all firms privately owned in the private sector having minimum 5 workers and being active in the same years than the firms in our merger sample. Note than no control group (columns 3 to 5) includes firms having been involved in any type of merger during the 1980-2001 period. * Statistically different at the 5% level between acquiring and target firms.

Figure 1: Size of Merged Firm Over Time
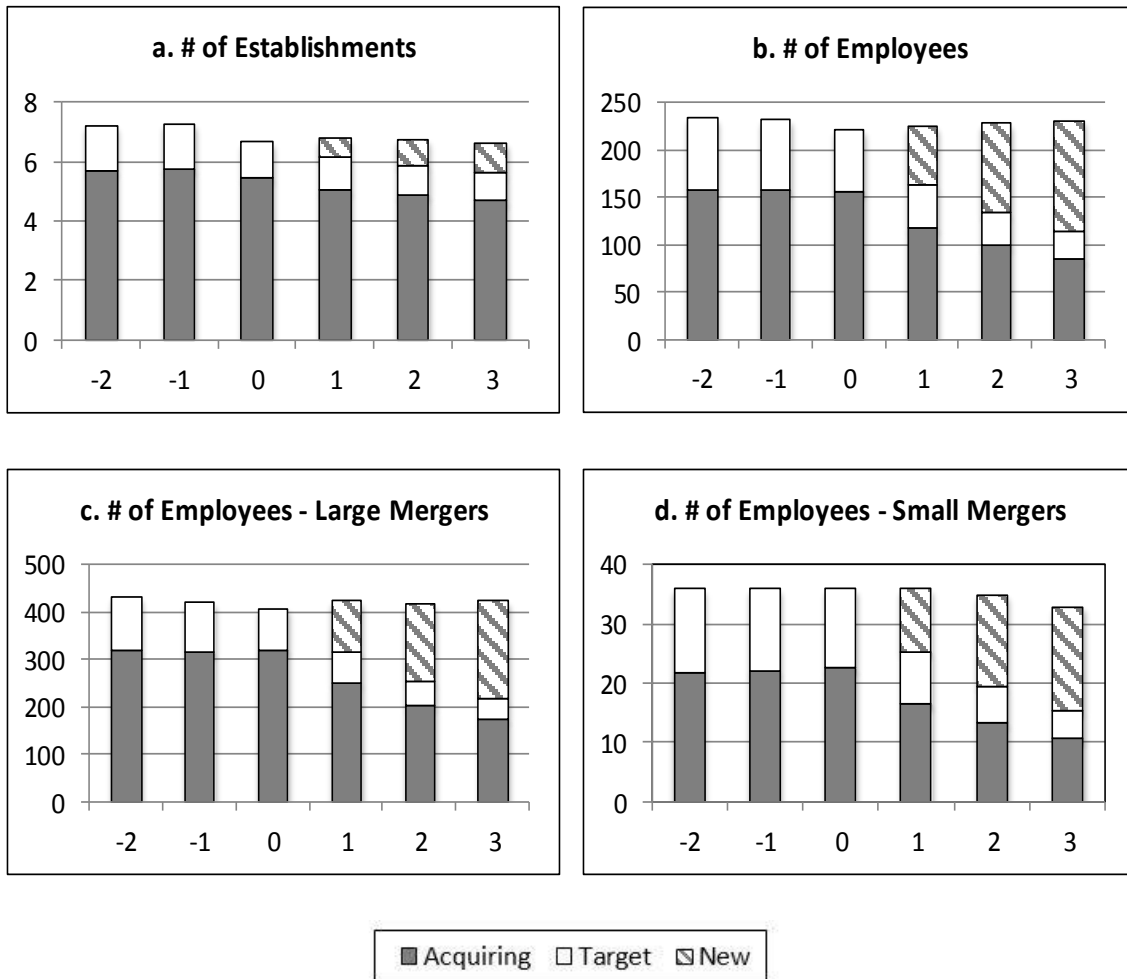
Figure 1a plots the number of establishments. Figures 1b-d plot the number of employees; b is for all mergers, while c-d divide the sample into large and small mergers (total number of employees at merger above or below 73). In all plots, the horizontal axis is the time period relative to the year of merger (t = 0). Shaded bars represent acquiring firms, white bars target firms, and cross-hatched bars new hires or establishments opened after the merger.

Table 3: Cumulative Post-Merger Transitions

			Acquiring		Target	
			Actual	Predicted	Actual	Predicted
From t=0 to t=1		**Among those who do not exit:**				
	Not Mixing	% staying in same establishment	91.3		89.9	
		% changing establishment w/in pre-merger firm	6.2	6.0*	0.8	0.6*
	Mixing	% Hard Mixing - to estab. in other firm	0.8	2.0*	6.8	8.7*
		% Soft Mixing - to estab. created post-merger	1.7	0.7*	2.5	0.6*
		% who exit	20.8		26.7	
From t=0 to t=3		**Among those who do not exit:**				
	Not Mixing	% staying in same establishment	80.3		83.1	
		% changing establishment w/in pre-merger firm	12.0	13.0*	1.5	1.2*
	Mixing	% Hard Mixing - to estab. in other firm	1.2	3.3*	12.0	14.0*
		% Soft Mixing - to estab. created post-merger	6.5	2.6*	3.4	1.3*
		% who exit	40.4		52.0	
	N		112,877		18,918	
		Related Mergers				
From t=0 to t=3		% changing establishment w/in pre-merger firm	10.1	11.9*	1.1	0.8*
		% Hard Mixing - to estab. in other firm	1.2	3.5*	10.0	12.1*
		% Soft Mixing - to estab. created post-merger	7.9	3.0*	3.0	1.0*
	N		80,244		14,318	
		Unrelated Mergers				
From t=0 to t=3		% changing establishment w/in pre-merger firm	16.5	15.9*	2.7	2.7
		% Hard Mixing - to estab. in other firm	1.0	2.9*	17.7	19.4*
		% Soft Mixing - to estab. created post-merger	3.3	1.6*	4.6	2.2*
	N		32,633		4,600	

*Actual and predicted transitions are different with 5% significance. Predicted values assume that, conditional on switching establishment, employees are reassigned to other establishments randomly, with odds equal to the fraction of employees in those other establishments.

Table 4: Employee Demographics by Type of Transition - 3 Years Post Merger

	Acquiring					Target					New Hires
	Not Mixing	Mixing Hard	Mixing Soft	Exit	All	Not Mixing	Mixing Hard	Mixing Soft	Exit	All	
Female	36.3	29.6	40.0	36.4	36.4	31.3	20.0	28.6	33.9	32.0	35.7
	(48.1)	(45.7)	(49.1)	(48.1)	(48.1)	(46.4)	(39.7)	(45.2)	(47.4)	(46.5)	(47.9)
Age	38.6	38.8	38.5	34.6	37.0	38.7	38.4	38.0	33.8	36.1	31.7
	(10.6)	(11.4)	(10.3)	(13.6)	(11.8)	(10.7)	(10.6)	(11.0)	(13.3)	(12.1)	(11.3)
Years of schooling	11.7	12.0	12.1	11.3	11.6	11.2	12.0	12.2	10.9	11.1	11.5
	(2.0)	(2.3)	(2.4)	(2.1)	(2.1)	(1.9)	(2.2)	(2.3)	(2.0)	(2.0)	(2.2)
Experience	15.1	13.4	14.5	10.4	13.2	15.1	15.6	14.0	10.4	12.7	9.0
	(8.0)	(7.9)	(7.5)	(8.6)	(8.2)	(8.0)	(8.6)	(8.3)	(8.7)	(8.4)	(8.0)
Tenure	7.7	4.6	6.3	4.1	6.2	6.0	4.6	4.8	3.3	4.5	0.9
	(7.1)	(5.7)	(6.5)	(5.8)	(6.5)	(6.5)	(5.4)	(6.0)	(5.2)	(5.7)	(1.7)
Wage percentile	53.2	54.5	52.1	45.6	50.1	51.6	56.4	57.1	43.4	47.7	42.3
	(27.8)	(29.0)	(27.7)	(30.0)	(28.7)	(27.2)	(28.0)	(28.0)	(28.9)	(28.1)	(29.6)
N	62,140	788	4,384	45,565	112,877	7,690	1,089	311	9,828	18,918	61,448
Occupation											
Manager	4.1	12.6	3.4	3.5	3.9	4.1	4.6	9.8	3.7	4.0	2.6
	(19.8)	(33.2)	(18.1)	(18.3)	(19.2)	(19.7)	(21.0)	(29.9)	(18.9)	(19.5)	(15.9)
R&D	10.7	21.7	7.3	8.6	9.9	8.2	31.3	4.9	9.2	10.2	11.7
	(30.9)	(41.3)	(26.1)	(28.1)	(29.8)	(27.5)	(46.4)	(21.7)	(28.9)	(29.4)	(32.2)
Sales	13.5	10.2	10.5	14.1	13.7	6.7	10.8	15.7	7.5	7.5	11.8
	(34.2)	(30.5)	(30.7)	(34.8)	(34.4)	(25.0)	(31.0)	(36.5)	(26.4)	(26.2)	(32.2)
Support	38.6	22.3	25.3	29.4	34.7	15.0	17.2	15.7	17.4	16.3	22.6
	(48.7)	(41.7)	(43.5)	(45.6)	(47.4)	(35.7)	(37.8)	(36.5)	(37.9)	(36.9)	(41.8)
Production	25.5	23.4	40.3	27.3	26.5	54.6	25.7	31.4	42.3	46.6	32.8
	(43.6)	(42.5)	(49.1)	(44.6)	(44.1)	(49.8)	(43.7)	(46.6)	(49.4)	(49.2)	(46.9)
Other	1.3	2.9	2.2	2.0	1.6	2.1	1.2	5.9	2.4	2.2	2.3
	(11.3)	(16.7)	(14.7)	(14.0)	(12.5)	(14.3)	(10.7)	(23.6)	(15.4)	(14.7)	(15.1)
Missing	6.3	4.0	11.0	15.1	9.8	9.4	9.3	16.7	17.4	13.2	16.2
	(24.2)	(19.7)	(31.2)	(35.8)	(28.9)	(29.2)	(29.0)	(37.5)	(37.9)	(33.4)	(36.8)
N	21,352	175	683	14,400	36,610	3,975	604	102	4,136	8,817	35,295

Means and standard deviations. Rows in the bottom half sum to 100%.

Table 5a: Multinomial Probit Estimation of Post-Merger Movements - Up to 3 years Post-Merger

Baseline: stay in establishments in pre-merger firm	Acquiring						Target					
	Mixing				Exit		Mixing				Exit	
	Hard		Soft				Hard		Soft			
	dy/dx	s.e.	dy/dx	s.e.	dy/dx	s.e.	dy/dx	s.e.	dy/dx	s.e.	dy/dx	s.e.
Dominance, employee's workforce	-0.013***	(0.003)	0.018	(0.013)	0.026	(0.040)	-0.081***	(0.015)	-0.036***	(0.010)	-0.091***	(0.031)
Related merger	0.000	(0.001)	0.007	(0.005)	-0.002	(0.013)	0.009	(0.008)	-0.008	(0.005)	-0.024	(0.017)
Partial merger	0.001	(0.002)	0.015***	(0.006)	-0.019	(0.018)	0.001	(0.010)	0.011	(0.009)	-0.023	(0.025)
Pre-merger turnover	0.008	(0.007)	0.077***	(0.019)	0.206***	(0.038)	-0.020	(0.019)	0.031***	(0.009)	0.086*	(0.047)
# establishments, employee's firm	-0.000	(0.000)	-0.000***	(0.000)	0.001**	(0.000)	0.004	(0.003)	0.003***	(0.001)	-0.011*	(0.006)
Merger size/100	-0.000	(0.001)	0.001***	(0.000)	-0.002**	(0.001)	0.000	(0.001)	-0.000	(0.001)	-0.002	(0.002)
Age	-0.000	(0.001)	0.000	(0.001)	-0.019***	0.002	-0.000	(0.001)	-0.000	(0.001)	-0.017***	(0.002)
Age²	0.000	(0.001)	-0.000	(0.001)	0.000***	(0.000)	-0.000	(0.001)	0.000	(0.001)	0.000***	(0.000)
Experience	0.000	(0.001)	0.001*	(0.000)	-0.004***	(0.001)	0.000	(0.001)	0.000	(0.001)	-0.012***	(0.002)
Experience²	-0.000	(0.001)	-0.000	(0.001)	0.000	(0.001)	0.000	(0.001)	0.000	(0.001)	0.000***	(0.000)
Tenure	-0.000	(0.001)	-0.001**	(0.000)	-0.015***	0.001	-0.001	(0.001)	-0.001***	(0.000)	-0.018***	(0.002)
Tenure²	0.000	(0.001)	0.000	(0.000)	0.000	(0.001)	0.000	(0.001)	0.000*	(0.000)	0.001***	(0.000)
Years of schooling	0.001	(0.001)	0.006**	(0.003)	-0.029***	(0.009)	-0.005	(0.005)	-0.005	(0.005)	-0.005	(0.014)
Years of schooling²	-0.000	(0.001)	-0.000**	(0.000)	0.001***	(0.000)	0.000**	(0.000)	0.000	(0.001)	0.000	(0.001)
Female	-0.000	(0.001)	0.000	(0.001)	-0.006	(0.006)	-0.012***	(0.004)	0.004**	(0.002)	-0.001	(0.008)
Wage residual	0.002	(0.004)	-0.003	(0.017)	0.278***	(0.054)	0.190***	(0.040)	0.004	(0.030)	0.394***	(0.111)
Predicted probability	0.004		0.020		0.162		0.037		0.013		0.225	
Log Pseudo Likelihood	-129,849						-26,582					
N	267,825						40,076					

All specifications include industry and year fixed effects. We use a non-parametric baseline by creating duration-interval-specific dummy variables, one for each spell year at risk. Data are truncated 3 years after the merger. Industry overlap is at the 4-digit level. Wage residuals were computed from OLS estimation of individual wages using quadratics for age, experience and firm tenure; female, years of education, merger size, and year and industry fixed effects as covariates. We report marginal effects of multinomial probit estimations. Standard errors are clustered by merger. ***/**/* indicates significance at 1/5/10%.

Table 5b: Multinomial Probit Estimation of Post-Merger Movements - Up to 10 years Post-merger

Baseline: stay in establishments in pre-merger firm	Acquiring						Target					
	Mixing				Exit		Mixing				Exit	
	Hard		Soft				Hard		Soft			
	dy/dx	s.e.	dy/dx	s.e.	dy/dx	s.e.	dy/dx	s.e.	dy/dx	s.e.	dy/dx	s.e.
Dominance, employee's workforce	-0.010***	(0.002)	0.015	(0.012)	0.064	(0.048)	-0.067***	(0.012)	-0.027***	(0.008)	-0.067**	(0.029)
Related merger	-0.000	(0.001)	0.006	(0.004)	-0.005	(0.017)	0.005	(0.006)	-0.004	(0.004)	-0.011	(0.019)
Partial merger	0.001	(0.001)	0.007	(0.005)	-0.039**	(0.019)	0.001	(0.007)	0.005	(0.006)	-0.009	(0.021)
Pre-merger turnover	0.005	(0.004)	0.060***	(0.017)	0.211***	(0.049)	-0.016	(0.014)	0.017***	(0.006)	0.077*	(0.041)
# establishments, employee's firm	-0.000	(0.001)	-0.000***	(0.000)	0.001**	(0.000)	0.003	(0.002)	0.003***	(0.001)	-0.007	(0.007)
Merger size/100	-0.000	(0.001)	0.001***	(0.000)	-0.000	(0.001)	0.000	(0.001)	-0.000	(0.001)	-0.003**	(0.001)
Age	-0.000*	(0.000)	0.000	(0.001)	-0.020***	(0.001)	0.000	(0.001)	-0.000	(0.001)	-0.018***	(0.002)
Age²	0.000	(0.001)	-0.000	(0.001)	0.000***	(0.000)	-0.000	(0.001)	0.000	(0.001)	0.000***	(0.000)
Experience	0.000**	(0.000)	0.001***	(0.000)	-0.006***	(0.001)	0.000	(0.001)	0.000	(0.001)	-0.011***	(0.002)
Experience²	-0.000	(0.001)	-0.000***	(0.000)	0.000**	(0.000)	0.000	(0.001)	-0.000	(0.001)	0.000***	(0.000)
Tenure	-0.000	(0.001)	-0.001***	(0.000)	-0.015***	(0.001)	-0.001	(0.001)	-0.001***	(0.000)	-0.013***	(0.002)
Tenure²	0.000	(0.001)	0.000	(0.001)	0.000***	(0.000)	-0.000	(0.001)	0.000**	(0.000)	0.000***	(0.000)
Years of schooling	0.001	(0.001)	0.003	(0.002)	-0.035***	(0.010)	-0.003	(0.004)	-0.003	(0.004)	-0.009	(0.013)
Years of schooling²	-0.000	(0.001)	-0.000	(0.001)	0.001***	(0.000)	0.000	(0.001)	0.000	(0.001)	0.000	(0.001)
Female	-0.000	(0.001)	0.002	(0.001)	-0.009	(0.006)	-0.008***	(0.003)	0.003***	(0.001)	-0.002	(0.008)
Wage residual	0.002	(0.003)	0.003	(0.012)	0.243***	(0.046)	0.124***	(0.027)	0.004	(0.020)	0.260***	(0.082)
Predicted probability	0.003		0.017		0.201		0.028		0.010		0.211	
Log Pseudo Likelihood	-230,848						-39,169					
N	447,690						62,722					

All specifications include industry and year fixed effects. We use a non-parametric baseline by creating duration-interval-specific dummy variables, one for each spell year at risk. Data are truncated 10 years after the merger. Industry overlap is at the 4-digit level. Wage residuals were computed from an OLS estimation of individual wages using quadratics on age, experience, and firm tenure; female, years of education, merger size, and year and industry fixed effects as covariates. We report marginal effects of multinomial probit estimations. Standard errors are clustered by merger. ***/**/* indicates significance at 1/5/10%.

Table 5c: Multinomial Probit Regression of Post-Merger Movements - Up to 3 years Post-Merger, Including Occupation Codes

Baseline: stay in establishments in pre-merger firm	Acquiring						Target					
	Mixing Hard		Mixing Soft		Exit		Mixing Hard		Mixing Soft		Exit	
	dy/dx	s.e.	dy/dx	s.e.	dy/dx	s.e.	dy/dx	s.e.	dy/dx	s.e.	dy/dx	s.e.
Dominance, employee's workforce	-0.013***	(0.005)	-0.003	(0.009)	-0.017	(0.037)	-0.066***	(0.023)	-0.030**	(0.012)	-0.021	(0.030)
Related merger	-0.001	(0.002)	0.012	(0.011)	-0.029*	(0.015)	-0.007	(0.011)	-0.008	(0.007)	0.011	(0.014)
Partial merger	0.000	(0.002)	0.008	(0.006)	-0.003	(0.015)	0.019	(0.015)	-0.008	(0.006)	0.013	(0.019)
Pre-merger turnover	-0.003	(0.005)	0.008	(0.013)	0.112***	(0.044)	0.019	(0.023)	0.039**	(0.016)	0.095**	(0.039)
# establishments, employee's firm	-0.000	(0.001)	-0.000	(0.001)	0.000	(0.001)	-0.000	(0.003)	0.004*	(0.002)	-0.001	(0.004)
Merger size/100	-0.001	(0.001)	0.000	(0.001)	-0.001	(0.001)	0.001	(0.001)	-0.001	(0.001)	-0.001***	(0.005)
Age	-0.000	(0.001)	0.000	(0.001)	-0.021***	(0.003)	0.001	(0.001)	-0.000	(0.001)	-0.020***	(0.004)
Age²	0.000	(0.001)	-0.000	(0.001)	0.000***	(0.000)	-0.000	(0.001)	0.000	(0.001)	0.000***	(0.000)
Experience	0.000	(0.001)	0.000*	(0.000)	-0.003*	(0.002)	0.001	(0.001)	0.000	(0.001)	-0.006**	(0.002)
Experience²	-0.000	(0.001)	-0.000	(0.001)	-0.000	(0.001)	0.000	(0.001)	-0.000	(0.001)	0.000	(0.001)
Tenure	-0.000	(0.001)	-0.001**	(0.000)	-0.011***	(0.002)	-0.002**	(0.001)	-0.000	(0.001)	-0.016***	(0.002)
Tenure²	0.000	(0.000)	0.000	(0.001)	0.000***	(0.000)	0.000**	(0.000)	-0.000	(0.001)	0.000***	(0.000)
Years of schooling	0.002*	(0.001)	0.008**	(0.003)	-0.008	(0.008)	0.010	(0.007)	-0.003	(0.003)	0.004	(0.018)
Years of schooling²	-0.000	(0.001)	-0.000**	(0.000)	0.000	(0.001)	0.000*	(0.000)	0.000	(0.001)	-0.000	(0.001)
Female	-0.002**	(0.001)	-0.003**	(0.002)	0.014*	(0.008)	-0.015**	(0.006)	0.001	(0.003)	0.009	(0.010)
Wage residual	-0.009	(0.006)	0.009	(0.020)	0.206***	(0.050)	0.158***	(0.052)	-0.014	(0.034)	0.431***	(0.144)
Managers	0.004**	(0.002)	-0.001	(0.002)	0.018	(0.014)	0.034***	(0.011)	0.002	(0.006)	0.032**	(0.014)
R&D	0.006***	(0.002)	-0.003	(0.003)	-0.012	(0.009)	0.037***	(0.008)	-0.002	(0.005)	0.020	(0.020)
Sales	0.003*	(0.002)	0.000	(0.002)	-0.004	(0.009)	0.024***	(0.007)	-0.001	(0.006)	0.010	(0.015)
Support	0.003**	(0.001)	-0.001	(0.002)	-0.013	(0.008)	0.024***	(0.006)	-0.002	(0.004)	0.011	(0.013)
Predicted probability	0.009		0.004		0.147		0.038		0.011		0.183	
Log Pseudo Likelihood	-37,317						-10,170					
N	83,026						17,027					

All specifications include industry and year fixed effects. We use a non-parametric baseline by creating duration-interval-specific dummy variables, one for each spell year at risk. Data are truncated 3 years after the merger. Industry overlap is at the 4-digit level. Wage residuals were computed from OLS estimation of individual wages using quadratics on age, experience and firm tenure; female, years of education, occupational groups, merger size, and year and industry fixed effects as covariates. Only workers with non missing occupation code are used; baseline is production and other occupations. We report marginal effects of multinomial probit estimations. Standard errors are clustered by merger. ***/**/* indicates significance at 1/5/10%.

Table 6: Wages and Exit Rates by Type of Mixing

			Year after merger		
			1	2	3
Acquiring	Not Mixing	hourly wage mean	178.8	186.4	189.3
		s.d.	99.2	96.6	94.2
		wage growth mean	3.8	8.4	10.9
		s.d.	29.2	34.1	36.4
		exit (%)	14.0	12.5	11.6
		N	87,183	72,176	57,393
	Hard Mixing	hourly wage mean	203.3	188.0	205.9
		s.d.	356.2	81.9	106.1
		wage growth mean	9.7	12.9	14.2
		s.d.	88.7	59.8	42.2
		exit (%)	16.7	16.6	13.1
		N	738	579	718
	Soft Mixing	hourly wage mean	179.2	205.9	209.9
		s.d.	67.4	119.8	94.2
		wage growth mean	4.3	8.3	11.4
		s.d.	21.7	44.0	29.2
		exit (%)	18.5	9.3	9.4
		N	1,510	4,051	4,049
Target	Not Mixing	hourly wage mean	165.1	170.3	175.3
		s.d.	77.5	67.4	66.3
		wage growth mean	3.1	6.5	8.9
		s.d.	29.5	28.2	34.6
		exit (%)	19.9	18.1	14.0
		N	12,582	9,649	6,896
	Hard Mixing	hourly wage mean	200.8	225.4	205.4
		s.d.	94.8	96.8	163.4
		wage growth mean	1.7	8.3	11.3
		s.d.	22.2	25.8	72.7
		exit (%)	23.4	15.6	18.8
		N	936	1,163	738
	Soft Mixing	hourly wage mean	195.7	199.9	204.5
		s.d.	73.4	86.4	127.5
		wage growth mean	6.8	14.7	17.0
		s.d.	54.8	77.5	34.4
		exit (%)	21.6	18.4	19.4
		N	347	256	237

Statistics are for all employees who were at the firm at time of merger and remain with the merged firm through period t. Wages are real wages in 2001 prices. Wage growth is cumulative real wage growth, computed as $(w(t)-w(t0))/w(0)$. Exit rates at period t are the rates of exit from t to t+1 and is computed ONLY for workers in surviving firms. The category Not Mixing includes employees who did not change establishments, or who changed to an establishment that was in their per-merger firm at the time of merger. As a reference, in t=0, acquiring hourly wage is 171.7 (100.2) and target hourly wage is 161.2 (82.0).

APPENDIX A. DATA CONSTRUCTION

We use the *Integrated Database for Labor Market Research* (IDA), one of the central registers of Statistics Denmark, from 1980 to 2001. IDA is a matched employer-employee dataset of all workers and firms in Denmark. Each individual has a unique identification number that can be matched with other IDA datasets. The data provide year-end snapshot information on an individual's job, including earnings, experience, and a unique identification number for each establishment. Information at the establishment level includes year of creation, 5-digit industry code, firm identification number and other variables. Firm number links establishments and firms, while establishment number links workers and establishments. Individual identification numbers do not change when a worker changes firms or leaves the labor market, allowing measure of tenure at the current employer.

Merger Identification

Statistics Denmark does not flag mergers, but we are able to identify 2,631 mergers using establishment and firm identification numbers. Establishment identification numbers are unique and do not change when ownership changes, while firm identification numbers change if there is a change of ownership (in our data firm identification numbers are updated every year). We isolate cases where establishments change firm identification from one year to the next. While this could identify establishments (and therefore firms) that go through a merger, it could also identify spurious changes, as firm identification codes may not be always consistent over time. This could happen when a firm changes the location of its headquarters or its legal form. In the data, we would observe such situations if all establishments in a single firm changed to a new firm code in the same year, but no establishments from any other firm changed to the same new firm code at the same time. Such cases were rare and dropped from the sample, as they would be falsely classified as mergers. We identified several types of mergers:

- *Single merger:* 2 firms merged, with some or all establishments from one firm changed in the same year to the previously existing identifier of the other firm. Partial mergers are a subset of this category. The firm whose identifier is used after merger is labeled the acquiring firm. The firm whose identifier disappears is labeled the target firm.
- *Multiple merger:* 3 or more firms merged, partially or fully. Establishments from multiple firms changed in the same year to the same previously existing identifier of one of the firms.

- *Joint merger:* 2 or more firms merged to form a new firm with a new identifier. For example, firms A and B might merge, forming new entity C. We limit our sample to single mergers. In prior drafts we included joint mergers, with the assumption that the larger of the two was the acquiring firm, and multiple mergers. Our general conclusions were unchanged.

For the purpose of our analysis, we add the following restrictions:

- Exclude mutual mergers, as in those cases we cannot identify which firms are acquiring or target.
- Exclude multiple mergers, as the dynamics of organizational integration are likely to be substantially different in those cases.
- Impose a time window: we include only mergers for which two years of pre-merger data was available for both firms, and at least three years of post-merger data for the combined.
- Drop cases where a firm went through more than one merger during the 6 years window to ensure no merger overlap in the time window we will study.
- Keep only mergers between private firms active in private industries (agriculture, manufacturing, retail, hotels and restaurants, construction, transport, finance, real estate and R&D activities).

This leaves a sample of 595 single mergers (see table A1 below) or 23% of all the mergers identified over 1982-1998. This is the sample we use throughout this paper.

Table A1: Mergers of Firms 5+ Employees, 1982-1998

	All	Type of Merger			Single mergers, with data for 2 years pre- & 3 years post- merger		
					Private industries		Public industries
		Single	Multiple	Joint	Private firms	Public firms	
N	2,631	2,003	433	195	595	26	146
%	100	76.1	16.5	7.4	22.6	1.0	5.5

APPENDIX B. OCCUPATIONAL GROUPS

Groups were defined using International Standard Classification of Occupations (ISCO88) codes (ILO 2011). Specific codes within each group are available on request. Numbers below refer to the IS-CO88 group at the 1-digit level.

- *Managers:* 1 (managers, legislators, senior officials), managers only.
- *R&D*: 2 (professionals) & 3 (technicians) in science, math, engineering, and health sciences.
- *Sales:* 3, 5 (service workers) & 9 (elementary occupations) in sales occupations.
- *Support:* 2, 3, 4 (clerks), 5 & 9 in support occupations.
- *Production:* 3, 6 (skilled agricultural & fishery workers), 7 (craft & related trade workers), 8 (plant & machine operators & assemblers), & 9 in production occupations.
- *Other*: all other occupations.

In Table 3, we report various types of post-merger transitions for acquiring and target workers over different time intervals and their "predicted values." These assume that, conditional on switching establishment, employees are randomly reassigned to other establishments, with odds equal to the fraction of total employees who work in the other establishments. The predicted values are computed as:

$$Predicted = Prtransition_{it} = 1 \cdot \beta_{itx},$$

where i indicates the type of worker (acquiring or target), t is the year post-merger (1 or 3), and x is the type of move within the pre-merger firm (hard mix to an establishment belonging to the other firm, or soft mix to an establishment set up post-merger).

For $Prtransition_{it} = 1$, we use the average share of movers per type of worker. For example, this is 19.7% for acquiring workers (12.0 + 1.2 + 6.5) and 16.9% for target workers (1.5 + 12.0 + 3.4) over a 3-year period (Table 3).

β_{ixt} is computed as the share of workers employed in potential destination establishments. As we have two groups of workers and three types of transitions, there are 6 transition-group pairs. βs are defined at the worker level for post-merger period t as follows:

$$\beta_{A,within,t} = \frac{\text{\# workers in all Acquiring establishments except mine in time } t}{\text{\# workers in all establishments except mine in time } t},$$

$$\beta_{A,hard,t} = \frac{\text{\# workers in all Target establishments in time } t}{\text{\# workers in all establishments except mine in time } t},$$

$$\beta_{A,soft,t} = \frac{\text{\# workers in all New establishments in time } t}{\text{\# workers in all establishments except mine in time } t},$$

$$\beta_{B,within,t} = \frac{\text{\# workers in all Target establishments except mine in time } t}{\text{\# workers in all establishments except mine in time } t},$$

$$\beta_{B,hard,t} = \frac{\text{\# workers in all Acquiring establishments in time } t}{\text{\# workers in all establishments except mine in time } t},$$

$$\beta_{B,soft,t} = \frac{\text{\# workers in all New establishments in time } t}{\text{\# workers in all establishments except mine in time } t}.$$

Once β is computed for each worker, the predicted value is simply the probability of moving to another establishment weighted by β. We aggregate predicted values at the transition-group level. A similar approach is used for the bottom part of Table 3, splitting the sample between related and unrelated mergers.