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New firm formation in the wake of mergers and acquisitions: Are employees pushed or pulled into entrepreneurship?

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New firm formation in the wake of mergers and acquisitions:

Are employees pushed or pulled into entrepreneurship?

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Abstract: This study investigates the relationship between mergers and acquisitions (M&A) and employee entrepreneurship in human capital-intensive service sectors. We investigate two sets of theoretical mechanisms. First, M&As may push employees entrepreneurship by lowering the average barriers of leaving the current employment (i.e. being associated with general deterioration of working conditions). Second, M&A activities may generate new entrepreneurial opportunities, which are first and foremost accessible by employees directly affected by M&As. Results on employee entrepreneurship in 3 039 Swedish firms during the time period 2000-2009 confirm that the number of firms spawned from a specific incumbent increases following an M&A. Push-oriented factors are found to contribute to this effect, but a dominating part of the total effect remains unexplained. This suggests that pull-oriented explanations of opportunity creation in the wake of M&As constitute an important avenue for further research on employee entrepreneurship.

Keywords: employee entrepreneurship; mergers; acquisitions; opportunity costs; entrepreneurial opportunity

JEL-codes: L26, G34, M50, L80

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1. INTRODUCTION

Mergers and acquisitions (M&As) have been identified as a central mechanism of market based economies. As demonstrated by Williamson (1968), a horizontal merger or acquisition may increase economic efficiency if it allows for the exploitation of previously unutilized economies and scale and scope which may well be greater than the efficiency loses incurred by the merged firm's increased market power. Furthermore, M&As potentially affect long-term economic development through transforming the conditions for industry-wide level innovation activities, but the accumulated evidence suggests that the net impact is subject to a number of contingencies (Cassiman & Colombo, 2006; Cloodt et al., 2006). In this paper, we explore an additional route through which M&A activity may affect the evolution of an industry: through affecting the conditions for entrepreneurial activity among employees of the involved firms.

Two main arguments are considered. First, we suggest that mergers and acquisitions may increase employees' transition to entrepreneurship by lowering the general barrier to job mobility. Problems of acculturation after a merger (Larsson & Lubatkin, 2001) and reduced fit between individual and organizational characteristics may lead to a perceived deterioration of career opportunities (Haveman & Cohen, 1994), and thereby influence employees' perceived value of staying employed. In other words, we note that the average opportunity cost of entrepreneurship for employees can be expected to be reduced by M&A activity. Employees would consequently be "pushed" into entrepreneurship as a consequence of firm-level turmoil.

Second, we draw on recent research inspired by evolutionary theory which suggests that M&As pave the way for the creation of new entrepreneurial opportunities. In post-merger processes, consolidation of activities often lead firms to abandon smaller segments which are seen as strategically unaligned in order to focus on markets and products where significant economies of scale and scope can be realized (Gugler etal., 2003; Luksha, 2008). M&As can thus be conceived as creating room for niche markets and as creating novel opportunities which may be identified by Kirznernian entrepreneurs. Such opportunities are first and foremost identified by individuals with first-hand information about pre-merger activities, i.e. by employees of the merged firms. Parallel arguments suggest that M&As can be expected to also drive entrepreneurship of a Schumpeterian nature. In particular, disagreement within a firm on the nature and potential of opportunities, or miss-match between an opportunity for new business and the incumbent's general strategy and existing line of products have been identified as important drivers of employee entrepreneurship (Klepper & Sleeper, 2005; Klepper & Thompson, 2010). As M&As typically involve and bring about shifts in strategy, such tendencies can be expected to be reinforced in their wake. That is, employees affected by M&As can also be understood as being "pulled" into entrepreneurship.

In line with both sets of arguments above, empirical results have verified that the rate of new firm[1] formation increases following M&As (see review in Klepper, 2007). This evidence is, however, primarily made up of studies of typical "high-tech" sectors in the emergent phase. In this paper, we investigate whether M&As are associated with increased employee entrepreneurship also in a wider set of service sectors, including "low-tech" human-capital intensive services. We also qualify the analysis by developing and empirically exploring the parallel arguments of a "pull"-effect according to which M&As create entrepreneurial

[1] Here, we use the term spin-out in reference to a new firm founded by one or several employees of an incumbent firm, irrespectively of whether the incumbent is actively contributing to, actively opposing or passively neutral to the formation of a new firm.

opportunities and a "push" effect according to which M&As reduce workers' reluctance to leave their existing job. These two arguments offer alternative explanations for why employee entrepreneurship increases after an M&A, with considerably different theoretical and practical implications.

Empirically, we investigate the spawn-rate of firms founded by employees of Swedish service sector firms during the time period 2000-2009 structural equation regressions. The data consists of 10 760 observations including 3 039 unique firms and 1 315 M&A operations. Acknowledging that an observed relationship between M&As and spin-out activity may be partly biased by simultaneity, e.g. in terms of unobserved industry-level developments, we utilize generalized structural equation model estimation. Our results confirm that the number of spin-outs spawned by a specific incumbent increases following an M&A, albeit with a delay of two years. Moreover, the results provide evidence suggesting that the employees' transition is partially explained by push factors.

2. THEORETICAL CONTEXT

We consider the decision of a utility-maximising employe whether to leave her current job to engage in entrepreneurial venturing. The opportunity cost, representing the foregone utility associated with making that decision, is in what follows represented in terms of two reservation wage constructs. The utility associated with the current job at time *t* is increasing in the reservation wage w^r_t specific for the current employer, i.e. the lowest wage for which the individual accepts to keep her current job over all labour market other options. The level of w^r_t depends on current job satisfaction, which is affected by the individual's current wage, but also by non-pecuniary aspects such as the match between individual abilities and preferences on the one hand and job content on the other. The reservation wage is furthermore affected both by the current situation and by the individual's expectations on future career opportunities from the present position. If the individual is unconditionally fired in period t, $w^r_t \rightarrow \infty$.

The utility associated with leaving the current job to engage in such a process is increasing in the level of entrepreneurial opportunity θ_t of the most attractive business idea known to the individual at time *t*. The size of θ_t is evaluated by the individual given his or her abilities, prevailing (and expected) industrial conditions and the nature of the idea.

The attractiveness of switching to entrepreneurship depends on current job satisfaction (Hyytinen & Ilmakunnas, 2007), but is also affected by other opportunities for paid employment available to the individual. Let w^l_t represent the reservation wage of the most attractive offer of a new position in paid employment, i.e. the lowest wage which the individual would be willing to accept to switch to the most attractive offer of new employment at time t. The individual's probability η_t to enter entrepreneurship at time *t* is then given by

$$\eta_t = f\left(\theta_{it}, \min\left(w^r_{it}, w^l_{it}\right)\right) + \varepsilon_t \quad (1)$$

where f is a function increasing in both arguments and ε_t represents individual idiosyncrasy related to the preference for self-employment. For a firm with N_t employees, the expected number of spin-outs S_{tj} for firm *j* is given by

$$S_{tj} = \sum_{i=1}^{N_{jt}} \eta_{it} \rightarrow \quad (2)$$

$$S_{tj} = \sum_{i=1}^{N_{jt}} f\left(\theta_{it}, \min\left(w^r_{it}, w^l_{it}\right)\right) + \varepsilon_{it} \rightarrow \quad (3)$$

$$S_{tj} = N_{jt} \times f\left(\theta_{it}, \min\left(w_{it}^{r}, w_{it}^{l}\right)\right) + \mu_{jt} \quad (4)$$

where w^{r}_{jt}, w^{l}_{jt} and θ_{jt} can be thought of as the aggregate reservation wage and entrepreneurial opportunity of employees of firm j. μ_{jt} correspondingly represents the average preference for entrepreneurship among the employees of firm j. It can be easily shown (see Appendix I) that the expected number of spin-outs S_{tj} is (non-strictly) increasing in w^{r}_{jt} and θ_{jt}. S_{tj} also increases in w^{l}_{jt} which for simplicity is assumed to be unaffected by specific M&A activities and which we will therefore not consider further. In the remainder of this section, we discuss how M&A activity affects w^{r}_{jt} and θ_{jt}.

2.1 Working conditions in post-merger and acquisition firms

Achieving operational synergies between the merging entities is a common objective for post-M&A integration processes (O´Shaughnessy & Flanagan, 1998). In the short term, M&As are therefore often associated with workforce downsizing. For example, Conyon et al. (2002) reported an average employment reduction of 8% for unrelated mergers and 19% for related mergers from a study of 442 UK mergers over the period 1967-1996. It is therefore plausible to expect that post-M&A lay-offs affect the rate of spin-out activity from the firm in the sense that the opportunity cost of entrepreneurship is reduced for parts of the workforce.

Through its disruptive nature, an M&A can be considered as a potential opportunity cost lowering factor also for many employees who are not directly laid off. M&As often bring together organizational units with different activities, objectives, culture, and talent sets. While interorganisational differences are typically more accentuated in the case of diversifying mergers, also when driven by the pursuit of scale economies post-M&A integration has proven a significant managerial challenge (Gates & Very, 2003). Re-orientation of strategic objectives, possibly including changes in management may create a mismatch between individual aspirations of the employees and firm management (Klepper & Thompson, 2010). As a consequence, a number of employees may choose to depart from the firm, e.g. to form their own firms (Henderson & Clark, 1990; Klepper & Sleeper, 2005; Tushman & Anderson, 1986).

The job characteristics theory (Seo & Hill, 2005) associates an M&A with deterioration of the working environment and a slump in employees' perception of work satisfaction. In addition to frustration and disappointment caused by firm policy shifts following an M&As, employees sometimes experience a change in the fundamental relationships between the workers and the firm such as the disruption of psychological contracts as well as an interruption of the relationships and ties established among the colleagues (Newma & Krzystofiak, 1993).

Changes to the firm's strategic direction and to its operations brought about through M&A processes may of course also be welcomed by parts of the workforce. For some individuals, the workplace-individual fit will likely increase. Certain employees of smaller firms may, for example, appreciate the opportunity to climb the corporate career ladder in a larger firm context. In acquisitions where competence-seeking motives play a dominating role or where knowledge and networks embodied in staff constitute key commercial value, management may furthermore be willing to make particular efforts, including compensation increases, to retain key personnel (Ranft & Lord, 2002). We argue, however, that aggregated over firms, the average impact of M&As is that of decreasing employee's satisfaction with their current employment. The changes introduced by an M&A thereby imply an increase in the reservation wage of the current job. With w^{r}_{jt} being an inverse measure of the opportunity cost of leaving the current job, we may formulate the following hypothesis:

Hypothesis 1: Merger and acquisitions decreases the opportunity cost of leaving the current job

We should, as a consequence, observe increased employment turn-over – also in the form of increased firm formation activity among employees (Amit et al., 1995; Sørensen & Sharkey, 2014) (Amit et al., 1995; Sorensen and Sharkey, 2014). That is, M&As are expected to push employees not only to seeking new employment but also to exert a push-effect increasing employee entrepreneurship.

2.2 Mergers and acquisitions as a source of entrepreneurial opportunities

The concept of entrepreneurial opportunities can be traced back to Austrian economics, where it is associated with entrepreneurial acts in terms of the formation of new ventures. Hayek (1945) recognizes the importance of timing and location for exclusive information and knowledge of the conditions of a market allowing the agents to detect, exploit and thereby eliminate market inefficiencies. While, similar to Hayek, opportunities are treated as exogenous by Kirzner (1997, 1973), kirznerian theory assigns a greater weight to the capacity of the agents in detecting and evaluating opportunities. Since Schumpeter (1911) connects his analysis of entrepreneurship strongly to the concept of innovation, the view of the entrepreneur as directly involved in the creation of opportunities is often referred to as "Schumpeterian". However, this interpretation of the Schumpeter's entrepreneur has been criticized, e.g. by Witt (2002) who claims that the opportunities are still pre-supposed just that in this specific case, entrepreneurs detect opportunities that are outside the market and the price system.

In recent research, M&A activities have been suggested as a particularly interesting source of entrepreneurial opportunities (Buenstorf, 2007). Despite typically perceived as making entry into the industry or industries affected by merger less attractive, due to the merged firm's new potential ability to exploit economies of scale and scope, M&As should also be thought of as affecting the potential for both kirznerian and schumpeterian entrepreneurship. Corporate re-structuring and re-orientation in post-M&A processes may create room for new forms of specialization along the value chain. For example, a newly merged firm may choose to abandon or divest selected business segments in order to achieve focus (Capron & Mitchell, 1998; Friberg & Romahn, 2012; Kaplan & Weisbach, 1992), to avoid overlaps in assets (Chastain, 1987) and to comply with antitrust policies. The creation of entrepreneurial opportunities may consequently be analyzed as an externality of M&As.

M&As can be expected to generate new entrepreneurial opportunities on an industry-wide level, in particular by creating room for niche markets. There are, however, reasons to believe that the effects of M&A on entrepreneurial activities, at least in the short term, are strongly concentrated to employees of the merging firms. Several parallel arguments have been empirically tested in previous studies:

- Employees are likely to have *acquired knowledge and experience* which make them better positioned than outsiders to identify and act on entrepreneurial opportunities generated in post-merger processes(Chastain, 1987).
- Employees may be *given formal offers to spin out* as a merged firm undertakes divestures of an asset or an activity (Curranet al., 2012). Such divestitures can take the form of regular sell-offs, but also be pursued through liquidation, management buy-out or through the creation of corporately controlled spin-offs (Hamilton & Chow, 1993).
- For founder-owners, an acquisition typically *frees up capital*, and it is not unusual that this capital is reinvested in new ventures in the years following the M&A event (Mason & Harrison, 2006).
- M&As may often generate uncertainty among existing customers, reducing loyalty to the incumbent firm and to the firm's brand (Homburg & Bucerius, 2005; Jaju et al., 2006). Opportunities for entrepreneurship may thus arise, allowing employees to

leverage their personal contacts to customers to continue serving their needs, albeit as private enterprisers rather than as employees (Campbell et al., 2012).

- Employees may be motivated by changed priorities in a newly merged firm to engage in entrepreneurship in order to *exploit business opportunities which they find no longer fits with their employer's agenda*; an opportunity which would not seem equally attractive (or even legally possible) as long as the incumbent firm was pursuing that line of development. For example, innovators in the employ of incumbents may be spurred to commercialise their ideas in the form of new ventures, if these ideas are not in line with the strategic orientation of the merged firm (Cassiman & Ueda, 2006; Christensen, 1993; Gambardella et al., 2015; Pakes & Nitzan, 1983).

In summary, we suggest that through changing industry structure and causing disagreement, M&As increase employee's average evaluation of the best available opportunity for entrepreneurship (as represented by the variable θ_{jt} in eq. 4 above). It follows from the presentation above that we expect an increase in θ_{jt} to result in an increased frequency of spin-out activity.

Hypothesis 2: In periods following mergers and acquisitions, the inflow of entrepreneurial opportunities available to employees increases.

3. METHODOLOGY

In order to test the hypotheses on the connection between M&As and spin-out formation outlined in the previous section, we investigate spawn rates of spin-out firms among service sector firms. We follow Gompers et al., (2005) and Lockett & Wright (2005) in conducting organizational-level analysis of employee entrepreneurship.[2]

3.1 Empirical strategy

Our first hypothesis concerns the relationship between M&A and employee job satisfaction. Let OC_{jt} denote an empirical approximation of the opportunity cost of leaving the current job at firm *j* in year *t* and

$$OC_{jt} = \alpha + \mu_j + \sum_{k=t-2}^{k=t}(\beta + \gamma F_{jk}) \times MA_{jt} + \boldsymbol{\upsilon C_{jt}} + \boldsymbol{\partial_t} + \boldsymbol{\gamma_j} \qquad (5)$$

where MA is a dummy variable indicating that firm *j* was involved in M&A activity in year *t* and F is a dummy variable indicating that the M&A activity involves partners in more than one country (=1), as opposed to purely domestic activity (=0). The inclusion of F allows for potential heterogeneity in the effect of cross-border and domestic M&As. For example, multinational M&As may offer new career opportunities inside the firm (Bertrand, 2009) to a larger extent than domestic M&As. Or, with an oppositely directed connotation, cultural differences may induce additional post-M&A frictions (Stahl & Voigt, 2008). M&As are allowed to affect the dependent variable with up to two years lag, reflecting a period of uncertainty about how firm strategy and working conditions will be affected by M&A activities.

[2] An alternative strategy would be to set up individual-level models. However, given that our focus is on firm-level factors and that estimation of firm-level factor coefficients using individual level data would potentially violate the assumption of independence between observations, we choose to aggregate all data to the level of firms.

We quite naturally expect the firm-level opportunity cost of leaving the current employment to be positively associated with the performance of the firm, and negatively associated with the level of human capital. The vector $\boldsymbol{C}_{jt}$ contains corresponding control variables, to be further specified below. $\boldsymbol{\delta_t}$ and $\boldsymbol{\gamma}_j$ are vectors of year and firm specific effects, respectively.

Our point of departure for empirical analysis of Hypothesis 2 is Eq. 4 above. Let MA_{jt} be a dummy variable representing the occurrence of M&A activity in year *t*. Then $S_{jt,}$ the number of new firms spawned from each firm *j* in each observed year *t*, is modeled as being related to both these variables and to a set of further variables:

$$S_{jt} = \alpha + \mu_j + \sum_{k=t-2}^{k=t}(\beta + \gamma \mathrm{F}_{jk}) \times \mathrm{MA}_{jt} + \delta \mathrm{OC}_{jk} + \boldsymbol{\upsilon \mathbf{C}_{jt}} + \boldsymbol{\lambda \mathbf{E}_{jt}} + \boldsymbol{\partial_t} + \boldsymbol{\gamma_j} \quad (6)$$

As in Eq 5, M&A dummies and our empirical proxy for opportunity costs are allowed to affect spin-out activity with up to two years of lag, taking into account the delays involved in the entrepreneurial process. We also allow, through the introduction of the variable F, for a differential impact of multinational and domestic M&A activity.

The vector $\boldsymbol{C}_{jt}$ contains variables characterizing the focal firm. Firm size, measured as the number of employees of the focal firm in hundreds of individuals, is included here as the number of spinouts should be expected to be strongly related to the number of individuals "at risk" of participating in new firm formation (see equation 5).[3] Acknowledging that better performing firms and firms with larger stocks of knowledge have been identified as more frequently spawning spin-outs (Gompers, Lerner, & Scharfstein, 2005), turnover per employee is included along with two variables measuring the education level of the workforce. Here, the share of employees with longer and shorter tertiary education are included, with the share of employees with secondary education or lower as their highest degree forming the base case. Finally, a set of dummy variables is used to denote the sector of activity, represented by a two-digit industry classification (NACE) code.

While controlling for generic sector idiosyncracy, we have a particular interest in relating spin-out activity to industry development more specifically. We note that M&As are more likely to occur in phases of industry consolidation (Schoenberg & Reeves, 1999), in the wake of technological change and during periods of economic expansion (Lambrecht, 2004). These conditions are clearly also conducive for spin-out activities. While general entry levels can be expected to go down as industries are consolidated and competitions hardens, niche creation will increase, off-setting some if not all of this disadvantage to spin-out entrants. Intensified technological change and an increased rate of economic expansion is generally conducive for entry. We could therefore expect to observe parallel increases in M&A and spin-out activity. Industry dynamics thus provide a set of alternative, non-causal arguments for a temporal linkage between the occurrence of M&As and the spawning of spin-out firms.

In order to investigate these relationships, we introduce two further industry-level controls in Eq. 6. $\boldsymbol{E}_{jt}$ contains two variables capturing specified time-varying industry- and year-specific conditions reflecting entry-conditions. These are an industry-level herfindahl index and the rate of new firm formation (number of entrants divided by number of incumbents) by industry and region. Reflecting the reasoning above, we also wish to empirically evaluate potential endogeneity between the occurrence of M&As and intertemporal change in these industry-level variables:

[3] In a fixed-effect setting such as that of eq. 6, the firm size variable may also capture the effect of workforce reductions at the focal firm on employee entrepreneurship. We expect, however, that since we explicitly control for opportunity costs in eq. 6, this effect should be limited in the present context.

$$MA_{jt} = \alpha + \boldsymbol{E}_{jt} \quad (7)$$

Equations 5, 6 and 7 constitute a system and are therefore to be estimated jointly using structural equation modelling. We use the SEM estimation package of STATA for this purpose. The dependent variable of eq. 6 is a count variable following a Poisson distribution with overdispersed variance suggesting the application of a negative binominal regression to our panel data. The dependent variable of eq. 7 is dichotomous, wherefore we apply a logistic estimator.

3.2 Data

In our empirical analyses we use register-based employer-employee data collected by Statistics Sweden. This data has been used for a stream of previous studies on new firm formation and labour mobility (c.f. Andersson & Klepper, 2013; Baltzopoulos & Broström, 2011; Delmar et al., 2011). From firm-level data covering all Swedish firms over a nine-year period (2000-2009), firms classified as belonging to the service sector are selected. We choose to concentrate our study to the service sectoras the mobility of complementary assets is relatively higher than in manufacturing industries. Mobility and employee entrepreneurship is hence more prevalent (Campbell et al., 2012; Teece, 2003), providing the econometrician interested in investigating changes in establishing effects more variation to work with. A number of sectors where spin-out activities within the same sector are either formally restricted by regulation (central banks, police activities, etc) or where entry barriers in terms of capital intensity are high (banking, ferry traffic) are excluded, as spin-out activities in these sectors are expected to be subject to partly different conditions than other service sectors. A list of included sectors is found in Appendix II. We restrict our analyses to firms with more than 50 employees which we are able to follow for at least three years of time. The resulting sample consists of 10 760 observations on 3 039 unique firms.

Our firm data is merged with information on all working individuals in Sweden. We use these measures to identify spin-outs, which we define as newly established firms employing at least one individual who was in the previous year employed at the incumbent firm. A domestic M&A is registered as having taken place when more than 50% of the individuals who worked in a firm in year *t-1* are identified as working for a different firm in year *t*. We furthermore document the occurrence of cross-border M&As, for which no employee data is available, using ownership data. Firms listed as foreign owned in year *t* and as domestically held in year *t-1* and firms listed as having domestic activity only in year *t-1* and as having significant activity abroad in year *t* are classified as having been involved in M&A activities.[4] In this way, 988 mergers and acquisitions and 16 871 spin-outs are identified throughout the period.

Finding empirical proxies for the opportunity cost of entrepreneurship is a significant challenge. The key difficulty in explicit study of opportunity costs lies in obtaining contra-factual information on what entrepreneurs would have earned in employment (Parker, 2009). Reflecting such difficulties, opportunity cost perspectives are generally understudied in the empirical entrepreneurship literature. Attempts to explicitly measure opportunity cost in the context of entrepreneurship are few and far between. Amit et al. (1995) use cross-sectional differences in pre-entrepreneurship wage as proxy for differential opportunity costs of

[4] We acknowledge that we are probably, among the 212 events identified where firms with only Swedish activities expand to a new country, including a number of events of "greenfield" expansion. These should not be associated with firm-specific shocks to job satisfaction and to employee entrepreneurship. As any bias introduced by this method should be working in a direction against our two hypotheses, we are confident that this approximation will not spuriously drive our results towards confirming the hypotheses.

individuals in a study on transition into entrepreneurship. Cassar (2006) similarly uses household income as a measure of opportunity cost, driving the stated growth aspirations of entrepreneurs. Arora & Nandkumar, (2011) and Berkhout et al. (2016) extend the wage-based approach to opportunity costs by using information on wage of other individuals expected to face comparable labour market opportunities as the focal individual. In the first of these studies, such individuals are identified through their industry of employment and occupation, in the second by educational fields.

We exploit the richness of matched employer-employee data to construct two novel measures which we believe allows us to capture inter-temporal changes in the firm-level opportunity costs of leaving the current employment. Our primary measure is the observed returns to job mobility. For all individuals who between year *t-1* and *t* leave firm *j* for a different paid employment, we calculate the difference in salary between years *t* and *t-1*. The arithmetic mean of these differences across all individuals who leave employment at firm *j* to take employment in another firm (excluding people who enter into self-employment) is calculated. This variable *opportunity cost* is used as our main proxy for opportunity costs, and is named consequently. For robustness check purposes, we also establish a related proxy in the form of the percentage of all employees at firm *j* in year *t-1* who are identified as having changed employer between year *t-1* and *t* while accepting a reduction in yearly salary. The two measures are complementary, in that they correspond to two different types of changes to the attractiveness of employment. The first measure has the advantage that it provides a metric describing how dramatic changes are across the firm, supposedly capturing the effects of extensive lay-offs and/or general deterioration of job satisfaction. The second measure, on the other hand, is intended to capture heterogeneous impact, where one group of employees is positively affected and another negatively affected by the firm-level development. While positive and negative impact of M&As may well cancel each other out in terms of the firm-level arithmetic mean, high values on this second measure provides an indication that for at least a sub-set of all employees, satisfaction with the current job is low. Individuals older than 60 are excluded from all calculations above, to avoid confusing retirement with other reasons for accepting a lower wage when switching jobs.

The Herfindahl index and the rate of new firm entry (the number of annual entrants divided by the number of incumbents) are calculated by aggregating data on industry-level entry using two digit NACE-codes to identify industries. Table 1 below provides descriptive statistics of our dependent and independent variables. The table shows that the returns to job mobility (our main measure of opportunity costs) on average are 18 %. The final row of table (our alternative measure on opportunity costs) shows that on average, only 0.8 % of a firm's employees switch to a new job where their registered wage income is reduced. The distribution of this variable is however very skewed; in 90% of all observation no individual is observed to make such a move while at the upper tail of the distribution we observe over 100 instances where more than a quarter of the workforce leaves a focal firm while seemingly accepting a lower wage in a new employment.

Table 1: Variables summary

Variable name	Description	Mean	Std. Dev.	Min	Max
Spin-outs	Number of spin-outs spawned	1.569	4.726	0	119
Size	Number of employees (in thousands)	.313	.815	51	14,129
MA	M&A activity	.072	.259	0	1
F	Cross-border M&A	.016	.124	0	1
Turnover per employee	Turnover per employee in M SEK	3,164	8,736	0	689
Low Education	Share of employees with secondary level education or lower education	.689	.258	0.008	1
Medium Education	Share of employees with less than 3 years post-secondary education	.139	.090	0	0.578
Long Education	Share of employees with more than 3 years post-secondary per employee	.173	.205	0	0.982
Industry concentration	Herfindahl index of the industry in which the firm is active	.008	.021	.001	.195
Industry rate of new firm formation	Rate of new firm formation in the industry of the focal firm	.1933	.0750	0	.4544
Opportunity cost (main measure)	Ratio between new and old wage for job movers	0.183	.162	-0.010	4.744
Opportunity cost (alternative measure)	Share of employees who switch job while accepting a lower wage	0.790	3.736	0	46.43

Correlations between variables in Table 1 are presented in Appendix III.

4. RESULTS

4.1 Main results

Table 2 reports the results of simultaneous estimation of equations 5, 6 and 7, reported as models A, B and C respectively. Model A results show that the workforce of firms involved in M&As are more likely to experience below-average *opportunity cost* of job switching, albeit this effect is significant first two years after the event. Estimates using our alternative measure of opportunity cost (not reported in table 2)provide similar results. This result suggests that M&A activity indeed is associated with a decrease in firm-level opportunity cost of job mobility, as stated by Hypothesis 1.

Table 2: Main results

	Model A	Model B	Model C
Dependent variable	Opportunity cost	Number of spin-outs	MA
MA_t	-.0106	.0701	
	(.0360)	(.0433)	
MA_{t-1}	-.0778*	.1111**	
	(.0355)	(.0458)	
MA_{t-2}	-.0821*	.2860**	
	(.0326)	(.0433)	
$F \times MA_t$	-.0099	.0912	
	(.0748)	(.0986)	
$F \times MA_{t-1}$	-.0372	-.0895	
	(.0787)	(.0915)	
$F \times M\&A_{-2}$	.0228	-.1392	
	(.0962)	(.1382)	
Size	.0224*	.6655**	
	(.0104)	(.0864)	
ln(Turnover per employee)	.0192	-.1083**	
	(.0148)	(.0296)	
Medium Education	.2202	1.3552**	
	(.1284)	(.3152)	
Long Education	.6165**	.6915**	
	(.0650)	(.1336)	
$\ln(\text{Opportunity cost}_t)$		-.0403*	
		(.0192)	
$\ln(\text{Opportunity cost}_{t-1})$		-.0511**	
		(.0166)	
$\ln(\text{Opportunity cost}_{t-2})$		-.0329	
		(.0179)	
Industry concentration		3.5238**	1.4328
		(.9401)	(1.2844)
Industry rate of new firm formation		.2668	-2.0865**
		(.4012)	(.3888)
Year fixed effects	Included	Included	Not included
Sector fixed effects	Included	Included	Not included
Individual fixed effects	Included	Included	Not included
_cons	-2.3259**	-1.6604**	.1697**
	(.0704)	(.1866)	(.0762)

Coefficient estimates with robust standard errors in parenthesis.
Legend: **: Coefficient significant at a 1% level *: Coefficient significant at a 5% level

Model B indicates a positive association between M&As and spin-out frequency, albeit occurring first one year after M&A activity took place and intensifying further in the year thereafter. Klepper & Sleeper's (2005) and Klepper & Thompsons' (2007) findings from the

laser, automobile and semiconductor industries implying a correlation between M&As and the spawn rate of spin-outs are thus confirmed to apply in a wide set of service sector.

The significantly negative estimate on the *opportunity cost* of job switching in Model B implies that in periods where job switchers are best compensated for leaving the focal firm, spin-out activity decreases. That is, in years when many employees are observed to be leaving the firm with low or even negative impact on their wage, the number of spin-outs spawned from the focal firm increases. Reflecting the delays involved in job switching and in setting up a new firm, this effect intensifies further one year after employees have been documented to accept below-average wages while leaving the focal firm. As in model 1, estimates using our alternative measure of opportunity cost provide similar results. We interpret these results as being in accordance with the prediction of our theoretical model (see eq. 4 above): spin-out activity is positively related to the reservation wage of the current employment – i.e. negatively related to the opportunity cost of leaving the current employment – as measured through our empirical proxies.

Industry concentration is found to be significantly related to the frequency of employee entrepreneurship (model B) but not simultaneous with M&A activity (model C). The industry rate of new firm formation, on the other hand, is found to be simultaneous to the likelihood of the focal firm being involved in M&A activity (model C) but not significantly related to employee entrepreneurship. We conclude that while industry-level development potentially could introduce intertemporal correlation between M&A activity and new firm formation (c.f. Klepper, 1996), no such simultaneity seems to be driving the results of the current analysis.

Furthermore, we note that while allowing for dynamic relationships involving our measures on changes in firm-level opportunity cost and changes in industry structure in Model B, a strong link between M&As and spin-out activities remain. In the two year window of observation applied in this study, M&As bring about a net increase in spin-out activity from a firm by 11+30 percent which does not seem to be explained by deterioration of job satisfaction. We are interpreting the outcome of this exploratory analysis as seemingly confirming the interpretation stated in Hypotheses 2 of M&As as generating externalities in the form of entrepreneurial opportunities.

The distinction between domestic and cross-border M&A activity, which we allowed to have differential impact on employee entrepreneurship and on job satisfaction through the inclusion of the interaction term *F*, does not seem decisive. Estimates on *F* are practically zero in model A, suggesting that the opportunity cost of job switching is not affected differently by cross-border than by domestic M&As. In model B, estimates go in a direction of cancelling out the (lagged) relationship between M&As and spinouts. This difference is not, however, statistically significant.[5]

4.2 Further robustness tests and extensions

We run several alternative specifications to ensure the robustness of the results reported above. First, we note that key results are valid also when estimating models A and B separately, when substituting the estimator of model B for traditional OLS, and when leaving year and industry fixed effects (which in general are highly significant in models A and B) out. Second, we extend the model within the flexible SEM framework to explicitly model

[5] In work not reported here, we estimate models A and B while setting the variable to 0 if the firm was only involved in cross-border merger activity in year t. In these results, the effect of domestic M&As remains much the same as in table 2 whereas the estimates of F are insignificant. We conclude that the hypothesized associations are less robust for cross-border M&As than for domestic M&As.

multicollinearity between the M&A variable and firm size in up to two years after the event (i.e. acknowledging firm size being bumped up through a merger and the possibility of post-M&A lay-offs). In further estimations, we go one step further and find support for that M&As are on average associated with lay-offs, as proxied by a reduction of net employment of the focal firm, and that reduction of net employment on average increases spin-out activity.

5. CONCLUSION

Mergers and acquisitions are key activities in theories of industrial evolution, through which consolidation and restructuring take place. In this paper, we discuss how M&As affect the frequency of spin-out activity by changing the conditions for entrepreneurship among employees. We introduce a methodological novelty in that we develop and test measures on (intra-temporal changes in) the firm-specific opportunity cost of entrepreneurship for employees. Our analysis offers three sets of results contributing to the literature on employee entrepreneurship on the one hand and the literature on the effects of M&A activity on the other.

First, we show that the empirical regularity that spin-outs flourish in the wake of M&As extends from the context of emerging high-tech industries such as lasers, semiconductors and disk-drives (Klepper & Thompson, 2006) to a wider setting of labour intensive service sectors. In this setting, we identify a two-year delay between a fusion of two or more existing firms and an increase in spin-out activity. This observed result suggests that the response to M&A in form of shift in employment requires an adaption period indicating that the decision to leave the firm, in form of an exit through a spin-out, is not taken immediately at the announcement of an M&A as might have been expected considering the negative impact of such an announcement on employees documented by Souder & Chakrabarti (1984), Lindholm (1994) and Hussinger (2007). We also find some indications of that this effect is primarily in place for domestic M&As.

Second, we demonstrate that M&As on average reduces the opportunity cost of entrepreneurship for employees, and that this accounts for part of the observed linkage between M&As and spin-out activity. This argument offers an alternative explanation for why spin-out activity increases after an M&A – through deterioration of local labour conditions rather than through the creation of novel opportunities – than the one offered by i.e. Klepper and colleagues, and one with considerably different implications.

Thirdly, we show that also when controlling for the opportunity cost effect and for industry factors which may introduce simultaneity between M&As and increased spin-out activity, a strong temporal linkage between the two remains. We are thus able to substantiate the claim that M&As generate new entrepreneurial opportunities, by creating room for niche markets (Luksha, 2008) and/or by inducing employees to pursue discontinued products, services and lines of development in the form of entrepreneurial activities (Klepper & Sleeper, 2005; Klepper & Thompson, 2010). In other words: while we have shown that M&As to some extent "pushes" people into entrepreneurship by deteriorating working conditions for involved employees, our results leave considerable room for an interpretation that the dominating mechanism through which M&As are associated with spin-out activities is that entrepreneurial opportunities are created, "pulling" employees into entrepreneurship.

The present analysis is limited in that it only offers indirect evidence of the creation of new entrepreneurial opportunities as a result of M&A activity. Further work seeking to conduct more direct systematic investigation of opportunities for entrepreneurship created and/or strengthened as a consequence of M&A activity seems highly motivated. Further work is also

needed to address the question whether there are alternative mechanisms which link the occurrence of M&As and spin-out activity, which do not fit within the entrepreneurial opportunities framework.

REFERENCES

Amit, R., Muller, E., & Cockburn, I. (1995). 'Opportunity costs and entrepreneurial activity', *Journal of Business Venturing*, **10**(2), 95–106.

Andersson, M., & Klepper, S. (2013). 'Characteristics and performance of new firms and spinoffs in Sweden', *Industrial and Corporate Change*, **22**(1), 245–280.

Arora, A., & Nandkumar, A. (2011). 'Cash-out or flame-out! Opportunity cost and entrepreneurial strategy: Theory, and evidence from the information security industry', *Management Decision*, **57**(10), 1844–1860.

Baltzopoulos, A., & Broström, A. (2013). 'Attractors of Entrepreneurial Activity: Universities, Regions and Alumni Entrepreneurs', *Regional Studies*, **47**(6), 934–949.

Berkhout, P., Hartog, J., & van Praag, M. (2016). 'Entrepreneurship and Financial Incentives of Return, Risk, and Skew', *Entrepreneurship Theory and Practice (forthcoming)*.

Bertrand, O. (2009). 'Effects of foreign acquisitions on R & D activity : Evidence from firm-level data for France', *Research policy*, **38**, 1021–1031.

Buenstorf, G. (2007). 'Creation and Pursuit of Entrepreneurial Opportunities: An Evolutionary Economics Perspective', *Small Business Economics*, **28**(4), 323–337.

Campbell, B., Ganco, M., Franco, A., & Agarwal, R. (2012). 'Who leaves, where to, and why worry? Employee mobility, entrepreneurship and effects on source firm performance', *Academy of Management Journal*, **33**, 65–87.

Capron, L., & Mitchell, W. (1998). 'The Role of Acquisitions in Reshaping Business Capabilities in the International Telecommunications Industry', *Industrial and Corporate Change*, **7**(4), 715–730.

Cassar, G. (2006). 'Entrepreneur opportunity costs and intended venture growth', *Journal of Business Venturing*, **21**(5), 610–632.

Cassiman, B., & Colombo, M. G. (2006). *Mergers & acquisitions: The innovation impact*. *Cheltenham*.

Cassiman, B., & Ueda, M. (2006). 'Optimal project rejection and new firm start-ups', *Management science*, **52**(2), 262–275.

Chastain, C. E. (1987). 'Divestiture: Antidote to merger mania', *Business Horizons*, **30**(6), 43–49.

Christensen, C. M. (1993). 'History of The Rigid Disk Drive Industry : A History of Commercial and Technological Turbulence', *The business history review*, **67**(4), 531–588.

Cloodt, M., Hagedoorn, J., & Van Kranenburg, H. (2006). 'Mergers and acquisitions: Their effect on the innovative performance of companies in high-tech industries', *Research Policy*, **35**(5), 642–654.

Conyon, M. J., Girma, S., Thompson, S., & Wright, P. W. (2002). 'The impact of mergers and acquisitions on company employment in the United Kingdom', *European Economic Review*, **46**(1), 31–49.

Curran, D., Van Egeraat, C., & O'Gorman, C. (2012). *Adverse Events and Opportunistic Spin-offs : The Irish Biotech Sector*, NIRSA Working Paper Series.

Delmar, F., Wennberg, K., & Hellerstedt, K. (2011). 'Endogenous growth through knowledge spillovers in entrepreneurship: An empirical test', *Strategic Entrepreneurship Journal*, **5**, 199–226.

Friberg, R., & Romahn, A. (2012). *Ex-Post Merger Review and Divestitures*, IESE Business School Working Paper.

Gambardella, A., Ganco, M., & Honore, F. (2015). 'Using what you know: Patented knowledge in incumbet firms and employee entrepreneurship', *Organization Science*, **26**(2), 456–474.

Gates, S., & Very, P. (2003). 'Measuring performance during M&A integration', *Long Range Planning*, **36**(2), 167–185.

Gompers, P., Lerner, J., & Scharfstein, D. (2005). 'Entrepreneurial Spawning : Public Corporations and the Genesis of New Ventures , 1986 to 1999', *The Journal of Finance*, **LX**(2).

Gugler, K., Mueller, D. C., Yurtoglu, B. B., & Zulehner, C. (2003). 'The effects of mergers: an international comparison', *International Journal of Industrial Organization*, **21**(5), 625–653.

Hamilton, R. T., & Chow, Y. K. (1993). 'Why managers divest- Evidence from New Zealand's largest companies', *Strategic Management Journal*, **14**(6), 479–484.

Haveman, H. a., & Cohen, L. E. (1994). 'The Ecological Dynamics of Careers: The Impact of Organizational Founding, Dissolution, and Merger on Job Mobility', *American Journal of Sociology*, **100**(1), 104.

Hayek, F. A. (1945). 'The use of knowledge in society', *The American Economic Review*, **35**(4), 519–530.

Henderson, R. M., & Clark, K. B. (1990). 'Architectural Innovation : The Reconfiguration of Existing Product Tech- nologies and the Failure of Established Firms', *Administrative Science Quartly*, **35**(3), 9–30.

Homburg, C., & Bucerius, M. (2005). 'A Marketing Perspective on Mergers and Acquisitions: How Marketing Integration Affects Postmerger Performance', *Journal of Marketing*, **69**(1), 95–113.

Hussinger, B. K. (2007). 'Inventors ' Response to Firm Acquisitions', *ZEW discussion paper*, No. 07–078.

Hyytinen, A., & Ilmakunnas, P. (2007). 'Entrepreneurial aspirations: Another form of job search?', *Small Business Economics*, **29**, 63–80.

Jaju, A., Jpiner, C., & Reddy, S. (2006). 'Consumer Evaluations of Corporate Brand Redeployments', *Journal of the Academy of Marketing Science*, **34**, 206–215.

Kaplan, S. N., & Weisbach, M. S. (1992). 'The Success of Acquisitions : Evidence from Divestitures', **XLVII**(1).

Kirzner, I. M. (1973). *Competition and entrepreneurship*. *University of Chicago*.

Kirzner, I. M. (1997). 'Entrepreneurial Discovery and the Competitive Market Process: An Austrian Approach', *Journal of Economic Literature*, **35**(1), 60–85.

Klepper, S. (1996). 'Entry , Exit , Growth , and Innovation over the Product Life Cycle', *American Economic Review*, **86**(3), 562–583.

Klepper, S. (2007). 'Disagreements, Spinoffs, and the Evolution of Detroit as the Capital of the U.S. Automobile Industry', *Management Science*, **53**(4), 616–631.

Klepper, S., & Sleeper, S. (2005). 'Entry by Spinoffs', *Management Science*, **51**(8), 1291–1306.

Klepper, S., & Thompson, P. (2006). 'Spin-off entry in high-tech industries: motives and consequences', In F. Malerba & D. Brussoni (eds.), *Economic Perspectives on innovation* (pp. 187–218), Cambridge Univ. Press.

Klepper, S., & Thompson, P. (2010). 'Disagreements and intra-industry spinoffs', *International Journal of Industrial Organization*, **28**(5), 526–538, Elsevier B.V.

Lambrecht, B. M. (2004). 'The timing and terms of mergers motivated by economies of scale', *Journal of Financial Economics*, **72**(1), 41–62.

Larsson, R., & Lubatkin, M. (2001). 'Achieving Acculturation in Mergers and Acquisitions: An International Case Survey', *Human Relations*, **54**(12), 1573–1607.

Lindholm, A. (1994). *The economics of technology-related ownership changes. A study of innovatiness and growth through acquisitions and spin-offs*, Chalmers university of technology.

Lockett, A., & Wright, M. (2005). 'Resources, capabilities, risk capital and the creation of university spin-out companies', *Research Policy*, **34**(7), 1043–1057.

Luksha, P. (2008). 'Niche construction: the process of opportunity creation in the environment', *Strategic Entrepreneurship Journal*, **2**, 269–283.

Mason, C. M., & Harrison, R. T. (2006). 'After the exit: acquisitions, entrepreneurial recycling and regional economic development', *Regional Studies*, **40**(1), 55–73.

Newma, J. M., & Krzystofiak, F. J. (1993). 'Changes in employee attitudes after an acquisition a longitudinal analysis', *Group & Organization Manag*, **18**(4), 390–410.

O´Shaughnessy, K. C., & Flanagan, D. J. (1998). 'Determinants of Layoff Announcements Following M&As: An Empirical Investigation', *Strategic Management journal*, **19**(19), 989–999.

Pakes, A., & Nitzan, S. (1983). 'Optimum contracts for research personnel, research employment, and the establishment of 'rival' enterprises', *Journal of labor economics*, **1**(4), 345–365.

Parker, S. C. (2009). 'Why do small firms produce the entrepreneurs?', *The Journal of Socio-Economics*, **38**(3), 484–494.

Ranft, A. L., & Lord, M. D. (2002). 'Acquiring New Technologies and Capabilities: A Grounded Model of Acquisition Implementation', *Organization Science*, **13**(4), 420–441.

Schoenberg, R., & Reeves, R. (1999). 'What Determines Acquisition Activity within an Industry ?', *European Management Journal*, **17**(1), 93–98.

Schumpeter, J. (1911). *Theorie der wirtschaftlichen Entwicklung*: *Leipzig: Duncker &amp*.

Seo, M.-G., & Hill, S. N. (2005). 'Understanding the Human Side of Merger and Acquisition: An Integrative Framework', *The Journal of Applied Behavioral Science*, **41**(4), 422–443.

Souder, W. ., & Chakrabarti, A. . (1984). 'Acquisitions: do they really work out?', *Interfaces*, **14**(4), 41–47.

Stahl, G. K., & Voigt, A. (2008). 'Do Cultural Differences Matter in Mergers and Acquisitions? A Tentative Model and Examination', *Organization Science*, **19**(1), 160–176.

Sørensen, J. B., & Sharkey, a. J. (2014). 'Entrepreneurship as a Mobility Process', *American Sociological Review*, **79**, 328–349.

Teece, D. . (2003). 'Expert talent and the design of (professional services) firms', *Industrial and Corporate Change*, **12**(4), 895–916.

Tushman, M. L., & Anderson, P. (1986). 'Technological discontinuities and organizational environments', *Administrative Science Quartly*, **31**(3), 439–465.

Williamson, O. E. (1968). 'Economics as an antitrust defence: The welfare trade-offs', *American Economic Review1*, **58**, 18–36.

Witt, U. (2002). 'How evolutionary is Schumpeter's theory of economic development?', *Industry and Innovation*, **9**(1-2), 7–22.

Appendix I: Exposition

We have

$$\eta_{it} = f\left(\theta_{it}, \min\left(w_{it}^r, w_{it}^l\right)\right) + \varepsilon_{it}$$

$$\frac{\partial}{\partial w_{it}^r} f\left(\theta_{it}, \min\left(w_{it}^r, w_{it}^l\right)\right) = \begin{cases} 1 \; if \; w_{it}^r < w_{it}^l \\ 0 \; if \; w_{it}^r > w_{it}^l \end{cases} \text{ (derivative not defined for } w_{it}^r = w_{it}^l) \rightarrow$$

$$\left[\frac{\partial}{\partial \theta_{it}} f > 0 \text{ by assumption}\right] \rightarrow \frac{\partial}{\partial w_{it}^r}\eta_{it} \geq 0 \text{ if } w_{it}^r \neq w_{it}^l for \; all \; i, \frac{\partial}{\partial \theta_{it}}\eta_{it} > 0$$

With $S_{tj} = \sum_{i=1}^{N_{jt}} \eta_{it} \rightarrow$

it follows that

$$\frac{\partial S_{tj}}{\partial \theta_{it}} = \sum_{i=1}^{N_{jt}} \frac{\partial \eta_{it}}{\partial \theta_{it}} > 0$$

$$\frac{\partial S_{tj}}{\partial w_{it}^r} = \sum_{i=1}^{N_{jt}} \frac{\partial \eta_{it}}{\partial w_{it}^r} \geq 0 \quad \text{if } w_{it}^r \neq w_{it}^l for \; all \; i$$

and, furthermore, that it is sufficient that $w_{it}^r < w_{it}^l$ for one individual for the latter derivative to be strictly positive (assuming that $w_{it}^r \neq w_{it}^l$ for all individuals *i*).

Appendix II: List of sectors included

Advertising and PR

Architecture

Artistic activities

Consulting

Design

Education

Financial services

Funeral services

Hair dressing and beauty salons

Health care

Hotels and restaurants

Human resource services

Logistics services

Media

Other service activities

R&D

Real estate services

Retail

Social services

Sports activities

Transportation by bus, taxi, truck

Travel arrangements

Waste treatment

Appendix III: Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Spin-outs	1.0000											
(2) MA	.1607*	1.0000										
(3) F	.0191*	.4491*	1.0000									
(4) Size	.6864*	.1978*	.0076	1.0000								
(5) Turnover per employee	.0232*	-.0021	-.0081	-.0120	1.0000							
(6) Low Education	-.0698*	-.0329*	-.0375*	-.0067	-.0099	1.0000						
(7) Medium Education	.0821*	.0287*	.0377*	.0274*	.0309*	-.7030*	1.0000					
(8) High Education	.0519*	.0288*	.0306*	-.0037	-.0011	-.9501*	.4460*	1.0000				
(9) Industry concentration	.0341*	-.0010	.0227*	.0420*	-.0202*	-.0766*	.0541*	.0727*	1.0000			
(10) Industry rate of new firm formation	.0078	.0249*	.0274*	-.0045	.0153	-.0483*	.0155	.0539*	-.0161	1.0000		
(11) Opportunity cost (main measure)	.0042	-.0096	-.0039	-.0012	.0347*	-.1086*	.0655*	.1079*	-.0110	.0720*	1.0000	
(12) Opportunity cost (alternative measure)	-.0029	-.0070	.0129	-.0140	-.0199*	-0.0790	-.0119	-.0256*	.0257*	.0028	-.0855	1.0000