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EMPLOYMENT EFFECTS OF ACQUISITIONS: EVIDENCE FROM ACQUIRED EUROPEAN FIRMS

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Employment effects of acquisitions: Evidence from acquired European firms

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Abstract

This paper examines the employment effects of acquisitions for acquired European firms taking non-random selection of acquisition targets explicitly into account. Following the empirical firm growth literature and theories put forward in the mergers and acquisition (M&A) literature we control for convergence dynamics in firm size and distinguish between different types of acquisitions. Empirically, we estimate an endogenous treatment model using accounting data for a newly created sample of acquired and non-acquired European firms. Our results reveal positive employment effects for all different types of acquisitions.

JEL Codes: C21, G34, L22, L25

Keywords: Acquisitions, employment effects, firm growth, endogenous treatment model.

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1 Introduction

In daily news media coverage large and international mergers and acquisitions (M&A's) usually attract special attention. Moreover, in case of a takeover of a prestigious domestic firm the media reports are often accompanied by a political discussion on the employment effects of the respective takeover. Recently, the negotiations with regard to the potential acquisition of the German *Opel A.G.* by different international investors in 2009 can serve as a textbook example for the involvement of policy-makers in private business deals. In particular, during the ongoing rounds of negotiations between the US-headquartered *General Motors* (GM) company (as owner of Opel) and different potential acquiring investors the German Federal Government actively took part in the negotiations. Representatives of the German Federal Government continuously i. a. justified their participation in the process of negotiations with concerns with regard to the potential closure of plants and/or the reduction of employment in existing plants. Accordingly, the policy-makers involved assumed that all potential acquirer of Opel will dramatically reduce employment at its plants. Consequentially, at the end of the negotiation process the German Federal Government favored the offer of the Canada based *Magna International Inc.* because in comparison to its competitors Magna guaranteed the largest number of protected Opel jobs in Germany. Finally, however GM decided not to sell their German subsidiary and, therefore, the effort of the German Federal Government did not pay off.

This specific case reveals interesting attitudes of policy-makers with regard to acquisitions. In particular, it seems to be that policy-makers (and maybe the whole electorate) fear takeovers of domestic firms because they might reduce employment. However, with regard to the theoretical and empirical economic literature the employment effect of acquisitions is still ambiguous and, therefore, policy interventions with regard to private acquisition decisions might not be justified by employment protection considerations.

For this reason and in order to improve our understanding regarding the impact of takeovers on the level of employment in the acquired firm, this paper combines the empirical firm growth literature with theories put forward in the M&A literature. In particular this paper examines the post-acquisition employment growth performance of acquired European firms taking non-random selection of acquisition targets into account. Additionally, this paper controls for convergence dynamics in firm size and distinguishes between foreign and domestic acquisitions as well as horizontal acquisitions, vertical integration and 100 percent acquisitions. Finally, from the already stressed policy point of view this approach allows to address the question whether takeovers, on average, destroy existing jobs or create new ones within the acquired firms.

Empirically, we utilize accounting data from a newly created sample of acquired and non-acquired European firms. Our estimation results reveal positive employment effects for acquired firms when non-random selection of takeover targets and convergence dynamics in firm size are taken into account. In particular, on average, an acquired firm raises its post-acquisition employment growth rate by approximately 10 percentage points in comparison to similar non-acquired firms. This result varies only little for different types of acquisitions such as foreign or domestic acquisitions and horizontal acquisitions versus vertical integration. With regard to the non-random selection of acquisition targets, our results indicate that pre-acquisitionally larger, younger and more productive firms are acquired more probably.

The remainder of the paper is organized as follows: Section 2 briefly surveys the related literature with regard to empirical firm growth models and discusses the previous literature on M&A activities and their employment effects. Section 3 introduces the empirical firm growth model and explains the econometric framework. Section 4 describes the data while Section 5 discusses the empirical findings. Finally, Section 6 provides the conclusions.

2 Related literature on firm growth and acquisitions

Our empirical approach relates this paper to four different strands of Industrial Organization literature, namely the empirical firm growth literature, the empirical literature on employment effects of M&A's, the literature on motives for M&A's and the literature on endogenous selection of acquisition targets.

To begin with, the empirical firm growth literature historically has put its focus on the relationship of firm growth and firm size, typically measured in terms of employment. Gibrat (1931) formulated the hypothesis that firm growth is independent of firm size. This relationship is known as *Gibrat's law* of proportionate growth. However, the majority of empirical contributions in this literature rejects this hypothesis.[1] In particular, a robust finding indicates that initially small firms exhibit higher growth rates than large firms indicating convergence in firm size within a given industry. Another stylized fact lends support to the importance of firm age as determinant of the observed variation in firm growth rates. More precisely, young firms tend to grow more rapidly.

Given this very robust findings, economists formulated theories which are able to explain why (within cross-sections of firms) small and young firms exhibit the highest growth rates. The most established theories among them are learning theories (Jovanovic 1982), Penrose effects (Penrose 1959), adjustment cost theories (Hamermesh and Pfann 1996), financial constraints (Cabral and Mata 2003) and organizational capabilities (Slater 1980). The mentioned theories are able to explain why start-up firms might initially produce at an inefficiently low level and adjust their firm size to the efficient level quite quickly. However, with regard to the specification of the typical empirical firm growth equation these theories commonly suggest to model a firm's annual average growth rate as a function of the (log) initial firm size and the (log) firm Age (see for example Geroski 2000, Geroski and

[1] Surveys on the empirical firm growth literature are available in Evans (1987a), Sutton (1997), Audretsch, Klomp, Santarelli and Thurik (2004), Bellak (2004) and Cabral (2007).

Gugler 2004).[2] Usually, some non-linearities are incorporated using squared terms of firm age and interaction terms of the initial firm size with firm age (see for example Evans 1987b, Geroski and Gugler 2004). Finally, in a survey on previous findings Hart (2000) concludes that the main reason why firm growth rates are not entirely stochastic is given by the tendency of young and small firms to grow more quickly. Therefore, in order to examine the employment effects of acquisitions we incorporate firm size and firm age as additional control variables in our model.

With regard to the second strand of related literature, a couple of empirical studies investigate the impact of M&A's on firm level or plant level employment. From a theoretical perspective the employment effects of acquisitions are ambiguous. On the one hand side, due to the necessity of cost savings acquisitions are often viewed to be accompanied by employment reduction. Contrary, standard acquisition theories highlight the role of efficiency gains which, in turn, strengthen the market position of the firms which might lead to an increase in overall employment.

Empirically, three different econometric approaches, so far, have been put forward to evaluate the employment effects of M&A's. Firstly, some authors simply regress a firm's observed level of employment on a set of contemporaneous and/or lagged dummy variables capturing whether a firm has been a target of an acquisition (Siegel and Simons 2010) incorporating several control variables such as five-year lagged level of employment and industry-fixed effects (Lichtenberg and Siegel 1990).

Econometrically more sophisticated, other authors estimate dynamic labor demand equations treating acquisitions as being exogenously determined. More precisely, Conyon, Girma, Thompson and Wright (2002a, 2002b) and Gugler and Yurtoglu (2004) model the current level of employment within a newly combined entity as a function of one year lagged level of combined employment, some other control variables derived from a Cobb-Douglas production technology with quadratic adjustment costs (Nickell 1984) and dummy variables containing different types of acquisi-

[2]Note that the typical firm growth equation is similar to cross-country growth regressions used to analyze income convergence tendencies at the country level.

tion information (e.g. hostile takeover, home country of the acquiring firm, etc.). Empirically, these models are estimated using standard dynamic panel data methods which, unfortunately, are not able to explicitly account for the endogenous selection of acquisition targets. Unfortunately so far, econometric estimators for dynamic panel data models with endogenous selection into treatment are not available in the econometrics tool box.

Finally, the most closely related type of merger studies uses models which usually analyze the impact of training on workers' earnings and employment. These models are well established in labor economics. Moreover, the empirical specification of these models is similar to a typical Gibrat's law type of regression. In particular, the changes in employment or wages within a given time period are modeled as a function of predetermined firm size, firm age, other controls and a dummy variable capturing whether a firm (plant) experienced an ownership change in the respective time period (Brown and Medoff 1988, McGuckin, Nguyen and Reznek 1998, McGuckin and Nguyen 2001).

The majority of the above mentioned studies report negative employment effects of M&A's for acquired firms or the newly combined entity. In comparison to non-acquired firms acquisition targets tend to exhibit lower or even negative growth rates. In line with the findings in this paper a remarkably different result is obtained by McGuckin and Nguyen (2001) who provide evidence for an increase in the number of jobs and the quality of the existing jobs after the ownership of a plant has changed.

Within the academic community the motives for M&A's have attracted special attention. Historically, two different viewpoints have emerged. Firstly, the neoclassical theory of the firm argues that profit-maximizing motives determine acquisition decisions. More precisely, an acquisition might lead to an increase in market power and/or causes efficiency gains via cost savings through rationalization and (short-run) economies of scale. Consequentially, whenever the benefits from increased market power or the efficiency gains outperform the costs associated with an acquisition a profit maximizing firm will accomplish the respective acquisition.

Conversely, exponents of the non-neoclassical theory of the firm argue that due to the separation of ownership and control a firm's manager maximizes its own utility rather than exclusively taking profit-maximizing decisions. Consequentially, the separation of ownership and control gives managers discretion over their decisions. Accordingly, managers might want to maximize the size of the firm under their control and use acquisition policies as a tool to increase the firm size via external growth (Baumol 1962, Williamson 1963, Marris 1964).

Another related argument explicitly focuses on asymmetric information between principals and agents in firms where ownership and control is separated. In particular, Manne (1965) argues that a principal is only able to collect incomplete information concerning the performance of a manager. However, a manager of a rival firm is better able to evaluate the performance of the competing manager and, therefore, will try to acquire a firm with poorly performing management. As a consequence a market for corporate control emerges.

Within the group of non-neoclassical motives for acquisitions, Dewey (1961) claims that acquisitions can serve as a 'civilized alternative' to bankruptcy and market exit. In this regard, failing firms can either leave the market via bankruptcy or will be acquired by a non-failing firm.

However, the just mentioned theories concerning the motives for M&A's commonly suggest that acquisitions will not be carried out randomly. Moreover, the theories focus on different firm characteristics which might be crucial for the selection of acquisition targets and, therefore, give advice for the specification of the selection equation, which we will discuss in Section 3.

Methodologically, some recent studies which focus on post-M&A outcomes started to account for non-random selection of acquisition targets. The econometric literature with regard to treatment evaluation offers a broad range of methods which can be applied to the evaluation of acquisition effects.[3] With regard to the endogenous occurrence of acquisitions

[3]Some recently published surveys on the econometrics of (policy) evaluation are provided by Blundell and Costa Dias (2002), Cobb-Clark and Crossley (2003) and Imbens and Wooldridge (2009).

three different types of models have been used so far. McGuckin and Nguyen (2001) use a traditional instrumental variable procedure where pre-merger plant characteristics such as relative productivity are used to construct the probability of an ownership change for all firms in their sample.

Secondly, in a study on market power and efficiency effects of M&A's versus research joint ventures Gugler and Siebert (2007) estimate an endogenous switching model where the decision to acquire a competing firm depends on the expected 'with-acquisition' versus 'without-acquisition' market shares. Technically, endogenous switching models are estimated using a two-stage procedure which combines maximum likelihood (ML) methods for the selection equation with (adjusted) ordinary least squares (OLS) estimates for the prediction of the 'with' and 'without-acquisition' market shares (see Lee 1978, for details on the estimation procedure).

Recently, Egger and Hahn (2010) use a specific type of matching estimator to evaluate the performance effects of M&A's in the Austrian banking industry. In particular, based on propensity scores obtained from standard binary choice models Egger and Hahn (2010) compare the performance outcomes of merged and non-merged banks with similar merging probabilities using a difference-in-difference (DID) approach. Their results clearly indicate that horizontal mergers exert positive performance effects.

To sum up, already existing literature indicates that Gibrat's law type of regressions constitute a suitable framework to analyze the impact of acquisitions on the growth performance of acquired firms. Additionally, the neoclassical and non-neoclassical theories of the firm provide potential motives for the non-random selection of acquisition targets. Finally, the econometric literature on treatment effects evaluation delivers suitable methods to empirically analyze the post-acquisition employment effects of acquisitions.

3 Empirical specification and estimation strategy

Following Geroski (2000, 2005), Geroski and Gugler (2004) and Oberhofer and Pfaffermayr (2010) a typical specification of the cross-sectional firm

growth model à la Gibrat's law can be written as:

$$g_i = \alpha_i + \pi S_{0i} + \mathbf{x'}_i\boldsymbol{\gamma} + \epsilon_i, \tag{1}$$

where g_i denotes the average annual growth rate measured in log differences of firm size and S_{0i} measures the initial size of a firm i. $\mathbf{x'}_i$ is a vector of additional control variables including the log of firm Age (A_i), A_i^2, industry fixed effects and country fixed effects. ϵ_i represents an iid error term. Following previous results, we assume that differences in firm size increase with firm age (see for example Oberhofer and Pfaffermayr 2010). Econometrically, this suggests the inclusion of an additional interaction term between log initial firm size and log firm age. Formally, the model is generalized so that $\pi = \beta_0 + \beta_1 A_i$, where (based on previous findings) we expect $\beta_0 < 0$ and $\beta_1 > 0$.

In order to evaluate the employment effects of being an acquisition target the baseline equation (1) is augmented with a dummy variable (D_i) which equals 1 if a firm i has been taken over within our sample period and zero otherwise:

$$g_i = \alpha_i + \pi S_{0i} + \mathbf{x'}_i\boldsymbol{\gamma} + \delta D_i + \epsilon_i. \tag{2}$$

In this model the (average) employment effect of acquisitions which is given by δ only correctly measures the impact of a takeover on a target firm's employment growth performance in case of random selection into the acquisition treatment. According to the above mentioned neoclassical and non-neoclassical motives for acquisitions the random selection hypothesis seems implausible. Consequentially, we reformulate the model to account for endogenous selection:

$$\begin{aligned} g_i &= \alpha_i + \pi S_{0i} + \mathbf{x'}_i\boldsymbol{\gamma} + \delta D_i + \epsilon_i, \text{where} \\ D_i^* &= \mathbf{z'}_i\boldsymbol{\theta} + \mu_i, \text{and} \\ D_i &= 1 \quad \text{if } D_i^* > 0, 0 \text{ otherwise,} \end{aligned} \tag{3}$$

where ϵ_i and μ_i are correlated and are drawn from a joint normal distribution. D_i now becomes 1 if the latent variable D_i^* crosses a threshold,

which is normalized to zero. The specific values for D_i^* are determined by $\mathbf{z'}_i$ which is another vector of explanatory variables. In particular, $\mathbf{z'}_i$ includes pre-acquisition information on a firm's initial size, its firm age, labor productivity, profitability, a firms leverage ratio, its capital intensity and its initial market share. Unobserved country and industry characteristics which influence the probability of being an acquired are captured by fixed effects.

Following the managerial discretion theory (Baumol 1962, Williamson 1963, Marris 1964) manager use acquisition policies to discretely increase the size of their firms. Consequentially, managers which decide to acquire any competing firm will, ceteris paribus, select initially larger firms and increase their own firm size more rapidly. In other words, we expect firms with a higher level of initial employment to more probably become a target of an acquisition. The inclusion of firm age as additional determinant of acquisitions allows to investigate in which stage of a firm's life cycle firms are more exposed to a takeover threat.

With regard to Manne's (1965) theory concerning the market for corporate control, labor productivity measured in terms of value added per employee and profitability (i.e. return on assets) serve as valuable information concerning the (relative) performance of an individual firm in a given industry. Therefore, firms with a low level of labor productivity and profitability might suffer from poor management and will be acquired by better performing competitors more probably. On the other hand, the neoclassical theory of the firm implies that profit-maximizing managers will select already efficient and profitable targets. Hence, the expectation concerning the direction of influence of productivity and profitability on the probability of being acquired is ambiguous.

Dewey's (1961) failing firms hypothesis states that an acquisition of a firm can be an alternative to its bankruptcy and market exit. In our application this implies that firms with a higher bankruptcy risk are more likely selected as acquisition target. A firm's leverage ratio (i.e. the sum of all liabilities over a firm's total assets) proxies a firm's bankruptcy risk and, following Dewey (1961), a higher leverage ratio leads to an increased probability of becoming a takeover target.

The neoclassical theory of the firm suggests that acquisitions aim to increase the market power of the acquirer. Empirically, market power is associated with the market share of an individual firm. Using the below described databases we are able to construct market shares for each firm and include this information in $\mathbf{z'}_i$. Usually only very large firms are able to influence the market concentration and, therefore, the firms with already high market shares tend to be the acquiring firms. For this reason, we expect a negative impact of more initial market shares on the probability of becoming a takeover target.

Finally, another profit-maximizing reason for a takeover might be the internalization of more efficient production technologies. Firms might acquire competitors in order to adopt its production technology and, therefore, more capital intense firms, ceteris paribus, are expected to become an acquisition target more probably.

Econometrically, equation (3) represents a simultaneous equation system with an endogenous dummy variable. In relation to models of non-random sample selection, Heckman (1978) proposed consistent estimators for this class of models. In particular, a straight-forward method to estimate the simultaneous equation system is full information maximum likelihood (FIML), where the model is simultaneously solved for all parameters in both equations based on the assumption of joint normality. An advantage of this procedure is that beside the incorporation of a selection equation we are able to condition on control variables obtained from the empirical firm growth literature in the outcome equation. In comparison to standard IV-methods, the FIML approach incorporates the correlation between ϵ_i and μ_i and, therefore, is more efficient.

4 Data and descriptive statistics

We base the empirical analysis concerning the impact of takeovers on the employment of acquired European manufacturing firms (NACE Rev 2 codes: 1000-3340) on data provided by two different sources. Balance sheet data, financial statements and profit & lost accounts for the years 1994 to 2007 are

obtained using update 170 (November 2009) of Bureau van Dijk's AMADEUS database. These accounting data are combined with acquisition information compiled by Bureau van Dijk in their ZEPHYR database. The ZEPHYR database includes daily updated business deal data from around the world starting with deals announced in 1993. It is worth noting, that for corporate networks consisting of more than one single firm AMADEUS database provides consolidated and unconsolidated accounting data. Since unconsolidated accounts are compiled at the individual firm level, the corresponding information still allows to examine the individual employment growth performance of an acquired firm after being taken over.

With regard to acquisitions the ZEPHYR database reports for each takeover the percentage of shares involved and the total after-transaction percentage of shares controlled by the acquiring firm. Therefore, and in line with previous literature (see for example Gugler and Yurtoglu 2004) we define an acquisition to take place if the before-transaction fraction of shares controlled is less than 50 percent while the acquirer holds more than 50 percent of all shares after the respective transaction. In the robustness analysis we will focus on 100 percent immediate takeovers as an alternative definition of acquisitions. Firms which are already majority controlled and firms which become minority controlled during the observational period are excluded from the analysis. The control group of non-acquired firms consists of all other manufacturing firms where all relevant firm characteristics are reported in the AMADEUS database. Firms in industries and countries in which no acquisition took place during our observational period are excluded from the control group.

To ensure that the empirical analysis does not suffer from endogeneity or errors-in-variables problems a number of exclusion criteria are defined. Firstly, Gibrat's law type of firm growth regressions contain firm age as an important covariate. Typically, firm age is calculated using information on the date of incorporation of a firm. However, in at least some takeovers the target firm changes its legal form during or at the end of the acquisition process. Consequentially, in such cases the date of (re-)incorporation does not reflect the true age of a firm and would lead to a systematic measurement

error. Therefore, we exclude all acquired firms from the analysis which change their legal form during the acquisition process.

Secondly, the variables collected in $\mathbf{z}'_i$ have to be exogenous to the acquisition. Since, the AMADEUS database represents an unbalanced panel data set with a huge number of missing observations over time, we have to exclude all takeovers where we cannot observe all covariates prior to the actual acquisition.

Thirdly, we exclude all takeovers where the acquiring firm primarily operates in the financial services or real estate industries. This exclusion intends to eliminate acquisition decisions which are based on a risk diversification motive rather than on a common control argument.

Fourthly, we exclude firms which had been acquired more than once within the observational period and, since we are only interested in the employment effects of acquisitions, we also excluded the small number of officially announced mergers.[4] Finally, we drop a number of outliers. In particular, we exclude firms in the highest and lowest percentiles of the employment growth rate distribution, firms with a leverage ratio above 100 percent, firms with negative earnings before interest and taxes, firms with negative or zero value added and firms with negative total costs of employment from the analysis. This leads to a final sample of of 123,314 firms with 408 firms being a target of an acquisition.

Following the traditional Gibrat's law literature we construct a cross-section of firms and estimate employment growth dynamics across firms. This approach allows the use of the above mentioned endogenous treatment estimation strategy. Unfortunately, the cross-sectional framework precludes to account for unobserved firm heterogeneity. However, since small and younger firms tend to systematically grow more quickly and this is identified to be the main reason why firm growth is not entirely stochastic (see Hart 2000) the outcome equation in (3) should be well specified. Additionally, in our regression framework the time structure of our data is still utilized since we are able to distinguish between pre- and post-acquisition information

[4]The motives for mergers versus acquisitions might differ substantially and, therefore, different factors might determine merger decisions.

concerning our variables of interest. More precisely, we use the last and first observed employment figures to construct the annual average employment growth rate in the control group. With regard to the acquired firms the annual average growth rate is based on the number of employees at the time of the actual acquisition and the last available employment information. In contrast, in the selection equation we include the pre-takeover number of employees. In a similar vein, in the outcome equation we calculate a firm's age relative to the last observed year (firm age), while the selection equation includes firm age relative to the takeover year (initial firm age).

Table 1 separately reports descriptive statistics for the non-acquired and acquired firms in the final sample. We calculate the initial market shares for all firms using revenue data from more than 390,000 firms where initial revenue information is available in the AMADEUS database. Consequentially, the total market size is calculated through the aggregation of all individual revenues within each NACE 2-digit in each country where at least one acquisition is observed. Straightforwardly, the individual market share is given by a firms' initial level of revenues over total market size.

In comparison to the control group of non-acquired firms, acquired firms systematically differ in their relevant characteristics. In particular, on average firms which are acquisition targets exhibit a zero annual average growth rate while the average control group firm grows at an annual rate of about 2.4 percent.

With regard to the standard Gibrat's laws variables the acquired firms also tend to differ in their characteristics. More precisely, on average, acquired firms are approximately 4.8 times larger in terms of initial employment and and 8.3 years older than non-acquired firms. However, in both groups of treated and non-treated firms the average firm is relatively large and old.

Focusing again on the average firm in both groups the differences in the treatment variables are less pronounced. For instance, acquired and non-acquired firms tend to possess of a similar level of initial labor productivity and obtain comparable pre-acquisition return on assets. Conversely, acquired firms show a 5.5 percentage points lower initial leverage ratio and

Table 1: Descriptive statistics

Variable	No. of. obs.	Mean	Std. Deviation	Min	Max
Non-acquired					
Growth rate	122,906	0.024	0.103	-0.366	0.549
Initial firm size	122,906	55.759	445.425	1	44326
Firm age	122,906	21.153	15.017	1	323
Initial firm age	122,906	21.153	15.017	1	323
Initial labor productivity	122,906	50.238	389.297	0.040	81890
Initial return on assets	122,906	0.116	1.300	0	313.255
Initial leverage	122,906	0.155	0.235	0	1.000
Initial capital intensity	122,906	174.756	7977.533	0.004	2697001
Initial market share	122,906	0.009	0.050	0	1
Acquired					
Growth rate	408	0.008	0.096	-0.339	0.472
Initial firm size	408	267.539	1233.972	1	23782
Firm age	408	29.463	19.564	5	138
Initial firm age	408	25.142	19.535	1	132
Initial labor productivity	408	55.911	50.637	1.525	550
Initial Return on Assets	408	0.121	0.128	0	1.268
Initial leverage	408	0.100	0.178	0	0.890
Initial capital intensity	408	183.442	534.166	0.190	8629.245
Initial market share	408	0.083	0.191	0	1

substantially possess of higher market shares. Finally, the average takeover target tend to be slightly more capital intense.

5 Estimation results

We estimate Equation (3) for the full sample of 123,314 observations including 408 acquired firms. Additionally, we provide sensitivity analysis in the form of functional form identification, where all variables collected in $\mathbf{z'}_i$ are also incorporated in $\mathbf{x'}_i$ and therefore, the identification of δ is only assured by functional form assumptions. This approach allows to check whether the baseline results are robust against a potentially prevailing omitted variables problem.

Additionally, we further investigate the robustness of our results by re-estimating our baseline specification for subsamples of 100% acquisitions, foreign acquisitions, domestic acquisitions, horizontal acquisitions and vertical integrations.

To begin with, Table 2 points to the relevance of endogenous selection of acquisition targets and the importance of firm size and age in explaining a firm's growth performance. Column 1 of Table 2 reports estimation results under the assumption of exogenous selection of takeover targets. More precisely, we simply estimate equation (2) using OLS and taking takeovers as being exogenously determined. In line with the related Gibrat's law literature, firm size and firm age significantly explain differences in employment growth performance. In particular, indicated by significant negative parameter estimates small and young firms grow more quickly, while these effects diminish for old firms (as indicated by the parameter on Age^2) and differ across age cohorts (see the interaction effect). Evidently, the growth performance of firms differs across countries and industries. Most importantly, if acquisitions would be carried out randomly the average employment effect for acquired firms in our sample would be 0.019 and statistically significant. In other words, acquired firms on average exhibit approximately 2 percentage points higher employment growth rates in comparison to identical non-acquired firms.

Table 2: Estimation results: Full sample

Variable	Exog. acquisition	No Gibrat's law	Baseline
Initial size	-0.055^{***}		-0.054^{***}
	(0.001)		(0.001)
Age	-0.065^{***}		-0.064^{***}
	(0.002)		(0.002)
Age^2	0.002^{***}		0.002^{***}
	(0.000)		(0.000)
Initial * age	0.013^{***}		0.013^{***}
	(0.000)		(0.000)
Fixed Effects (F-Test)			
Country	173.87^{***}	2420.30^{***}	2035.60^{***}
3-digit industry	11.69^{***}	1221.97^{***}	1501.39^{***}
Acquisition	0.019^{***}	-0.151^{***}	0.137^{***}
	(0.005)	(0.008)	(0.007)
Initial size		0.354^{***}	0.327^{***}
		(0.015)	(0.016)
Initial age		0.080^{**}	-0.123^{***}
		(0.032)	(0.029)
Initial labor productivity		-0.064^{*}	0.248^{***}
		(0.036)	(0.044)
Initial Return on Assets		0.005	-0.000
		(0.011)	(0.012)
Initial leverage		-0.096	-0.158
		(0.115)	(0.116)
Initial capital intensity		0.016	0.095^{***}
		(0.026)	(0.031)
Initial market share		-0.868^{***}	-0.899^{***}
		(0.249)	(0.250)
Fixed Effects (F-Test)			
Country		103.52^{***}	159.87^{***}
2-digit industry		43.63^{***}	29.19
$\rho = 0$		160.94^{***}	168.20^{***}
Acquisitions	408	408	408
Observations	123,314	123,314	123,314

Notes: Parameter estimates for fixed effects and the constant are not reported. Standard errors in parentheses. *, ** and *** denote significance at 10%, 5% and 1% levels, respectively.

Column 2 of Table 2 shows estimation results in case of incorporation of endogenous selection of acquisition targets without conditioning on firm size and firm age in the outcome equation. Econometrically, these results are, to some extent, comparable to a simple matching approach, which only accounts for endogenous treatment. Evidently, and in line with descriptive statistics this estimator provides a highly significant and negative employment effect of acquisitions. Since, initially large firms exhibit slower growth rates and are more likely to be acquired this result clearly suffers from an omitted variable bias.

The combination of Gibrat's law type of control variables and the endogenous treatment equation results in the baseline specification in column 3 of Table 2 which is expected to deliver more reliable results. In general a test on the assumption of two independent equations (i.e. outcome equation and selection equation) is rejected as indicated by the significant test statistic on $\rho = 0$ at the bottom of column 3. In this regard the FIML estimation of the whole system is appropriate. With regard to firm size and firm age the results are virtually identical to the exogenous treatment specification from column 1, confirming once more the robust findings from previous Gibrat's law literature.

Focusing on the selection equation some interesting results can be obtained. With regard to the above mentioned theories on acquisition decisions we are able to provide evidence in favor of the managerial discretion and external growth theory and the neoclassical foundation for acquisition activities. Furthermore, we are not able to confirm the market for corporate control theory and Dewey's (1961) failing firm hypothesis.

More precisely, pre-acquisitionally larger firms are more likely to become a takeover target. Additionally, younger, more productive and more capital intense firms show a higher probability of being acquired. Finally, firms with initially smaller market shares tend to become a takeover target more likely. This supports the view that within a given market firms with higher market shares are inclined to acquire competitors with small market shares. However, the level of profitability and leverage ratio have no significant impact on the acquisition probability, as illustrated by insignificant parameter esti-

mates in the treatment equation. Interestingly, country fixed effects examine a significant impact on the variation in takeover probabilities while industry fixed effects are insignificant. This points to the relevance of time invariant differences across countries (e.g. legal system with regard to acquisitions).

Most importantly, in comparison to column 1 and 2 of Table 2 δ is now again positive, significant and, in magnitude, considerably exceeds the employment effect obtained in the exogenous treatment specification. Put differently, an acquired firm now, ceteris paribus, exhibits a 13.7 percentage points higher employment growth rate in comparison to non-acquired firms. This result supports the view that acquired firms significantly contribute to the creation of jobs. Consequentially, the threat of a reduction in a target firm's level of employment in the aftermath of the acquisition can not be confirmed in our baseline specification.

Tables 3 and 4 provide sensitivity analysis with regard to our baseline results. Firstly, in Table 3 we relax the assumption that the information collected in $\mathbf{z'}_i$ only indirectly influence a firm's growth performance via the selection equation. Therefore, we impose the same functional form with regard to firm size and firm age in the treatment equation and augment $\mathbf{x'}_i$ with all variables which previously only determined the takeover probability. Beyond the robust findings with regard to firm size and firm age all of the additionally included variables in the outcome equation possess a significant impact on a firm's growth performance. In comparison the the baseline specification the employment effect of being acquired is now smaller but an acquired firm still increases its average employment growth rate in the magnitude of 9.6 percentage points in comparison to non-acquired firms.

Secondly, Table 4 provides estimation results for subsamples consisting of only 100% acquisitions, only foreign acquisitions, only domestic acquisitions, only horizontal acquisitions and only vertical integrations. It's worth noting that in each of these subsamples we additionally exclude firms from the control group which operate in industries and countries where now no acquisition took place. In short, the estimated employment effect in all subsamples is virtually identical to the result obtained in the full sample. For this reason, we conclude that the strong and positive impact of acquisitions

Table 3: Estimation results: Functional form

Variable	Functional form
Initial size	-0.045^{***}
	(0.001)
Age	-0.060^{***}
	(0.002)
Age^2	0.001
	(0.000)
Initial * age	0.011^{***}
	(0.000)
Initial labor productivity	0.036^{***}
	(0.001)
Initial Return on Assets	-0.002^{***}
	(0.000)
Initial leverage	-0.005^{***}
	(0.001)
Initial capital intensity	0.010^{***}
	(0.000)
Initial market share	-0.035^{***}
	(0.006)
Fixed Effects (F-Test)	
Country	4339.10^{***}
3-digit industry	1637.80^{***}
Acquisition	0.096^{***}
	(0.009)
Initial size	0.412^{***}
	(0.050)
Initial age	0.175
	(0.146)
Initial Age^2	-0.022
	(0.027)
Initial size * initial age	-0.038^{**}
	(0.016)
Initial labor productivity	0.084^{*}
	(0.044)
Initial Return on Assets	0.005
	(0.012)
Initial leverage	-0.097
	(0.114)
Initial capital intensity	0.066^{**}
	(0.031)
Initial market share	-0.611^{***}
	(0.246)
Fixed Effects (F-Test)	
Country	119.12^{***}
2-digit industry	36.09^{**}
$\rho = 0$	41.70^{***}
Acquisitions	408
Observations	123,314

Notes: Parameter estimates for fixed effects and the constant are not reported. Standard errors in parentheses. *, ** and *** denote significance at 10%, 5% and 1% levels, respectively.

Table 4: Estimation results: Sub-samples

Variable	100% acquisitions	Foreign	Domestic	Horizontal	Vertical
Initial size	-0.054^{***}	-0.054^{***}	-0.054^{***}	-0.055^{***}	-0.055^{***}
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	-0.065^{***}	-0.064^{***}	-0.065^{***}	-0.065^{***}	-0.065^{***}
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Age^2	0.002^{***}	0.002^{***}	0.002^{***}	0.002^{***}	0.002^{***}
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Initial * age	0.013^{***}	0.013^{***}	0.013^{***}	0.013^{***}	0.013^{***}
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fixed Effects (F-Test)					
Country	2025.98^{***}	1858.47^{***}	1932.71^{***}	1823.42^{***}	1997.50^{***}
3-digit industry	1505.51^{***}	1438.26^{***}	1498.76^{***}	1421.89^{***}	1513.94^{***}
Acquisition	0.139^{***}	0.146^{***}	0.135^{***}	0.135^{***}	0.142^{***}
	(0.008)	(0.012)	(0.009)	(0.011)	(0.010)
Initial size	0.332^{***}	0.300^{***}	0.324^{***}	0.294^{***}	0.326^{***}
	(0.018)	(0.025)	(0.019)	(0.023)	(0.020)
Initial age	-0.146^{***}	-0.148^{***}	-0.091^{***}	-0.117^{***}	-0.115^{***}
	(0.031)	(0.044)	(0.034)	(0.040)	(0.036)
Initial labor productivity	0.256^{***}	0.127^{*}	0.263^{***}	0.186^{***}	0.272^{***}
	(0.048)	(0.077)	(0.051)	(0.063)	(0.055)
Initial Return on Assets	-0.004	0.078^{**}	-0.015	-0.006	0.006
	(0.013)	(0.035)	(0.012)	(0.015)	(0.016)
Initial leverage	-0.137	-0.260	-0.130	-0.282	-0.070^{*}
	(0.125)	(0.217)	(0.130)	(0.186)	(0.137)
Initial capital intensity	0.078^{**}	0.221^{***}	0.044	0.125^{***}	0.064^{*}
	(0.033)	(0.057)	(0.034)	(0.045)	(0.038)
Initial market share	-1.190^{***}	-0.679^{*}	-1.114^{***}	-1.064^{***}	-0.770^{**}
	(0.317)	(0.352)	(0.333)	(0.397)	(0.299)
Fixed Effects (F-Test)					
Country	126.99^{***}	58.82^{***}	108.95^{***}	79.79^{***}	86.41^{***}
2-digit industry	26.27	18.73	30.97^{*}	31.75^{**}	31.82^{*}
$\rho = 0$	133.94^{***}	65.67^{***}	111.30^{***}	72.55^{***}	103.54^{***}
Acquisitions	334	142	266	168	240
Observations	123,091	117,014	122,073	117,561	123,146

Notes: Parameter estimates for fixed effects and the constant are not reported. Standard errors in parentheses. *, ** and *** denote significance at 10%, 5% and 1% levels, respectively.

on an acquired firm's employment growth performance carries over to all different types of acquisitions, mentioned above.

To sum up, our empirical investigation points to the importance of non-random selection of acquisition targets and highlights the ability of Gibrat's law type of regressions to appropriately analyze the impact of acquisitions on target firms employment growth performance. Quantitatively, we provide robust evidence for a positive and economically significant impact of acquisitions on the average employment growth performance of acquired firms.

6 Conclusions

In daily news media coverage and political discussions acquisitions of large domestic firms are usually confronted with skepticism. In particular, policy-makers tend to fear that takeovers will reduce employment in the respective domestic firms leading to an increase in unemployment in certain areas. However, the economic literature on the employment effects of acquisitions is still ambiguous.

In order to improve our understanding regarding the impact of takeovers on the level of employment in the acquired firm, this paper combines the empirical firm growth literature with theories put forward in the M&A literature. In particular this paper examines the post-acquisition employment growth performance of acquired European firms taking non-random selection of acquisition targets into account and controls for convergence dynamics in firm size.

Our estimation results reveal positive employment effects for targets of acquisitions when non-random selection of acquisition targets and convergence dynamics in firm size are taken into account. This result varies only little for different types of acquisitions such as foreign or domestic acquisitions and horizontal acquisitions versus vertical integrations. With regard to the non-random selection of acquisition targets, our results support the view that firms which are large, young and more productive are acquired more probably.

From a policy point of view, we are not able to confirm the view that in the aftermath of a takeover employment in the acquired firm is reduced. In comparison to firms of the same size and age targets of acquisitions increase their post-acquisition employment growth rates by approximately 10 percentage points.

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