DO TARGETS GAIN FROM M&A: UKRAINE

by

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Abstract

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The objective of this paper is to estimate the overall post M&A effect on target companies in Ukraine. I concentrate on company specific characteristics to estimate the change in profitability and productivity in the target companies. Dataset include deals in the real business sector in Ukraine between 2003 and 2007. Total factor productivity is predicted using Olley-Pakes Methodology. Further, I follow propensity score matching methodology of the recent empirical literature to deal with the selection problem. Indeed, target companies usually have bigger size, higher values of assets, labor and material costs, higher net sales. In addition, the effect of M&A on profitability and productivity changes is estimated for 1-4 years long perspective. As a result of the study, I found no evidence of either short or long term effect of M&A on the mentioned measures. However, I found positive effect of majority share bought on the productivity changes through 2-4 year after the deals. Cross-border characteristic has negative effect in the third year after the transaction.

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GLOSSARY

Return on assets (ROA). The financial ratio of net income to average assets during the year. It indicates profitability of the company.

Operating ROA The financial ratio of earnings before interest and taxes to the average assets during the year. It indicates profitability of the company from the operational activity only.

Fixed assets. Property, plant and equipment in the balance sheet of the company.

Quick liquidity ratio. The financial ratio of current assets except from inventory to current liabilities (short term loans and accounts payable).

Financial leverage. The financial ratio of equity to assets. It indicates the leverage that company uses when borrowed funds exist.

C h a p t e r   1

INTRODUCTION

The market of mergers and acquisitions (M&A) quickly grew before the onset of the World financial crisis of 2008: M&A market value in Central and Eastern Europe (CEE) had tripled between 2004 and 2006 (PriceWaterHouseCoupers, 2006). Among the CEE countries Ukraine was mentioned as a "new star" attracting investments (PriceWaterHouseCoupers, 2006). Since 2005, M&A activities in Ukraine were skewed towards the steel sector, telecom sector and financial sector (PriceWaterHouseCoupers, 2005, 2008; Bolkhovitinov, 2010). Despite the slowing down in merger activities in 2008-2009 the market demonstrates signs of recovering (increasing number of M&A). There is flushing aggregate demand that will drive business activity and, as a result, M&A activity in the CEEs countries in the following years (PriceWaterhouseCoupers, 2009).

The strong objectives to initiate M&A may be explained by the intention to get the synergy effect from acquisition, which is explained by 4 main sources (Ross, Randolf, Jeffrey, 2001):

- revenue enhancement (marketing gains, strategic benefits, market power);

- cost reduction (economies of scale, economies of vertical/horizontal integration, complementary resources, elimination of inefficient management);

- lower taxes (tax gains from net operating losses, unused debt capacity, use of surplus funds);

- lower cost of capital.

However, the increasing number and volume of M&A transactions of last decades all over the world is accompanied by the prevailing worries about the number of successes of those deals (Belaisch et al, 2001; Bruner 2005).

Thus M&A deal may become dangerous both for the bidder and target companies. Many factors are named as possible causes of failure (Sadtler et al, 2008), such as a very high price paid for the target company, wrongful choice of the target company, disagreements among managers, cultural obstacles, strategic and financial mistakes, resistance by regulatory authorities or rival groups, and low quality due diligence and planning. Majority of these factors are common for Ukrainian companies (for example, there is the same educational system which influences managers' performance, the same regulatory authorities, market and competition peculiarities). In addition to the routine problems there are cultural and historical peculiarities of Ukraine as a transition country, such as high level of corruption and low level of easiness of doing business (World Bank Database, 2008-2009). This implies that causes of possible M&A failures in Ukraine may be further reinforced by internal country factors. I cannot aim to estimate the presence of synergy in M&A deals with Ukrainian targets due to lack of data; however, I decide to find out the effect of such kind of deals on the profitability and productivity of Ukrainian target companies. The results are important for right policy decisions. If such effect is negative then M&A activity is an erosive process during which (i) Ukrainian target companies are used as cash cows or cheap suppliers by native and foreign acquirers or (ii) bidders are not able to overcome the complex problems of M&A process mentioned above.

The objective of this paper is to estimate the overall post M&A effect on target companies in Ukraine. I will concentrate on company specific characteristics to estimate the change in profitability and productivity in the target company. Preceding literature in that area of research usually considers financial sector M&A deals due to data availability, but there is another side of the business where more than half deals occur. Thus I will research the M&A effect on the deals in the real business sector in Ukraine between 2003 and 2007.

In this paper 3 indicators of efficiency are used: a change in total factor productivity and in financial ratios (return on assets (ROA) and operation return on assets (Operating ROA)). Defference in changes of these measures for acquired and not acquired companies will reflect the effect of M&A. The influence of factors will be estimated for differences in every indicator. Differences are necessary to see the cumulative effect during 1-4 years. As targets for M&A are thoroughly chosen among peers this creates selection bias, and this companies cannot be compared directly with all the other companies in the sample, thus research will treat the bias selection with the help of propensity score matching.

The relation of M&A and post-performance is recognized to be under-researched (King, Dalton, Daily, and Covin, 2004) and there is little research for Ukraine mainly devoted to the financial M&A deals. There are ambiguous results in research for other countries, in addition, topics, groups of transactions and variables are almost not overlapping. This motivates the author to estimate the impact of factors on the targets post-M&A performance. I will use M&A deal specific characteristics which may cluster deals by common problems (such as industry, share bought, cross-border transaction, region) to discover which M&A characteristics have influence on profitability and productivity.

In the literature it is common to find the effect on the range of 1 year before and 1 year after the transaction, however, it's a common mistake (King, Dalton, Daily, and Covin, 2004). This is evident since internal reengineering process which demands additional funding usually lasts for 1-3 post-deal years. In the current paper I estimate the short term and the long-term effect up to 4 years afte transaction.

The rest of the paper is structured as following. Chapter 2 presents literature review, then the methodology employed and data description are presented in Chapter 3 and 4 respectively. And finally, results of the analysis are discussed in Chapter 5.

LITERATURE REVIEW

Most papers in the realm of M&A research are focused on studying possible effects of M&A in the financial sector in the developed countries, such as the USA, Japan or Europe. The literature can be split into several strands:

1.   Companies' probabilities to become a M&A target;

2.   Pricing schemes;

3.   Stock performance and announcement date of M&A;

4.   Post-M&A performance;

5.   Macroeconomic and network effects of M&A's (on prices, other firms, employment, etc.).

Post-merger performance is the most relevan approach for current research. Indicators of post M&A performance are broadly used in the literature both as the dependent variables, independent variable as well as control variables; hence, the measures of this performance vary in form.

The current review is focused on the empirical work. This review is structured as follows. Firstly, the discussion of the three types of efficiency estimators is presented since the empirical works vary in terms of indicators chosen to measure efficiency and the methodology. Second part is the review of papers by groups of controls taken into the estimation (financial ratios, country specific variables, deal-specific variables, etc.).

Among a variety of treatment parameters used in first stream of literature we can separate 3 groups of estimators of the post-M&A performance: first and the most prevailing indicator is the stock market return for companies involved in transaction; another one is financial ratios (ROA, ROE, ROS, or some exotic financial indicators); and the third one is the company's productivity.

The approach to proxy M&A efficiency as the stock market performance is usually applied to developed countries with developed stock exchanges and

over-the-counter securities market. Inasmuch as stock prices are public and represent fair market value of the company, this approach is very handy. Moreover, it represents changes in companies' value, but not only changes in profitability or in operational performance as other approaches do. Hence, it is the only approach possible to estimate the change in common efficiency (or sometimes called 'synergy') from an acquisition as the difference between the value of the new merged company and the sum of the values of companies-parties of the transaction (Ross, Westerfield, Jaffe, 2001).

The stock market approach was mainly the only one since the beginning of related research (since 1921) till the end of the century according to meta-study by King, Dalton, Daily, and Covin (2004). Most studies of this type are performed for American and European public companies involved into M&A transactions. Andrade, Mitchell, Stafford (2001) study the stock market reaction to the announcement of a M&A and find out that the common return (for acquiring and target firms) is positive, but mainly due to the high abnormal return on target U.S. firm stocks, whereas bidder stock returns are negative since M&A are often financed by additional stock emission. The same measurement of wealth gain is used in Kale, Omesh Kini and Ryan (2003) to estimate the relationship between firm's advisor proficiency and M&A efficiency. Abnormal stock returns were also used by Healy, Palepu and Ruback (1992) to compare post-M&A efficiency with the efficiency of not merged (not acquired) peers, and it shows that the returns are higher for post merged U.S. firms. Most studies based on the stock market performance estimate the impact of announcement date on abnormal returns and establish that returns have a positive effect for a target (King, Dalton, Daily& Covin, 2004). All these results show that expectations on post-M&A target companies' performance are usually positive in the U.S.; however, there is no evidence on the actual changes in targets' performance. It is impossible to use such approach for the majority of Ukrainian M&A deals since the majority of such companies are not public.

Another approach to estimate efficiency after transactions is to analyze changes in financial ratios. This approach demands information from public reports on companies' performance to use all necessary variables. That is why they usually estimate efficiency in financial sector, where bank and insurance companies' financial reports are often available.

As an example, Omesh, Kracaw and Mian, (2004) use operating performance instead of market return to study relationship between the post-merger CEO turnover and the change in industry adjusted operating return on assets. The operating return is one of the key performance indicators of CEO, so it is very suitable to use it in this case. However, it reflects the operational performance free of other activities and, ,thus, it is an alternative measure to apply to the post-M&A performance estimation.

Financial ratios approach is successfully applied to banks. Houston, James and Ryngaert (1999) derive several financial indicators (discounted sums of cost savings and revenues) as measures of post-merger efficiency for large bank acquisitions. They find that post-transaction performance is efficient mainly due to cost savings, but not due to increase in revenue. However, Ponomareva (2009) found a negative effect of M&A in bank-mergers in emerging European economies. She uses the change in return on assets (as the most common indicator for this type of research) after the propensity score matching as an efficiency measure. However, the reason for negative result may be that only one post-merger year was used. Also the ROA was not adjusted (because assets are usually reappraised upward before M&A transaction). Most non-Ukrainian studies also deal with the effect of M&A on efficiency exceptionally in the banking sector (see Akhavein et al, 1997; Fritsch et al, 2007 for an example). The financial ratio approach is much less used in the efficiency testing of M&A. Also, usually only one year after the transaction is used and results are not significant (King, Dalton, Daily&Covin, 2004). We are not aware of studies of M&A efficiency for Ukrainian real sector.

Productivity Analysis is the least common approach in estimation of M&A effect. It implies the estimation of effect of M&A transaction on the operational activities only, which more comparable than other activities across industries. However, there are several studies (such as Robert, McGuckin& Nguyen, 1995; Hosono; Arndt& Mattes, 2010, to name a few) where total factor productivity is used to test the effect of M&A in Japan, Germany and other countries. Andrade and Stafford (2004) estimate positive post-transaction effect on sales growth, but mention that M&A are clustered in time toward some industries as a responding activity to the industry shock, hence the positive effect is likely to be the result of better asset reallocation in the industry. This may be explained by a theoretical model of Gort (1969) postulating that evaluation differences are higher when abrupt changes in stock prices, energy prices and technology take place. Lichtenberg (1990) also estimates the effect of leveraged buyouts on the indicator of TFP for manufacturing plants and found strong positive relation. Schiffbauer et al. (2009) use foreign ownership as a dummy for cross-border M&A of UK companies and apply Olley-Pakes methodology to predict TFP. After that they use propensity score matching procedure to estimate treatement effect for companies with foreign ownership. They find significant heterogeneity in TFP effects of cross-boeder M&A across industries. They find no evidence of long-run effect of M&A on TFP. In a variety of research there is a paper (Fadzlan et al., 2007) using the Data Envelopment Analysis along with the Financial Ratio Analysis where the author found contradictory results: there is no positive effect on profitability ratio of Singaporean banks, but there is overall positive effect on their efficiency.

The literature review shows inconsistent results of financial post-M&A performance and positive effect of the announcement of M&A for target companies. There is little evidence available on Ukrainian mergers. On the other hand, growing acquisition activity seems to connect M&A with future expectations of business prosperity. As a result, this may indicate that

expectations from M&A are not exclusively financial. Bidders usually have two opportunities – original growth versus M&A activity, such the inefficiency may show that the bidders circumvent high obstacles of original growth by initiating M&A (for example by buying a competitor).

The second part of the review discusses the set of independent variables. Several studies test efficiency for cross-border M&A only (Wu&Xie, 2009) or for a specific industry (Marcelo et al., 2008; Fritsch et al., 2007). I use cross-border and industry parameters as individual variables. In addition, pre-acquisition performance and state owned shares show significant positive effect on M&A efficiency (Wu&Xie, 2009). Such variables as value of the deals, profitability of targets, organizational age are also often included into the set of controls. Fritsch, Gleizner&Holzhauser (2007) suggest to include relative size of the target firm to the bidder, M&A experience, ratio of asset size of the target to the bidder, but in the current research there is no data on bidders so such variables will be omitted. On the other hand Akhaven, Berger&Humphrey (1997) pay more attention to initial profitability, cost efficiency of both deal parts, and we will take into account respective ratios for target company due to the same reasons.

The meta-study by King, Dalton, Daily&Covin (2004), however, asserts that there are four most commonly used variables in the post-acquisition performance research: conglomerate firms, related acquisitions, method of payment, and acquisition experience. Remarkably, all these factors failed to explain post-M&A performance. Moreover, there is no significant overlap in the variables across studies; hence it is difficult to choose which once should be in the model.

In the mentioned previously paper by Schiffbauer et al. (2009) the authors use ROA, age, employment, interest expenses to total assets and solvency ratio as determinant variables for propensity score matching. I'll take the similar set of variables.

This study will use two approaches from the represented before. First one is the financial ratio approach where I will use change in ROA as an estimator

of change in efficiency. The other is the productivity analysis with total factor productivity as the main estimator. Then I will use propensity score matching procedure (Rosenbaum&Rubins, 1983) to treat selection bias. After all, I will estimate the influence of deal specific characteristics on the change in profitability and productivity to find out which are the most influential. Here I will use such determinant variables as cross-border indicator,

METHODOLOGY

The performance indicators taken to estimate the effect of M&A are chosen for each company for the 1-4 years after transaction. This accounts for a problem of many studies which include only short term indicators for the year following the transaction and it doesn't take into account additional expenses and investments for reengineering of business processes (King et al, 2004).

I will first discuss the selectivity bias treatment, and then we will consider two indicators to estimate efficiency: the productivity approach and the application of the financial ratios.

One of the most important stages of any M&A is selection of a target: all target candidates are under close scrutiny and their values are estimated prior to the decision is made. Factors leading to the choice of one company over another may influence its subsequent performance and cause a bias in the estimation due to sample selection. The propensity score matching (Rosenbaum and Rubin, 1983) used to choose a control group of companies and correct for the bias in the estimation of treatment effects. The propensity score is the estimated probability that company with a set of characteristics will become a target. The set of characteristics will include log of fixed assets, age, employment as well as industry and region variables. When matching on characteristics is valid then matching on summary statistics (probability of being acquired) is also valid for both sets of

companies: both targets and those that were not involved in M&A under the condition that the set of variables on which sets of companies differ must be observable (Heckman, Todd, 2009). This assumption is fulfilled since the decisions on M&A are based on thorough estimations using financial data and publicly available information. Hence, using nearest-neighbor matching a paired company is chosen (matched) to each acquired company such that difference in probability of being a target among two companies is the smallest.

As the previous chapter describes, I'm inclined to use both productivity and financial estimators for the research objective. The former parameter is the traditional measure of productivity which is total factor productivity and the latter is the traditional measure of efficiency in the corporate finance which is return on assets. This enables us to observe the question from both angles.

The financial ratios approach will include assessment of return on assets and operational return on assets. The estimation of change in both ratios will follow the propensity score matching. The former shows the efficiency from usage of all assets, whereas the latter provides information on how efficiently the assets are used to generate operational profit. The average treatment effect on treated is:

$$Y_i^a = Average(\Delta ROA_i^{m\&a} - \Delta ROA_i) \qquad (1)$$

Where $\Delta ROA_i^{m\&a}$ – is the change in the return on assets of acquired company in the 0-4th year after the transaction comparing with the year previous to M&A deal;

ΔROA_i – is the change in the return on assets of a paired company matched to the acquired company in the same time period as treated company.

Using the comparison with the paired company enables me to estimate the level of profitability (productivity) gained (lost) because of the M&A transaction for target companies. This should be tested with students test with the hypothesis of zero-equal difference

The second approach used is total factor productivity dependence on the variety of deal's characteristics. Obtaining the change in TFP the influence of different pre-acquisition variables on the productivity is estimated using multivariate linear regression. Independent variables include net sales (size of the company), dummy for majority share bought, cross-border relation, industry.

To estimate TFP change of each firm from the pre-acquisition period to three years after the acquisition period we use both estimation of production function and indexes for the group of observations consisting with treated (bought companies) and untreated (matched neighbors) companies..

To estimate TFP I use linear approximation of Cobb Douglas production technology traditionally assumed in the literature:

$$y_i = \beta_0 + \beta_k * k_j + \beta_l * l_j + \varepsilon_j \tag{2}$$

where k, l – logs of capital and labor inputs.

The residual is explained as the time- and producer specific deviation from the mean. So it is presented as a sum of TFP and unobservable components. So TFP may be expressed out of the equation. But OLS estimators lead to biased productivity estimates. The endogeneity problem occurs in such a case due to the correlation between capital and labor and the error term: each firm chooses its inputs according to the technology available. To deal with production function endogeneity variety of approaches are possible. Two of them are the fixed effects estimation and the instrumental variables for production function inputs; however, both of them do not perform well in practice because of the invalid assumption of time-invariant nature of the unobservable productivity term (in case of fixed effect) and the lack of instruments (in the case of instrumental variable). Olley and Pakes (1996) algorithm will be used instead. The main idea of which is the assumption that unobservable total factor productivity may be expressed in terms of capital and investments. As investments assumed to strictly increase in productivity, the latter may be expressed in terms of observable factors (capital and investments).

The values of outputs and inputs account for changes in price levels over time. In the analysis the following financial indicators represent inputs of production function: net sale represents output, fixed assets/deprciation represent capital input and labor expenses represent labor input, all the data came from financial statements.

DATA DESCRIPTION

This analysis is based on firm-level data for Ukrainian stock-companies over the period from 2001 until 2009. The major part of them is not listed at the Ukrainian stock exchanges. The data on M&A deals was collected from a number of sources, including Bloomberg database, Thomson One Banker database, M&A Roundtable 2007-2008, Interfax news database. The database covers M&A cases with Ukrainian-based-targets and contains names of parties, date of the deal, share acquired, cross-border indicator and indicator for an acquirer from Russia.

Financial statement data for about 10 000 stock companies is coming from the Fenix Data Base. In our data set financial indicators are extracted from financial statements Balance sheet (F1) and Income statement (F2) with enclosures. Data on employment, regions of registration and industry codes (KVED) are extracted from the same source.

The data set is an unbalanced panel and the distribution of observations per year is represented in the Table 1. The data set keep only companies with the same industries where M&A actually happen. There is a drop in observations in 2007 due to the drop in number of observation in the Fenix Data Base. There are 82617 observations during the period from 2001 to 2009 out of which there are 149 cases of M&A during the period from 2003 to 2007. The number of observation in each industry is represented at the Table A1 of the Appendix A. The number of acquisitions by each industry is shown in the same table.

Table 1. Number of observations in the sample of companies

Year	M&A deals	Observations on companies w/o M&A status	Observations on companies with M&A status	All companies
2001		3,283	44	3,327
2002		12,908	125	13,033
2003	33	11,846	130	11,976
2004	23	11,057	139	11,196
2005	11	7,541	133	7,674
2006	38	9,696	145	9,841
2007	44	9,084	147	9,231
2008		8,365	146	8,511
2009		7,684	144	7,828
Total	149	81,464	1,153	82,617

To compute TFP I use the data on output (log of net sales) and the following inputs: fixed assets at the beginning of the year (as a proxy for capital), depreciation (as another proxy for capital), labor costs, material costs. Gross investment is calculated as change in the capital stock plus depreciation, which is a necessary instrument in the unobservable technology shock when Olley and Pakes (1996) procedure used. All variables are in natural logs. Additional dummy variable for exit is defined as the methodology accounts that companies have to exit the market when they constantly have low TFP. Such control variables as industry, region and year are added to the estimation at the steps of probit and non-linear least squares procedures.

I model propensity score (probability of being acquired) as a function of the following firm characteristics two years before the case of acquisition: age of the company and the number of employees (as a measure of size), their squared values, log of fixed assets in the beginning of each year. In addition, the dummy variable indicating outliers is included to control for extreme representatives. It is equal to 1 for companies (both acquired and not) which have extreme values of assets, stockholders' equity, material costs, labor

costs, number of employees, operating ROA, net income. There are 907 outliers and 29 of them were acquired. I account for the industry fixed effect as well as for the region fixed effect.

The estimation of M&A deal characteristics effect on the change of ROA, Operating ROA and TFP is performed by using the following variables as controls: financial statement characteristics (logs of assets, net sales, labor costs; financial leverage and quick liquidity ratio), year, region and industry. The effect is estimated for cross-border acquirer indicator, cross-border Russian acquirer indicator and the share of the acquired company.

Table 2 represents descriptive statistics for all firms in the sample and for target companies only. After appending data from all data sources, the amount of observations in the sample is reduced to 133 923, and the set of target companies' observations is reduced to 149. Minimum and maximum values of almost all variables in the table specify the existence of outliers both with huge and small extreme values. Mean values of the number of employees is higher for acquired companies. The same is true comparing logs of investments, fixed assets, depreciation, net sales, material and labor costs. Average values of these variables for acquired companies are above the average values for the whole sample. Thus, companies targeted in M&A deals are usually larger than peers. The result of comparison of absolute values of financial indicators for both groups could be found in the Figure 1 below. Such a big difference in the financial characteristics of two sets of companies shows that the problem of selection bias may have place in the process of M&A decision.

In this table the log of TFP is already represented since it will be used as a difference-in-difference matching estimator. The procedure of estimation will be discussed in the following chapter, but it is clear from the descriptive statistic that estimators of TFP based on Olley-Pakes are higher for target companies than for the other set of companies. That difference is represented in the Figure 3, based on the log of TFP predicted by Olley-Pakes regression further indicated with number (3).
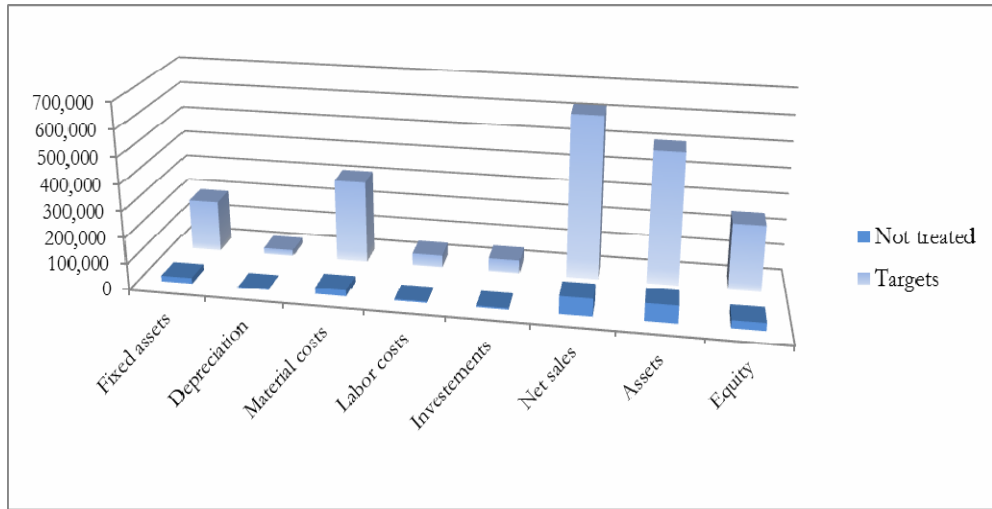
Figure 1. Comparison of financial indicators of targets and non-treated companies
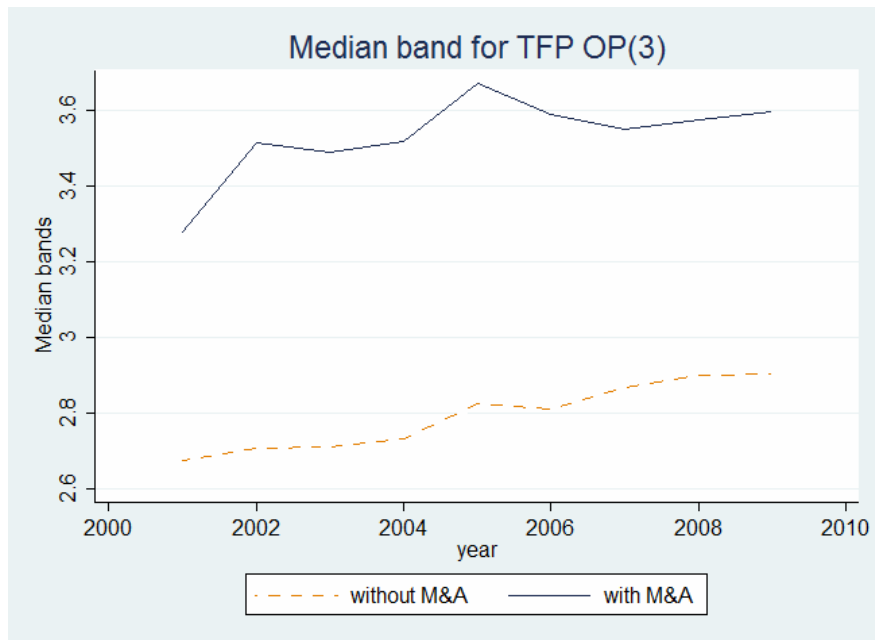
Figure 2. Median band of lnTFP for targets and non-targets

Table 2. Descriptive statistics for the sample of stock-companies

The sample of not treated companies

variable	N	mean	sd	p50	min	max
Employees	80822	338.063	2,273.731	86	0	125,291
Organisational age	81439	8.520	3.482	8	0	68
Ln of investments	81464	5.590	4.136	6.565	0.000	18.128
Ln of fixed assets	79541	9.844	2.125	9.941	0.000	19.591
Ln depreciation	78805	7.501	1.999	7.496	0.000	17.225
Ln net sales	79589	10.597	2.285	10.634	0.000	20.437
Ln material costs	77806	9.163	2.588	9.240	0.000	18.980
Ln labor costs	80781	8.654	1.911	8.659	0.000	16.975
ROA	81429	-0.014	0.293	0.000	-23.849	28.733
Operating ROA	81429	0.006	0.280	0.003	-23.849	30.672
Quick liquid. ratio	81005	60.007	3,745.033	0.758	0.000	868,178.000
Financial leverage	81299	5.544	546.154	1.404	-111,614.900	87,762.500
lnTFP OP (1)	76152	4.874	1.334	4.739	-5.467	14.417
lnTFP OP(2)	74625	1.519	1.093	1.487	-8.925	12.512
lnTFP3 OP(3)	75204	2.831	1.113	2.789	-7.588	12.321
Outliers	81464	0.043	0.202	0	0	1
Industries	81464	4.671	2.721	3	1	12
Regions	80036	2.998	1.338	3	1	5

The sample of acquired companies

variable	N	mean	sd	p50	min	max
Employees	1146	2,627.705	6,091.996	672	1	55,395
Organisational age	1153	8.567	3.495	9	0	17
Ln investments	1153	9.710	4.167	10.642	0.000	17.036
Ln fixed assets	1130	12.536	2.267	12.669	2.565	17.973
Ln depreciation	1146	10.404	2.151	10.413	0.000	15.726
Ln net sales	1133	13.668	2.389	13.843	2.303	19.214
Ln material costs	1126	12.056	2.920	12.394	0.693	18.684
Ln labor costs	1152	11.346	2.068	11.513	2.708	16.720
ROA	1153	0.005	0.184	0.006	-1.271	0.937
Operating ROA	1153	0.046	0.193	0.027	-1.067	1.249
Quick liquid. ratio	1152	53.193	744.781	0.971	0.006	17,441.570
Financial leverage	1153	4.283	87.028	1.673	-218.405	2,896.513
lnTFP OP (1)	1099	5.980	1.203	6.028	-3.153	10.817
lnTFP OP(2)	1111	1.695	1.005	1.763	-5.741	6.720
lnTFP3 OP(3)	1099	3.475	1.110	3.547	-4.973	8.063
Outliers	1153	0.189	0.392	0	0	1
Industries	1153	4.829	2.695	3	1	12
Regions	1153	2.788	1.267	3	1	5

EMPIRICAL RESULTS

To get the difference-in-difference estimator of the effect of M&A, we have first to obtain all measures of this effect. ROA and Operating ROA estimators are financial ratios obtained from the calculations based on the financial statements data.

In order to run a preliminary test of whether there is an effect of M&A on the productivity (TFP) of the company I first estimated a fixed-effect equation. An assumption that TFP is time invariant is quite strong. Accounting for year-industry fixed effects I get positive significant coefficient for M&A status of a company (Table 3). This means that if a company is once acquired then there exists some positive fixed effect as a part of its TFP.

Table 3. Fixed-effect estimation of production function

	Log of net sales	
variables	FE 1	FE 2
Log of depreciation	0.097***	0.090***
	(-11.79)	(-11.14)
Log of labor costs	0.532***	0.494***
	(-40.86)	(-45.62)
Log of material costs	0.365***	0.371***
	(-41.73)	(-41.63)
Status: M&A occurred	0.114**	0.081
	(-2.19)	(-1.59)
year*industry FE	YES	NO
Constant	1.962***	2.228***
	(-17.04)	(-29.95)
Observations	76727	76727

t statistics in parentheses statistics
* $p<0.1$, ** $p<0.05$, *** $p<0.001$

However, this approach has additional problem aside from the assumption of time invariance of TFP. Problem appears since demand for factors depends on the productivity coefficient. Thus I will further deal with this problem using Olley-Pakes(OP) methodology. As a proxy for capital I use one of two variables: fixed assets or depreciation. Fixed assets is an account in the financial system, which corresponds mainly to what economists determine as capital. However, presence of the asset doesn't mean that it is used in production. For example, for many companies with partial state ownership there are fixed assets which include buildings of kindergartens, holiday camps, football stadiums. From this point of view depreciation costs are more relevant to the production process. Moreover, one of the methods of depreciation calculation includes calculating it with respect to the volume of production in the period.

The results of OP estimation are partially controversial to the theory due to negative and significant coefficient of capital (fixed assets). The results of final equation are given in Table 4. Coefficients of materials and labor costs are positive, significant and correspond to the standard results of productivity analysis. Coefficient of depreciation is positively significant at 1% level. Almost all dummies for industry, year and region have significant coefficients. Further I use the prediction of TFP according to OP model 2 and 3.

The next step of estimations is the preparation of a quasi-experimental set of observations to treat the selection bias and get unbiased results in the presence of endogeneity. Propensity score matching procedure for each year of acquisition (2003-2007) is used for this aim. It is necessary to match companies acquired in 2007 with companies having similar propensity score in 2007. Thus, the probit regression is estimated for 5 years, with estimation of difference-in-difference for each measure (ROA, Operating ROA, TFP (2), TFP (3)). Additionally, I use 5 differences with 0,1,2,3,4 years after the acquisition and one year before acquisition. All explanatory variables are in a second lag to represent pre-merger characteristics.

Table 4. Olley and Pakes final equation

	(1) w/ocontrol dummies	(2) w/ control dummies	(3) w/ control dummies
Log of net sales			
Log of fixed assets	-0.166***		-0.093***
	(-11.25)		(-5.74)
Organizational age	-0.041		
	(-1.13)		
Log of material costs	0.234***	0.380***	0.409***
	(37.68)	(44.97)	(52.17)
Log of labor costs	0.641***	0.444***	0.516***
	(63.88)	(39.83)	(49.87)
Log of depreciation		0.164***	
		(11.90)	
Mining industry		0.008	0.010
		(0.23)	(0.30)
Manufacturing ind.		0.263***	0.229***
		(17.81)	(14.70)
Electr.,gas, water prod.		0.652***	0.647***
		(11.24)	(11.01)
Construction		0.314***	0.212***
		(16.00)	(8.96)
Trade;repair services		1.930***	1.900***
		(78.50)	(65.98)
Hotels&restaurants		0.213***	0.221***
		(6.31)	(6.86)
Transport		0.614***	0.631***
		(16.31)	(21.48)
Financial services		2.040***	1.868***
		(30.52)	(26.40)
Real-estate		0.412***	0.421***
		(13.42)	(12.20)
Education		0.514***	0.444***
		(6.54)	(5.25)
Services		0.532***	0.585***
		(4.64)	(5.07)
East		0.052**	0.044
		(2.30)	(1.60)
North		0.029	0.032
		(1.36)	(1.61)
South		-0.105***	-0.095***
		(-5.44)	(-3.74)
West		-0.152***	-0.143***
		(-7.57)	(-6.48)
Annual dummies		YES	YES

t statistics in parentheses, * $p<0.1$, ** $p<0.05$, *** $p<0.001$

The result of the propensity score probit regression for 3 year difference in TFP OP(3) is presented in the Table 5. Coefficients have different signs and significance in different years. The same regressions were estimated for all 5 differences of each 4 measures. The results are represented in the Appendix B. All estimations are similar in unstable signs, values and significance of coefficients for different years.

For each treated company there are 4 matched neighbors with the most similar probability scores. Thus balanced sample is produced for each year of acquisition based on each measure (4 measures, 5 differences). Each balanced sample is tested with the balancing test.

The Balancing test for 3 year difference in TFP OP(3) in 2007 is presented in table 6. It tests whether the difference of means of treated group and control group is equal zero. Such balancing tests show very good balance in explanatory variables in each of the cases.

Table 5. Propensity score estimation for 3-y. change in TFP OP(3)

Propensity score, probit to match outcome TFP$_{+2}$-TFP$_{-1}$ (from OP (3))

	2007	2006	2005	2004	2003
Acquisition					
Age	0.030	-0.045	0.229	0.825 *	5.765
	(0.250)	-(1.020)	(0.610)	(1.680)	(1.640)
Age squared	-0.006	0.001	-0.017	-0.076 *	-0.472
	-(0.740)	(0.650)	-(0.640)	-(1.870)	-(1.610)
Log fixed assets	0.132 **	0.192 ***	0.182**	0.266 ***	0.125
	(2.220)	(2.970)	(1.960)	(3.750)	(0.810)
Number of employees	0.000 ***	0.000 *	0.000	0.000	0.001
	(2.760)	(1.890)	(0.120)	(0.440)	(1.720)
Empolyees squared	0.000 **	0.000 **	0.000	0.000	0.000
	-(2.420)	-(2.040)	(0.320)	-(0.490)	-(1.560)
Outliers	0.037	0.206	-0.854	0.301	0.627
	(0.130)	(0.620)	-(0.650)	(0.920)	(0.690)
Mining industry	4.746 ***			3.528 *	
	(5.910)			(1.910)	
Manufacturing industry	4.540 ***	0.269	3.626**	3.893 **	3.851 **
	(5.960)	(0.720)	(2.180)	(2.240)	(4.900)
Electr. gen., gas and water	3.614 ***	0.513			4.268
	(3.800)	(1.120)			.
Construction	4.533 ***		3.864**		
	(6.080)		(2.390)		
Trade; repair services	4.255 ***	0.155		3.982 ***	4.910 **
	(5.330)	(0.310)		(2.330)	(4.910)
Hotels and restaurants				4.631 ***	
				(2.610)	
Transport		0.835 *		4.064 **	
		(1.930)		(2.320)	
Financial services	5.145 ***	1.374 ***	4.914***	5.494 ***	4.976 **
	(7.510)	(3.120)	(3.250)	(3.370)	(4.460)
Real-estate	4.425 ***				
	(5.210)				
Services	5.270 ***				
	(5.910)				
East	-0.243	-0.370	-0.273	0.336	
	-(1.090)	-(1.350)	-(0.600)	(1.050)	
North	-0.012	-0.020	-0.061	-0.046	0.877
	-(0.060)	-(0.090)	-(0.160)	-(0.130)	(1.110)
South	-0.049	-0.155	-0.138	0.220	0.726
	-(0.210)	-(0.640)	-(0.320)	(0.650)	(0.850)
West	-0.299	-0.224	0.127	0.254	0.885
	-(1.030)	-(0.800)	(0.330)	(0.690)	(1.020)
Constant	-8.260 .	-4.726 ***	-9.230	-11.971	-26.456 *
	.	-(5.950)	.	.	-
Number of observations	4114	3,605	3,556	5,761	985
where treated	35	28	9	18	7
LR	83.01	54.05	23.63	63.37	32.09
Prob>chi2	0	0.000	0.035	0.000	0.002
Pseudo R2	0.21	0.16	0.19	0.26	0.39

z-statistics in parantheses
* p<0.1, ** p<0.05, ***

Table 6. Balancing test results for 3 year change in TFP OP(3) estimated for the matching for the 2007

| Variable | Sample | Mean | | t-test | |
		Treated	Control	t	p>|t|
TFP_dif 2007	Unmatched	-0.152	-0.069	-0.610	0.543
	Matched	-0.152	-0.016	-1.160	0.251
Org. age	Unmatched	8.029	8.777	-1.700	0.088
	Matched	8.029	7.964	0.100	0.921
ln Fixed assets	Unmatched	12.529	10.503	6.730	0.000
	Matched	12.529	12.547	-0.030	0.975
Employees	Unmatched	3,160.100	526.800	7.150	0.000
	Matched	3,160.100	2,964.900	0.190	0.852
outliers	Unmatched	0.257	0.027	8.210	0.000
	Matched	0.257	0.257	0.000	1.000
Mining	Unmatched	0.143	0.036	3.380	0.001
	Matched	0.143	0.179	-0.400	0.689
Manufacturing	Unmatched	0.571	0.479	1.090	0.275
	Matched	0.571	0.521	0.410	0.680
Electr., gas,	Unmatched	0.029	0.026	0.110	0.914
	Matched	0.029	0.029	0.000	1.000
sek52005	Unmatched	0.057	0.134	-1.330	0.183
	Matched	0.057	0.079	-0.350	0.726
Trade	Unmatched	0.029	0.118	-1.640	0.101
	Matched	0.029	0.029	0.000	1.000
Financial	Unmatched	0.114	0.051	1.700	0.089
	Matched	0.114	0.114	0.000	1.000
Real-estate	Unmatched	0.029	0.056	-0.700	0.481
	Matched	0.029	0.021	0.190	0.851
Services	Unmatched	0.029	0.006	1.610	0.107
	Matched	0.029	0.029	0.000	1.000
East	Unmatched	0.200	0.196	0.050	0.958
	Matched	0.200	0.221	-0.220	0.829
North	Unmatched	0.286	0.276	0.120	0.902
	Matched	0.286	0.286	0.000	1.000
South	Unmatched	0.171	0.182	-0.160	0.876
	Matched	0.171	0.150	0.240	0.811
West	Unmatched	0.057	0.171	-1.780	0.075
	Matched	0.057	0.043	0.270	0.788

The results of difference-in difference matching estimators are presented in Table 7 for differences in ROA and in Table 9 for differences in TFP OP(3). Analysis of ROA-differences shows that average treatment on treated (ATT) is always insignificant. Also, in different years of estimation it has different signs for the same measure. One-year and two-year differences are mostly negative and this is consistent with the fact that usually reengineering processes occur in target companies immediately after the

acquisition. However, results remain uncertain even in the 5 year difference. Likelihood-ratio test shows that the given specification is jointly insignificant after matching. It means that the treated and control variables are well matched.

Difference-in-difference matching results are very similar for Operating ROA. They are presented in the Appendix

Different results appear when analyze cumulative effects of M&A on TFP OP (3). It is negative for the small period change in TFP, but it becomes positive almost for all further periods, and several differences are statistically significant.

Table 7. Cumulative effect of M&A on ROA

ROA_0-ROA_{-1}

Year of	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.020	0.018	-0.038	-0.85	5.93	0.949
2004	0.032	0.004	0.029	0.82	3.41	1.000
2005	-0.027	-0.014	-0.013	-0.38	5.20	0.951
2006	-0.048	-0.009	-0.039	-1.10	1.93	1.000
2007	0.013	0.006	0.006	0.22	2.65	1.000

$ROA_{+1}-ROA_{-1}$

Year of	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.009	0.031	-0.040	-0.64	1.17	1.000
2004	0.018	0.008	0.010	0.45	3.61	0.999
2005	-0.064	-0.055	-0.009	-0.16	5.02	0.957
2006	-0.061	-0.024	-0.037	-0.67	4.62	0.995
2007	-0.054	-0.052	-0.001	-0.03	2.17	1.000

$ROA_{+2}-ROA_{-1}$

Year of	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	0.002	0.019	-0.017	-0.26	3.65	0.994
2004	0.004	0.120	-0.116	-1.04	1.01	1.000
2005	-0.000	-0.002	0.002	0.02	4.83	0.963
2006	-0.070	-0.071	0.001	0.02	3.14	0.999
2007	-0.058	-0.068	0.009	0.19	2.57	1.000

$ROA_{+3}-ROA_{-1}$

Year of	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.041	0.019	-0.060	-0.75	2.33	0.999
2004	0.016	0.005	0.011	0.33	5.65	0.991
2005	-0.118	-0.125	0.006	0.07	2.82	0.997
2006	-0.097	-0.051	-0.045	-1.05	2.14	1.000
2007						

$ROA_{+4}-ROA_{-1}$

Year of	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.098	0.009	-0.106	-1.23	2.29	1.000
2004	-0.030	-0.021	-0.009	-0.25	4.20	0.999
2005	-0.133	-0.115	-0.018	-0.18	2.42	0.992
2006						
2007						

LR-test of joint insignificance of all regressors after matching

Table 8. Cumulative effect of M&A on TFP OP(3)

$TFP_0 - TFP_{-1}$ (for OP (3))

Year of M&A	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.403	-0.261	-0.142	-0.35	3.54	0.982
2004	0.022	-0.014	0.037	0.29	2.91	1.000
2005	-0.013	0.046	-0.059	-0.31	3.81	0.987
2006	-0.186	-0.269	0.084	0.69	4.88	0.993
2007	-0.040	-0.047	0.009	0.08	2.67	1.000

$TFP_{+1} - TFP_{-1}$ (for OP (3))

Year of M&A	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.454	-0.321	-0.134	-0.46	7.36	0.833
2004	0.280	-0.012	0.292	1.80	3.15	0.999
2005	-0.034	-0.050	0.015	0.06	3.96	0.984
2006	-0.035	-0.159	0.124	0.84	2.98	1.000
2007	0.138	0.023	0.115	1.11	0.95	1.000

$TFP_{+2} - TFP_{-1}$ (for OP (3))

Year of M&A	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.221	-0.120	-0.101	-0.43	2.94	0.996
2004	0.262	-0.139	0.401	2.12	5.11	0.991
2005	0.271	0.064	0.207	0.72	4.78	0.965
2006	-0.098	-0.222	0.124	0.91	2.56	1.000
2007	0.012	-0.063	0.075	0.62	1.59	1.000

$TFP_{+3} - TFP_{-1}$ (for OP (3))

Year of M&A	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.405	-0.055	-0.350	-1.21	3.75	0.988
2004	0.166	-0.291	0.457	1.63	3.05	1.000
2005	0.391	0.060	0.331	1.12	2.53	0.998
2006	0.219	-0.167	0.386	2.00	6.53	0.951
2007						

$TFP_{+4} - TFP_{-1}$ (for OP (3))

Year of M&A	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.281	-0.091	-0.19	-0.75	6.69	0.823
2004	0.175	0.115	0.06	0.22	3.32	1.000
2005	0.273	-0.028	0.301	0.69	2.40	0.992
2006						
2007						

LR-test of joint insignificance of all regressors after matching

To estimate average treatment on treated irrespectively to the year of acquisition, obtained results for each type of difference is averaged (Table 9). As a result, for ROA and Operating ROA average effect of M&A in any number of years are always negative and based on insignificant regressors. For TFP the first year difference is negative and the following

ones are positive, except negative value for the 5-th difference. Hence, TFP –differences are the highest for the 2nd and 3rd years after the merger. However, these positive cumulative TFP growths is calculated based on not statistically significant results of cumulative TFP growth estimated separately for each year. Thus, there is no evidence found on the effect of M&A on ROA, Operating ROA and TFP.

Table 9. Average cumulative effect of M&A on different measures

Years since M&A-year	ROA diff	Op. ROA diff	TFP-diff OP(2)	TFP-diff OP(3)
0	-0.011	-0.002	-0.045	-0.015
1	-0.015	-0.015	0.052	0.083
2	-0.024	-0.01	0.083	0.141
3	-0.022	-0.017	0.135	0.206
4	-0.044	-0.066	-0.009	0.057

The limited evidence for positive productivity effects and negative ROA effects during first 4 years after the deal might be explained by heterogeneous performance among M&A cases due to differences of the deals. The following linear analysis would estimate the effect of cross-border M&A, cross-border with acquirer from Russia M&A and the majority or minority stake bought. The resulting regressions for effect on ROA are represented in Table 10, on Operating ROA in Table 11, on TFP OP(2) in table 12 and on TFP OP(3) in Table 13.

The only indicator of cross-border acquirer is significant for ROA 4-year difference. However, it is negative. Thus, cross border acquirer affects negatively on long-term profitability. The other coefficients (Russian bidder and share bought) have unstable signs and insignificant.

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Table 10. Effect of M&A characteristics on differences in ROA

	1 year ROA-	2 year ROA-	3 year ROA-	4 year ROA-	5 year ROA-
Cross-border	-0.063	-0.018	0.036	-0.111*	-0.097
	(-1.47)	(-0.29)	(0.51)	(-1.75)	(-1.31)
Russian bidder	0.018	0.021	-0.034	0.041	0.006
	(0.58)	(0.47)	(-0.70)	(0.77)	(0.07)
Maj. Share acquired	-0.033	0.022	-0.027	0.001	0.000
	(-1.00)	(0.42)	(-0.49)	(0.01)	(0.00)
M&A status	0.057	-0.024	0.000	0.045	0.039
	(1.44)	(-0.66)	(0.01)	(1.27)	(0.53)
Organizational age	-0.001	0.003	-0.006	-0.001	0.021*
	(-0.29)	(0.60)	(-0.68)	(-0.48)	(1.90)
Log of assets	-0.003	0.012	-0.006	0.004	-0.007
	(-0.37)	(1.23)	(-0.45)	(0.29)	(-0.40)
Log of net sales	0.015**	-0.007	-0.032*	-0.015	0.002
	(2.20)	(-0.80)	(-1.81)	(-1.07)	(0.11)
Log of labor costs	-0.008	-0.001	0.018	0.011	-0.011
	(-1.07)	(-0.06)	(1.59)	(1.05)	(-0.73)
Financial leverage	-0.000	-0.000	-0.000	-0.001	0.001*
	(-0.31)	(-0.07)	(-1.03)	(-1.20)	(1.89)
Quick liquidity ratio	0.000**	-0.000	0.000	-0.000	-0.000**
	(3.23)	(-0.74)	(0.57)	(-1.40)	(-3.10)
Dummy for year	YES	YES	YES	YES	YES
Dummy for region	YES	YES	YES	YES	YES
Dummy for industry	YES	YES	YES	YES	YES
Constant	0.041	-0.380***	0.640*	0.046	-0.007
	(0.44)	(-4.77)	(1.89)	(0.46)	(-0.05)
Observations	474	473	473	309	167
R-squared	0.085	0.133	0.057	0.188	0.198

t statistics in parentheses
*p<0.1, ** p<0.05, *** p<0.001

The effect of cross-border acquisition of the difference in Operating ROA is negative as well and significant for differences of 4 and 5 years. Thus, foreign acquisition leads to decrease in ROA and Operating ROA in 3 and 4 years after acquisition.

Table 11. Effect of M&A characteristics on differences in Operating ROA

	1 year Op. ROA-diff	2 year Op. ROA-diff	3 year Op. ROA-	4 year Op. ROA-diff	5 year Op. ROA-diff
Cross-border	-0.014	-0.026	0.044	-0.134**	-0.150**
	(-0.36)	(-0.38)	-0.56	(-2.05)	(-2.34)
Russian bidder	0.014	0.038	-0.033	0.077	0.008
	-0.5	-0.77	(-0.67)	-1.28	-0.09
Maj. Share	-0.004	-0.01	-0.055	0.023	-0.005
	(-0.12)	(-0.18)	(-0.90)	-0.41	(-0.09)
M&A status	0	-0.001	0.024	0.044	0.069
	-0.02	(-0.03)	-0.51	-1.18	-1.17
Organizational age	-0.001	0.002	-0.005	-0.001	0.01
	(-0.37)	-0.42	(-0.66)	(-0.34)	-1.12
Log of assets	-0.007	0.012	0.003	0.001	0.012
	(-1.01)	-1.32	-0.24	-0.11	-0.8
Log of net sales	0.018**	-0.003	-0.029*	-0.007	-0.003
	-3.03	(-0.38)	(-1.68)	(-0.87)	(-0.16)
Log of labor costs	-0.006	-0.005	0.007	0.002	-0.011
	(-0.91)	(-0.56)	-0.58	-0.21	(-0.74)
Financial leverage	0	0	0	-0.001	0.001
	(-0.54)	(-0.49)	(-1.42)	(-1.11)	-1.29
Quick liquidity	0.000*	0	0	0	-0.000**
	-1.91	(-0.52)	(-0.29)	(-1.25)	(-2.75)
Dummy for year	YES	YES	YES	YES	YES
Dummy for region	YES	YES	YES	YES	YES
Dummy for	YES	YES	YES	YES	YES
Constant	-0.01	-0.356***	0.597*	-0.014	-0.057
	(-0.13)	(-4.45)	-1.75	(-0.11)	(-0.38)
Observations	474	473	473	309	167
R-squared	0.093	0.134	0.061	0.166	0.194

t statistics in parentheses
*p<0.1, ** p<0.05, *** p<0.001

The effect of cross-border acquisition is negative on the TFP-difference from OP(2), it is significant for the 4-year difference. I addition, to this negative effect, the significant positive effect of the major share acquired is determined for the differences of 3 and 4 years.

Table 12. Effect of M&A characteristics on differences in TFP OP(2)

	1 year TFP-diff OP(2)	2 year TFP-diff OP(2)	3 year TFP-diff OP(2)	4 year TFP-diff OP(2)	5 year TFP-diff
Cross-border	-0.075	-0.182	-0.122	-0.512**	-0.423
	(-0.58)	(-1.37)	(-0.98)	(-2.62)	(-1.46)
Russian bidder	-0.030	0.048	-0.189	0.073	-0.183
	(-0.26)	(0.31)	(-1.13)	(0.27)	(-0.37)
Maj. Share acquired	0.167	0.160	0.242*	0.543**	0.468
	(1.37)	(1.13)	(1.88)	(2.61)	(1.47)
M&A status	-0.093	0.089	0.048	0.165	0.171
	(-0.83)	(0.84)	(0.57)	(1.11)	(0.64)
Organizational age	0.014	0.020	0.012	-0.049	-0.039
	(1.20)	(1.27)	(0.86)	(-1.54)	(-0.60)
Log of assets	-0.027	-0.083	-0.101*	-0.090	-0.069
	(-0.34)	(-1.42)	(-1.88)	(-1.01)	(-0.66)
Log of net sales	0.310***	0.080	-0.005	-0.066	-0.117
	(5.74)	(1.24)	(-0.08)	(-0.75)	(-1.39)
Log of labor costs	-0.320**	-0.033	0.094	0.065	0.186*
	(-3.13)	(-0.41)	(1.57)	(0.85)	(1.76)
Financial leverage	-0.002	-0.000	-0.000	-0.000	-0.007
	(-1.59)	(-0.23)	(-0.39)	(-0.05)	(-1.14)
Quick liquidity ratio	-0.000***	-0.000	-0.001	-0.000***	-0.001
	(-6.04)	(-0.36)	(-0.72)	(-5.49)	(-0.79)
Dummy for year	YES	YES	YES	YES	YES
Dummy for region	YES	YES	YES	YES	YES
Dummy for industry	YES	YES	YES	YES	YES
Constant	-0.077	-1.028**	0.696	1.869**	0.509
	(-0.13)	(-3.00)	(1.34)	(3.05)	(0.54)
Observations	468	461	454	295	151
R-squared	0.249	0.104	0.101	0.122	0.191

t statistics in parentheses
*p<0.1, ** p<0.05, *** p<0.001

The effect of cross-border acquisition is negative as well and significant for the same difference kevel of TFP. Major market share bought is positively significant for 3-5 year differences in TFP. The effect of M&A status and Russian bidder has different signs and statistically insignificant.

Table 13. Effect of M&A characteristics on differences in TFP OP(2)

	1 year TFP-diff OP(3)	2 year TFP-diff OP(3)	3 year TFP-diff OP(3)	4 year TFP-diff OP(3)	5 year TFP-diff
Cross-border	-0.069	-0.173	-0.132	-0.462**	-0.298
	(-0.57)	(-1.26)	(-1.09)	(-2.12)	(-0.95)
Russian bidder	-0.127	-0.013	-0.093	0.248	-0.515
	(-1.15)	(-0.08)	(-0.60)	(0.82)	(-1.05)
Maj. Share acquired	0.177	0.194	0.239**	0.519**	0.581*
	(1.44)	(1.41)	(1.97)	(2.49)	(1.74)
M&A status	-0.058	0.136	0.100	0.203	-0.010
	(-0.58)	(1.39)	(1.22)	(1.23)	(-0.04)
Organizational age	0.010	0.017	-0.010	0.001	0.020
	(0.90)	(1.13)	(-0.67)	(0.04)	(0.31)
Log of assets	-0.184***	-0.085	-0.109**	-0.231**	-0.269**
	(-4.72)	(-1.60)	(-1.99)	(-2.12)	(-2.07)
Log of net sales	0.191***	0.064	-0.029	0.126	0.181
	(4.76)	(1.06)	(-0.59)	(1.00)	(1.39)
Log of labor costs	-0.050	-0.006	0.142**	0.012	0.009
	(-1.21)	(-0.08)	(2.39)	(0.15)	(0.08)
Financial leverage	-0.002	0.000	0.003***	0.008	-0.001
	(-1.58)	(0.22)	(7.60)	(1.36)	(-0.86)
Quick liquidity ratio	-0.000***	-0.000	-0.001***	-0.000**	-0.000***
	(-5.33)	(-0.25)	(-8.57)	(-2.90)	(-5.92)
Dummy for year	YES	YES	YES	YES	YES
Dummy for region	YES	YES	YES	YES	YES
Dummy for industry	YES	YES	YES	YES	YES
Constant	1.231***	0.204	0.868	1.381*	-0.904
	(4.06)	(0.47)	(1.60)	(1.69)	(-1.28)
Observations	473	463	449	299	157
R-squared	0.260	0.130	0.182	0.162	0.243

t statistics in parentheses
*p<0.1, ** p<0.05, *** p<0.001

CONCLUSIONS

This paper estimates the relationship between acquisition and the productivity and profitability of the Ukrainian target companies during 2003-2007. I use Olley-Pakes approach for to estimate total factor productivity. Further, propensity scoring was undertaken to construct a new balanced sample on the basis of minimum difference in probability scores. Difference-in-difference estimators of 2 financial ratios and 2 productivity factors were analyzed.

The results show no evidence on either positive or negative effect of M&A on profitability and productivity during 4 years after the M&A deal occurred.

However, I found negative effect of cross-border M&A deals on profitability and productivity coefficients 3-4 years after the deal. That may be explained by the fact that acquisition requires many reengineering and managerial efforts to unite the companies into one system. Therefore, when the company is integrated into a conglomerate, acquirer starts to "milk" the target to return the investments. However, the effect is negative on the productivity, thus foreign bidder invests money into not productivity-efficient projects in the target company.

Another effect found is the positive effect of the majority share bought on the productivity 2-4 years after the deal . This might be explained by the confidence of the acquirer and his desire to invest more in the increase of target's productivity. The effect of majority stake bought is higher than the effect of the cross-border acquisition.

This study has contributed to the literature on the effects of M&A by presenting evidence of selection problem in research on M&A treatment effect. Moreover, following the call for estimation of the long-term effect of

M&A, this study looked at a 4 year perspective. Additionally, there is no research on M&A effect in the non-banking sector in Ukraine.

There are several directions for further development of this research topic. In this paper only 149 M&A cases were taken into consideration. The main challenge for future research is to collect data on more M&A deals as well as to find a database with financial statements and other explanatory variables where all deals are represented. More observations of M&A transaction would give the possibility to account for heterogeneity across industries. Also, other deal specific characteristics may help to explain the effect of M&A. Among them there is level of integration (horizontal/vertical), state ownership, indicator of being previously acquired or being a bidder.

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Table A1. Observations by industry including number of acquisitions

	Year and dummy for being acquired during the year (1=acquired)														
	2001	2002	2003		2004		2005		2006		2007		2008	2009
Industry	0	0	0	1	0	1	0	1	0	1	0	1	0	0
Agriculture	195	1,98	1721		1516		805		1008		901		797	721
Mining industry	33	436	295	2	278	2	187		243		237	5	252	245
Manufacturing industry	1,026	5,192	4754	16	4364	10	2985	5	3589	18	3265	25	3,056	2,819
Electr., gas and water prod.	58	201	196	9	210		123		207	4	211	1	201	170
Construction	308	1,438	1318		1208		984	1	1010		936	1	847	734
Trade; repair services	959	2,22	2045	4	1675	2	1255		1355	2	1242	3	998	788
Hotels and restaurants	76	128	114		126	1	107		151		136		118	107
Transport	98	335	335		405	2	266		410	3	405	1	373	361
Financial services	381	533	619	1	721	4	425	5	737	8	795	4	945	932
Real-estate	132	448	423	1	571	2	465		1002	3	975	3	837	869
Education	27	66	68		45		23		33		30		32	30
Services	34	56	55		54		38		58		54	1	55	52
Total	3,327	8,833	11,976		11,196		7,674		9,841		9,231		8,511	7,828

Table A2. Descriptive statistics by year and by M&A status

	Non treated companies			Treated companies		
year	2001	2004	2009	2001	2004	2009
variable	mean	mean	mean	mean	mean	mean
Employees	231	323	392	1,507	2,781	2,327
Organisational age	5	8	12	4	7	12
Log of investments	4.84	5.17	6.23	7.75	9.29	9.91
Log of fixed assets	8.83	9.67	10.46	10.99	12.26	13.25
Log of depreciation	6.58	7.23	8.32	9.08	10.05	11.18
Log of net sales	9.80	10.30	11.46	11.96	13.35	14.29
Log of material costs	7.82	8.92	10.00	9.73	11.83	12.43
Log of labor costs	7.44	8.33	9.48	9.31	10.93	12.09
ROA	0.01	-0.01	-0.04	-0.02	0.04	-0.03
Operating ROA	0.03	0.01	-0.01	0.04	0.07	0.00
Quick liquidity ratio	11.71	49.25	48.04	404.96	25.94	5.65
Financial leverage	16.63	4.95	4.34	-0.76	21.60	1.83
lnTFP OP (1)	4.86	4.77	5.27	5.40	5.89	6.26
lnTFP OP(2)	1.55	1.51	1.52	1.29	1.69	1.67
lnTFP3 OP(3)	2.74	2.78	2.94	2.90	3.45	3.54
Outliers	0.06	0.05	0.04	0.16	0.19	0.19
Industries	5.29	4.44	5.17	5.95	4.61	5.01
Regions	3.01	3.00	2.99	3.09	2.77	2.78

APPENDIX B

Table B1. Propensity score estimations for difference in ROA

Propensity score, probit to match outcome ROA_0-ROA_{-1}

	2007	2006	2005	2004	2003
Acquisition					
Age	-0.017	-0.055	0.300	0.727*	0.637
	-(0.160)	-(1.310)	(0.780)	(1.670)	(1.010)
Age squared	-0.004	0.001	-0.023	-0.070*	-0.055
	-(0.470)	(0.740) ***	-(0.840)	-(1.910)	-(0.940)
Log fixed assets	0.147 ***	0.229	0.201 **	0.295***	0.142
	(2.760)	(3.760)	(2.320)	(4.400)	(1.250)
Number of empl.	0.000 ***	0.000	0.000	0.000	0.001 *
	(2.880)	(1.620)	(0.130)	(0.450)	(1.840)
Empolyees sq.	0.000 **	0.000 *	0.000	0.000	0.000
	-(2.500)	-(1.850)	(0.320)	-(0.490)	-(1.640)
Outliers	0.007	0.124	-0.897	0.229	0.702
	(0.020)	(0.400)	-(0.700)	(0.750)	(1.490)
Industry dummy	YES	YES	YES	YES	YES
Region dummy	YES	YES	YES	YES	YES
Constant	-8.272	-5.165	-9.832	-12.012	-10.845
		-(6.810)	.		.
Number of obs.	5,365	4,750	4,688	8,137	1,804
where treated	37	30	10	19	9
LR	92.88	65.01	30.82	73.42	41.09
Prob>chi2	0.000	0.000	0.004	0.000	0.000
Pseudo R2	0.21	0.18	0.22	0.27	0.36

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

Table B1 - Continued. Propensity score estimations for difference in ROA

Propensity score, probit to match outcome ROA$_{+1}$-ROA$_{-1}$

	2007		2006		2005		2004		2003	
Acquisition										
Age	0.029		-0.035		0.295		0.681		0.627	
	(0.250)		-(0.790)		(0.780)		(1.520)		(0.980)	
Age squared	-0.006		0.001		-0.023		-0.067	*	-0.054	
	-(0.780)		(0.450)		-(0.830)		-(1.750)		-(0.900)	
Log fixed assets	0.153	***	0.227	***	0.195	**	0.304	***	0.136	
	(2.720)		(3.640)		(2.210)		(4.230)		(1.150)	
Number of empl.	0.000	***	0.000		0.000		0.000		0.001	*
	(2.750)		(1.540)		(0.140)		(0.410)		(1.850)	
Empolyees sq.	0.000	**	0.000	*	0.000		0.000		0.000	*
	-(2.410)		-(1.780)		(0.310)		-(0.480)		-(1.660)	
Outliers	0.016		0.145		-0.907		0.210		0.692	
	(0.060)		(0.460)		-(0.700)		(0.630)		(1.450)	
Industry dummy	YES		YES		YES		YES		YES	
Region dummy	YES		YES		YES		YES		YES	
Constant	-8.530		-5.208		-9.577		-11.965		-10.787	
	.		-(6.670)		.		.		-(4.370)	
Number of obs.	4,744		4,183		4,084		5,307		1,565	
where treated	36		29		10		19		9	
LR	88.62		59.99		29.11		67.89		39.85	
Prob>chi2	0.000		0.000		0.006		0.000		0.000	
Pseudo R2	0.21		0.17		0.21		0.27		0.36	

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

Table B1 - Continued. Propensity score estimations for difference in ROA

Propensity score, probit to match outcome $ROA_{+2}-ROA_{-1}$

	2007		2006		2005		2004		2003	
Acquisition										
Age	0.032		-0.043		0.316		0.717		0.647	
	(0.270)		-(0.980)		(0.820)		(1.630)		(0.980)	
Age squared	-0.007		0.001		-0.024		-0.069	*	-0.055	
	-(0.800)		(0.640)		-(0.870)		-(1.860)		-(0.900)	
Log fixed assets	0.146	***	0.196	***	0.186	**	0.289	***	0.127	
	(2.560)		(3.080)		(2.100)		(4.180)		(1.050)	
Number of empl.	0.000	***	0.000	*	0.000		0.000		0.001	
	(2.740)		(1.900)		(0.120)		(0.380)		(1.850)	
Empolyees sq.	0.000	**	0.000	*	0.000		0.000		0.000	
	-(2.410)		-(2.030)		(0.330)		-(0.430)		-(1.680)	
Outliers	0.021		0.177		-0.883		0.237		0.770	
	(0.070)		(0.550)		-(0.690)		(0.750)		(1.550)	
Industry dummy	YES		YES		YES		YES		YES	
Region dummy	YES		YES		YES		YES		YES	
Constant	-8.457		-4.789		-9.540		-11.883		-10.765	
	.		-(6.100)		.		.		.	
Number of observations	4,266		3,715		3,660		6,245		1,352	
where treated	36		28		10		19		9	
LR	84.00		54.26		28.08		67.39		38.43	
Prob>chi2	0.000		0.000		0.009		0.000		0.000	
Pseudo R2	0.20		0.16		0.20		0.26		0.36	

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

Table B1 - Continued. Propensity score estimations for difference in ROA

Propensity score, probit to match outcome $ROA_{+3}-ROA_{-1}$

	2007	2006		2005		2004		2003	
Acquisition									
Age		-0.043		0.321		0.754	*	0.652	**
		-(0.970)		(0.830)		(1.690)		(0.960)	
Age squared		0.001		-0.025		-0.072	**	-0.055	
		(0.660)		-(0.870)		-(1.920)		-(0.890)	
Log fixed assets		0.190	***	0.182	**	0.281	***	0.132	
		(2.980)		(2.040)		(4.010)		(1.070)	
Number of empl.		0.000		0.000		0.000		0.001	
		(1.840)		(0.100)		(0.370)		(1.790)	
Empolyees sq.		0.000	**	0.000		0.000		0.000	
		-(2.000)		(0.350)		-(0.420)		-(1.670)	
Outliers		0.198		-0.871		0.246		0.850	
		(0.600)		-(0.680)		(0.770)		(1.630)	
Industry dummy		YES		YES		YES		YES	
Region dummy		YES		YES		YES		YES	
Constant		-4.701	***	-9.510		-11.903		-10.815	
		-(5.930)		.		.		.	
Number of obs.		3,355		3,307		5,539		1,228	
where treated		28		10		19		9	
LR		50.71		26.83		64.84		37.83	
Prob>chi2		0.000		0.013		0.000		0.001	
Pseudo R2		0.16		0.20		0.26		0.36	*

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

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Table B1 - Continued. Propensity score estimations for difference in ROA

Propensity score, probit to match outcome ROA$_{+4}$-ROA$_{-1}$

	2007	2006	2005		2004		2003	
Acquisition								
Age			0.149		0.759	*	0.678	
			(0.400)		(1.690)		(1.010)	
Age squared			-0.012		-0.073	*	-0.058	*
			-(0.420)		-(1.920)		-(0.920)	
Log fixed assets			0.193	*	0.279	***	0.118	
			(1.770)		(3.860)		(0.920)	
Number of empl.			0.000		0.000		0.001	
			-(0.630)		(0.330)		(1.790)	
Empolyees sq.			0.000		0.000		0.000	
			(0.620)		-(0.380)		-(1.660)	
Outliers			-1.878		0.260		0.898	
			-(0.130)		(0.800)		(1.670)	
Industry dummy			YES		YES		YES	
Region dummy			YES		YES		YES	
Constant			-9.091	***	-11.883		-10.720	*
			-(5.330)		.		-(4.180)	
Number of obs.			2,472		4,895		1,099	
where treated			8		19		9	
LR			24.18		62.06		37.01	
Prob>chi2			0.019		0.000		0.001	
Pseudo R2			0.22		0.25		0.35	

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

Table B2. Propensity score estimations for difference in Operating ROA

Propensity score, probit to match outcome Operating ROA_0-

	2007		2006		2005		2004	2003	
Acquisition									
Age	-0.017		-0.055		0.300		0.727	0.637	
	-(0.160)		-(1.310)		(0.780)		(1.670)	(1.010)	
Age squared	-0.004		0.001		-0.023		-0.070	-0.055	
	-(0.470)		(0.740)		-(0.840)		-(1.910)	-(0.940)	
Log fixed assets	0.147	***	0.229	***	0.201	**	0.295	0.142	
	(2.760)		(3.760)		(2.320)		(4.400)	(1.250)	
Number of empl.	0.000	***	0.000		0.000		0.000	0.001	*
	(2.880)		(1.620)		(0.130)		(0.450)	(1.840)	
Empolyees sq.	0.000	**	0.000	*	0.000		0.000	0.000	
	-(2.500)		-(1.850)		(0.320)		-(0.490)	-(1.640)	
Outliers	0.007		0.124		-0.897		0.229	0.702	
	(0.020)		(0.400)		-(0.700)		(0.750)	(1.490)	
Industry dummy	YES		YES		YES		YES	YES	
Region dummy	YES		YES		YES		YES	YES	
Constant	-8.272		-5.165		-9.832		-12.012	-10.845	
	.		-(6.810)		.		.	.	
Number of obs.	5,365		4,750		4,688		8,137	1,804	
where treated	37		30		10		19	9	
LR	92.88		65.01		30.82		73.42	41.09	
Prob>chi2	0.000		0.000		0.004		0.000	0.000	
Pseudo R2	0.21		0.18		0.22		0.27	0.36	

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

Table B2 - Continued. Propensity score estimations for difference in Operating ROA

Propensity score, probit to match outcome Operating ROA$_{+1}$-

	2007		2006		2005		2004		2003	
Acquisition										
Age	0.029		-0.035		0.295		0.681		0.627	
	(0.250)		-(0.790)		(0.780)		(1.520)		(0.980)	
Age squared	-0.006		0.001		-0.023		-0.067	*	-0.054	
	-(0.780)		(0.450)		-(0.830)		-(1.750)		-(0.900)	
Log fixed assets	0.153	***	0.227	***	0.195	**	0.304	***	0.136	
	(2.720)		(3.640)		(2.210)		(4.230)		(1.150)	
Number of empl.	0.000	***	0.000		0.000		0.000		0.001	*
	(2.750)		(1.540)		(0.140)		(0.410)		(1.850)	
Empolyees sq.	0.000	**	0.000	*	0.000		0.000		0.000	*
	-(2.410)		-(1.780)		(0.310)		-(0.480)		-(1.660)	
Outliers	0.016		0.145		-0.907		0.210		0.692	
	(0.060)		(0.460)		-(0.700)		(0.630)		(1.450)	
Industry dummy	YES		YES		YES		YES		YES	
Region dummy	YES		YES		YES		YES		YES	
Constant	-8.530		-5.208		-9.577		-11.965		-10.787	
	.		-(6.670)		.		.		-(4.370)	
Number of obs.	4,744		4,183		4,084		5,307		1,565	
where treated	36		29		10		19		9	
LR	88.62		59.99		29.11		67.89		39.85	
Prob>chi2	0.000		0.000		0.006		0.000		0.000	
Pseudo R2	0.21		0.17		0.21		0.27		0.36	

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

Table B2 - Continued. Propensity score estimations for difference in Operating ROA

Propensity score, probit to match outcome Operating $ROA_{+2}-ROA_{-1}$

	2007		2006		2005		2004		2003	
Acquisition										
Age	0.032		-0.043		0.316		0.717		0.647	
	(0.270)		-(0.980)		(0.820)		(1.630)		(0.980)	
Age squared	-0.007		0.001		-0.024		-0.069	*	-0.055	
	-(0.800)		(0.640)		-(0.870)		-(1.860)		-(0.900)	
Log fixed assets	0.146	***	0.196	***	0.186	**	0.289	***	0.127	
	(2.560)		(3.080)		(2.100)		(4.180)		(1.050)	
Number of empl.	0.000	***	0.000	*	0.000		0.000		0.001	*
	(2.740)		(1.900)		(0.120)		(0.380)		(1.850)	
Empolyees sq.	0.000	**	0.000	**	0.000		0.000		0.000	*
	-(2.410)		-(2.030)		(0.330)		-(0.430)		-(1.680)	
Outliers	0.021		0.177		-0.883		0.237		0.770	
	(0.070)		(0.550)		-(0.690)		(0.750)		(1.550)	
Industry dummy	YES		YES		YES		YES		YES	
Region dummy	YES		YES		YES		YES		YES	
Constant	-8.457		-4.789		-9.540		-11.883		-10.765	
	.		-(6.100)		.		.		.	
Number of obs.	4,266		3,715		3,660		6,245		1,352	
where treated	36		28		10		19		9	
LR	84.00		54.26		28.08		67.39		38.43	
Prob>chi2	0.000		0.000		0.009		0.000		0.000	
Pseudo R2	0.20		0.16		0.20		0.26		0.36	

z-statistics in parantheses, * $p<0.1$, ** $p<0.05$, *** $p<0.001$

Table B2 - Continued. Propensity score estimations for difference in Operating ROA

Propensity score, probit to match outcome Operating $ROA_{+3}-ROA_{-1}$

	2007	2006		2005		2004		2003	
Acquisition									
Age		-0.043		0.321		0.754	*	0.652	
		-(0.970)		(0.830)		(1.690)		(0.960)	
Age squared		0.001		-0.025		-0.072	*	-0.055	
		(0.660)		-(0.870)		-(1.920)		-(0.890)	
Log fixed assets		0.190	***	0.182	**	0.281	***	0.132	
		(2.980)		(2.040)		(4.010)		(1.070)	
Number of empl.		0.000	*	0.000		0.000		0.001	*
		(1.840)		(0.100)		(0.370)		(1.790)	
Empolyees sq.		0.000	**	0.000		0.000		0.000	*
		-(2.000)		(0.350)		-(0.420)		-(1.670)	
Outliers		0.198		-0.871		0.246		0.850	
		(0.600)		-(0.680)		(0.770)		(1.630)	
Industry dummy		YES		YES		YES		YES	
Region dummy		YES		YES		YES		YES	
Constant		-4.701	***	-9.510	***	-11.903		-10.815	
		-(5.930)		-(5.690)		.		.	
Number of obs.		3,355		3,307		5,539		1,228	
where treated		28		10		19		9	
LR		50.71		26.83		64.84		37.83	
Prob>chi2		0.000		0.013		0.000		0.001	
Pseudo R2		0.16		0.20		0.26		0.36	

z-statistics in parantheses

* p<0.1, ** p<0.05, *** p<0.001

Table B2 - Continued. Propensity score estimations for difference in Operating ROA

Propensity score, probit to match outcome Operating ROA_{+4}-ROA_{-1}

	2007	2006	2005		2004		2003	
Acquisition								
Age			0.149		0.759	*	0.678	
			(0.400)		(1.690)		(1.010)	
Age squared			-0.012		-0.073	*	-0.058	
			-(0.420)		-(1.920)		-(0.920)	
Log fixed assets			0.193	*	0.279	***	0.118	
			(1.770)		(3.860)		(0.920)	
Number of empl.			0.000		0.000		0.001	*
			-(0.630)		(0.330)		(1.790)	
Empolyees sq.			0.000		0.000		0.000	*
			(0.620)		-(0.380)		-(1.660)	
Outliers			-1.878		0.260		0.898	*
			-(0.130)		(0.800)		(1.670)	
Industry dummy			YES		YES		YES	
Region dummy			YES		YES		YES	
Constant			-9.091	***	-11.883		-10.720	***
			-(5.330)		.		-(4.180)	
Number of obs.			2,472		4,895		1,099	
where treated			8		19		9	
LR			24.18		62.06		37.01	
Prob>chi2			0.019		0.000		0.001	
Pseudo R2			0.22		0.25		0.35	

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

Table B3. Propensity score estimations for difference in TFP OP(2)

Propensity score, probit to match outcome TFP_0-TFP_{-1} (from OP (2))

	2007		2006		2005		2004		2003
Acquisition									
Age	0.026		-0.054		0.315		0.848	*	5.542
	(0.220)		-(1.280)		(0.820)		(1.740)		(1.600)
Age squared	-0.006		0.001		-0.025		-0.078	*	-0.456
	-(0.700)		(0.720)		-(0.870)		-(1.940)		-(1.570)
Log fixed assets	0.144	**	0.226	***	0.197	**	0.274	***	0.140
	(2.530)		(3.670)		(2.230)		(3.960)		(0.940)
Number of employees	0.000	**	0.000		0.000		0.000		0.001
	(2.830)		(1.590)		(0.120)		(0.530)		(1.620)
Empolyees squared	0.000	**	0.000	*	0.000		0.000		0.000
	-(2.460)		-(1.830)		(0.320)		-(0.550)		-(1.430)
Outliers	0.025		0.143		-0.874		0.269		0.449
	(0.090)		(0.450)		-(0.670)		(0.860)		(0.540)
Industry dummy	YES		YES		YES		YES		YES
Region dummy	YES		YES		YES		YES		YES
Constant	-8.416		-5.131		-9.665		-12.147		-25.744
	.		-(6.690)		.		.		-(2.350)
Number of	5,151		4,567		4,498		7,332		1,286
where treated	35		30		10		19		9
LR	92.62		63.65		30.88		68.58		33.60
Prob>chi2	0.000		0.000		0.004		0.000		0.001
Pseudo R2	0.22		0.18		0.22		0.27		0.39

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

Table B3 - Continued. Propensity score estimations for difference in TFP OP(2)

Propensity score, probit to match outcome $TFP_{+1} - TFP_{-1}$ (from OP (2))

	2007		2006		2005		2004		2003	
Acquisition										
Age	0.028		-0.035		0.312		0.757		5.623	*
	(0.240)		-(0.770)		(0.810)		(1.530)		(1.660)	
Age squared	-0.006		0.001		-0.024		-0.071	*	-0.460	
	-(0.730)		(0.430)		-(0.870)		-(1.720)		-(1.620)	
Log fixed assets	0.140	**	0.223	***	0.194	**	0.278	***	0.127	
	(2.400)		(3.540)		(2.150)		(3.790)		(0.820)	
Number of empl.	0.000	***	0.000		0.000		0.000		0.001	*
	(2.780)		(1.510)		(0.120)		(0.490)		(1.700)	
Empolyees sq.	0.000	**	0.000	*	0.000		0.000		0.000	
	-(2.430)		-(1.760)		(0.320)		-(0.540)		-(1.520)	
Outliers	0.040		0.166		-0.880		0.274		0.461	
	(0.140)		(0.510)		-(0.670)		(0.800)		(0.540)	
Industry dummy	YES		YES		YES		YES		YES	
Region dummy	YES		YES		YES		YES		YES	
Constant	-8.350		-5.162	***	-9.610		-11.916		-26.003	**
	.		-(6.540)		.		.		-(2.410)	
Number of obs.	4,571		4,008		3,939		4,873		1,132	
where treated	35		29		10		18		7	
LR	87.56		58.91		29.25		62.91		33.24	
Prob>chi2	0.000		0.000		0.006		0.000		0.002	
Pseudo R2	0.21		0.17		0.21		0.26		0.39	

z-statistics in parantheses, * $p<0.1$, ** $p<0.05$, *** $p<0.001$

Table B3 - Continued. Propensity score estimations for difference in TFP OP(2)

Propensity score, probit to match outcome $TFP_{+2}-TFP_{-1}$ (from OP (2))

	2007		2006		2005		2004		2003	
Acquisition										
Age	0.029		-0.044		0.232		0.824	*	5.770	
	(0.240)		-(0.990)		(0.620)		(1.680)		(1.640)	
Age squared	-0.006		0.001		-0.018		-0.076	**	-0.473	
	-(0.740)		(0.630)		-(0.640)		-(1.870)		-(1.610)	
Log fixed assets	0.132	**	0.192	***	0.183	**	0.266	***	0.124	
	(2.230)		(2.970)		(1.970)		(3.730)		(0.800)	
Number of empl.	0.000	***	0.000	*	0.000		0.000		0.001	*
	(2.760)		(1.890)		(0.120)		(0.440)		(1.720)	
Empolyees sq.	0.000	**	0.000	**	0.000		0.000		0.000	
	-(2.420)		-(2.030)		(0.330)		-(0.490)		-(1.570)	
Outliers	0.037		0.193		-0.857		0.301		0.634	
	(0.130)		(0.590)		-(0.650)		(0.920)		(0.700)	
Industry dummy	YES		YES		YES		YES		YES	
Region dummy	YES		YES		YES		YES		YES	
Constant	-8.260		-4.734	***	-9.250	***	-11.968		-26.455	**
	.		-(5.960)		-(5.710)		.		-(2.380)	
Number of obs.	4,087		3,583		3,526		5,646		976	
where treated	35		28		9		18		7	
LR	82.77		53.91		23.57		62.74		31.99	
Prob>chi2	0.000		0.000		0.035		0.000		0.002	
Pseudo R2	0.21		0.16		0.19		0.26		0.39	

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

Table B3 - Continued. Propensity score estimations for difference in TFP OP(2)

Propensity score, probit to match outcome TFP$_{+3}$-TFP$_{-1}$ (from OP (2))

	2007	2006		2005		2004		2003	
Acquisition									
Age		-0.045		0.244		0.736	*	5.869	
		-(1.000)		(0.640)		(1.660)		(1.630)	
Age squared		0.001		-0.019		-0.071	*	-0.481	
		(0.660)		-(0.680)		-(1.890)		-(1.600)	
Log fixed assets		0.187	***	0.182	*	0.273	***	0.121	
		(2.850)		(1.920)		(3.850)		(0.750)	
Number of empl.		0.000	*	0.000		0.000		0.001	*
		(1.820)		(0.100)		(0.350)		(1.700)	
Empolyees sq.		0.000	**	0.000		0.000		0.000	
		-(1.990)		(0.340)		-(0.410)		-(1.630)	
Outliers		0.208		-0.857		0.286		0.858	
		(0.620)		-(0.650)		(0.870)		(0.870)	
Industry dummy		YES		YES		YES		YES	
Region dummy		YES		YES		YES		YES	
Constant		-4.643	***	-9.248		-11.752		-26.757	**
		-(5.760)		.		.		-(2.360)	
Number of obs.		3,218		3,191		5,245		881	
where treated		28		9		19		7	
LR		50.20		22.86		64.17		31.25	
Prob>chi2		0.000		0.043		0.000		0.003	
Pseudo R2		0.16		0.18		0.26		0.38	

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

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Table B3 - Continued. Propensity score estimations for difference in TFP OP(2)

Propensity score, probit to match outcome $TFP_{+4}-TFP_{-1}$ (from OP (2))

	2007	2006	2005	2004	2003	
Acquisition						
Age			0.175	0.718	6.030	*
			(0.460)	(1.600)	(1.650)	
Age squared			-0.014	-0.069*	-0.493	
			-(0.490)	-(1.820)	-(1.610)	
Log fixed assets			0.193*	0.281***	0.114	
			(1.720)	(3.720)	(0.680)	
Number of empl.			0.000	0.000	0.001	*
			-(0.640)	(0.270)	(1.710)	
Empolyees sq.			0.000	0.000	0.000	*
			(0.610)	-(0.370)	-(1.690)	
Outliers			-1.921	0.312	1.276	
			-(0.130)	(0.920)	(1.100)	
Industry dummy			YES	YES	YES	
Region dummy			YES	YES	YES	
Constant			-9.141	-11.785	-27.283	**
			.	.	-(2.360)	
Number of obs.			2,375	4,651	781	
where treated			8	18	7	
LR			24.53	57.95	30.87	
Prob>chi2			0.017	0.000	0.004	
Pseudo R2			0.23	0.25	0.39	

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

Table B4. Propensity score estimations for difference in TFP OP(3)

Propensity score, probit to match outcome TFP_0-TFP_{-1} (from OP (3))

	2007		2006		2005		2004		2003
Acquisition									
Age	-0.019		-0.054		0.312		0.844	*	5.548
	-(0.180)		-(1.280)		(0.810)		(1.740)		(1.600)
Age squared	-0.003		0.001		-0.024		-0.078	*	-0.456
	-(0.410)		(0.720)		-(0.870)		-(1.940)		-(1.570)
Log fixed assets	0.134	**	0.226	***	0.196	**	0.274	***	0.141
	(2.430)		(3.680)		(2.220)		(3.970)		(0.940)
Number of empl.	0.000	***	0.000		0.000		0.000		0.001
	(2.910)		(1.590)		(0.130)		(0.540)		(1.620)
Empolyees sq.	0.000	**	0.000		0.000		0.000		0.000
	-(2.520)		-(1.830)		(0.320)		-(0.560)		-(1.430)
Outliers	0.026		0.141		-0.874		0.271		0.450
	(0.090)		(0.440)		-(0.670)		(0.870)		(0.540)
Industry dummy	YES		YES		YES		YES		YES
Region dummy	YES		YES		YES		YES		YES
Constant	-8.092		-5.138	***	-9.815		-12.125		-25.766
	.		-(6.700)		.		.		.
Number of obs.	5,187		4,609		4,543		7,508		1,296
where treated	36		30		10		18		7
LR	92.06		64.11		30.96		69.16		33.70
Prob>chi2	0.000		0.000		0.003		0.000		0.001
Pseudo R2	0.21		0.18		0.22		0.27		0.39

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

Table B4 - Continued. Propensity score estimations for difference in TFP OP(3)

Propensity score, probit to match outcome TFP_{+1}-TFP_{-1} (from OP (3))

	2007		2006		2005		2004		2003
Acquisition									
Age	0.027		-0.035		0.309		0.758		5.623
	(0.230)		-(0.770)		(0.800)		(1.530)		(1.660)
Age squared	-0.006		0.001		-0.024		-0.071	*	-0.460
	-(0.730)		(0.430)		-(0.860)		-(1.720)		-(1.620)
Log fixed assets	0.138	**	0.223	***	0.193	**	0.278	***	0.128
	(2.380)		(3.540)		(2.150)		(3.800)		(0.830)
Number of empl.	0.000	***	0.000		0.000		0.000		0.001
	(2.790)		(1.510)		(0.130)		(0.490)		(1.710)
Empolyees sq.	0.000	**	0.000	*	0.000		0.000		0.000
	-(2.440)		-(1.770)		(0.320)		-(0.540)		-(1.520)
Outliers	0.038		0.169		-0.880		0.273		0.466
	(0.130)		(0.520)		-(0.670)		(0.800)		(0.540)
Industry dummy	YES		YES		YES		YES		YES
Region dummy	YES		YES		YES		YES		YES
Constant	-8.333		-5.165	***	-9.592		-11.925		-26.016
	.		-(6.540)		.		.		.
Number of obs.	4,594		4,040		3,973		4,930		1,139
where treated	35		29		10		18		7
LR	87.73		59.33		29.32		63.20		33.29
Prob>chi2	0.000		0.000		0.006		0.000		0.002
Pseudo R2	0.21		0.17		0.21		0.27		0.39

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

Table B4 - Continued. Propensity score estimations for difference in TFP OP(3)

Propensity score, probit to match outcome TFP_{+2}-TFP_{-1} (from OP (3))

	2007		2006		2005		2004		2003	
Acquisition										
Age	0.030		-0.045		0.229		0.825	*	5.765	
	(0.250)		-(1.020)		(0.610)		(1.680)		(1.640)	
Age squared	-0.006		0.001		-0.017		-0.076	*	-0.472	
	-(0.740)		(0.650)		-(0.640)		-(1.870)		-(1.610)	
Log fixed assets	0.132	**	0.192	***	0.182	**	0.266	***	0.125	
	(2.220)		(2.970)		(1.960)		(3.750)		(0.810)	
Number of empl.	0.000	***	0.000	*	0.000		0.000		0.001	
	(2.760)		(1.890)		(0.120)		(0.440)		(1.720)	
Empolyees sq.	0.000	**	0.000	**	0.000		0.000		0.000	
	-(2.420)		-(2.040)		(0.320)		-(0.490)		-(1.560)	
Outliers	0.037		0.206		-0.854		0.301		0.627	
	(0.130)		(0.620)		-(0.650)		(0.920)		(0.690)	
Industry dummy	YES		YES		YES		YES		YES	
Region dummy	YES		YES		YES		YES		YES	
Constant	-8.260		-4.726	***	-9.230		-11.971		-26.456	
	.		-(5.950)		.		.		-(2.380)	
Number of obs.	4114		3,605		3,556		5,761		985	
where treated	35		28		9		18		7	
LR	83.01		54.05		23.63		63.37		32.09	
Prob>chi2	0		0.000		0.035		0.000		0.002	
Pseudo R2	0.21		0.16		0.19		0.26		0.39	

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

Table B4 - Continued. Propensity score estimations for difference in TFP OP(3)

Propensity score, probit to match outcome TFP_{+3}-TFP_{-1} (from OP (3))

	2007	2006		2005		2004		2003
Acquisition								
Age		-0.045		0.232		0.737	*	5.864
		-(1.000)		(0.610)		(1.660)		(1.630)
Age squared		0.001		-0.018		-0.071	*	-0.480
		(0.660)		-(0.650)		-(1.890)		-(1.600)
Log fixed assets		0.187	***	0.179	*	0.273	***	0.124
		(2.850)		(1.900)		(3.850)		(0.770)
Number of empl.		0.000	*	0.000		0.000		0.001
		(1.830)		(0.110)		(0.350)		(1.700)
Empolyees sq.		0.000	**	0.000		0.000		0.000
		-(1.990)		(0.330)		-(0.400)		-(1.620)
Outliers		0.209		-0.856		0.290		0.864
		(0.620)		-(0.650)		(0.880)		(0.870)
Industry dummy		YES		YES		YES		YES
Region dummy		YES		YES		YES		YES
Constant		-4.643	***	-9.185	***	-11.752		-26.775
		-(5.760)		-(5.660)		.		-(2.360)
Number of obs.		3,241		3,213		5,321		886
where treated		28		9		19		7
LR		50.39		22.72		64.68		31.29
Prob>chi2		0.000		0.045		0.000		0.003
Pseudo R2		0.16		0.18		0.26		0.38

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

Table B4 - Continued. Propensity score estimations for difference in TFP OP(3)

Propensity score, probit to match outcome TFP_{+4}-TFP_{-1} (from OP (3))

	2007	2006	2005		2004		2003
Acquisition							
Age			0.165		0.745	*	5.973
			(0.440)		(1.660)		(1.640)
Age squared			-0.013		-0.072	*	-0.488
			-(0.470)		-(1.900)		-(1.600)
Log fixed assets			0.189	*	0.274	***	0.114
			(1.690)		(3.720)		(0.680)
Number of empl.			0.000		0.000		0.001
			-(0.620)		(0.320)		(1.700)
Empolyees sq.			0.000		0.000		0.000
			(0.610)		-(0.380)		-(1.680)
Outliers			-1.893		0.312		1.278
			-(0.130)		(0.930)		(1.100)
Industry dummy			YES		YES		YES
Region dummy			YES		YES		YES
Constant			-9.071	***	-11.770		-27.106
			-(5.260)		.		-(2.350)
Number of obs.			2,396		4,718		784
where treated			8		19		7
LR			24.46		62.37		30.84
Prob>chi2			0.018		0.000		0.004
Pseudo R2			0.23		0.25		0.39

z-statistics in parantheses, * p<0.1, ** p<0.05, *** p<0.001

APPENDIX C

Table C1. Cumulative effects of M&A on Operating ROA

Operating ROA_0 - Operating ROA_{-1}

Year of M&A	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.015	0.013	-0.028	-0.58	5.93	0.949
2004	0.036	0.003	0.033	1.07	3.41	1.000
2005	-0.017	-0.019	0.002	0.06	5.20	0.951
2006	-0.024	-0.004	-0.020	-0.66	1.93	1.000
2007	-0.001	-0.003	0.002	0.09	2.65	1.000

Operating ROA_{+1} - Operating ROA_{-1}

Year of M&A	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.025	0.019	-0.044	-0.58	1.17	1.000
2004	0.010	-0.006	0.016	0.86	3.61	0.999
2005	-0.053	-0.047	-0.006	-0.09	5.02	0.957
2006	-0.036	-0.033	-0.004	-0.06	4.62	0.995
2007	-0.048	-0.012	-0.036	-0.60	2.17	1.000

Operating ROA_{+2} - Operating ROA_{-1}

Year of M&A	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.007	-0.001	-0.007	-0.10	3.65	0.994
2004	0.011	0.100	-0.087	-0.78	1.01	1.000
2005	0.008	-0.041	0.049	0.52	4.83	0.963
2006	-0.048	-0.031	-0.017	-0.33	3.14	0.999
2007	-0.063	-0.075	0.012	0.22	2.57	1.000

Operating ROA_{+3} - Operating ROA_{-1}

Year of M&A	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.070	0.007	-0.077	-0.91	2.33	0.999
2004	0.020	-0.015	0.035	0.84	5.65	0.991
2005	-0.074	-0.093	0.019	0.21	2.82	0.997
2006	-0.093	-0.048	-0.045	-1.02	2.14	1.000
2007						

Operating ROA_{+4} - Operating ROA_{-1}

Year of M&A	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.127	-0.006	-0.120	-1.35	2.29	1.000
2004	-0.021	-0.002	-0.018	-0.50	4.20	0.999
2005	-0.145	-0.086	-0.059	-0.60	2.42	0.992
2006						
2007						

LR-test of joint insignificance of all regressors after matching

Table C2. Cumulative effects of M&A on Operating TFP OP(2)

TFP_0-TFP_{-1} (for OP (2))

Year of M&A	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.463	-0.290	-0.173	-0.45	3.91	0.973
2004	-0.029	-0.058	0.029	0.22	3.64	0.999
2005	-0.028	0.063	-0.091	-0.39	3.68	0.989
2006	-0.221	-0.223	0.002	0.01	4.09	0.995
2007	-0.018	-0.028	0.009	0.14	1.68	1.000

TFP_{+1}-TFP_{-1} (for OP (2))

Year of M&A	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.523	-0.454	-0.069	-0.27	5.57	0.936
2004	0.210	0.006	0.204	1.31	2.97	1.000
2005	-0.099	-0.118	0.019	0.07	3.72	0.988
2006	-0.109	-0.173	0.065	0.40	1.50	1.000
2007	0.045	0.005	0.040	0.44	3.77	1.000

TFP_{+2}-TFP_{-1} (for OP (2))

Year of M&A	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.306	-0.203	-0.103	-0.37	3.50	0.991
2004	0.169	-0.260	0.429	2.48	6.90	0.960
2005	0.126	-0.150	0.276	0.83	3.32	0.993
2006	-0.201	-0.148	-0.053	-0.38	3.33	0.999
2007	-0.152	-0.016	-0.137	-1.36	0.95	1.000

TFP_{+3}-TFP_{-1} (for OP (2))

Year of M&A	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.537	-0.329	-0.208	-0.61	3.68	0.988
2004	0.079	-0.187	0.266	1.02	3.46	1.000
2005	0.218	-0.055	0.272	0.89	5.98	0.917
2006	0.087	-0.122	0.209	1.24	4.95	0.993
2007						

TFP_{+4}-TFP_{-1} (for OP (2))

Year of M&A	Treated	Controls	ATT	t-stat	LR-test	p>chi2
2003	-0.463	-0.195	-0.267	-1.32	3.30	0.986
2004	0.068	-0.183	0.251	0.97	3.94	0.999
2005	0.123	0.133	-0.01	-0.02	3.78	0.957
2006						
2007						

LR-test of joint insignificance of all regressors after matching