Growth Effects of Mergers and Acquisitions: A Sector-level Study of OECD countries

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The purpose of the paper is to analyze the impact of mergers and acquisitions (M&A) sales on economic growth. The analysis is conducted by sectors: primary, manufacturing and services. M&A sales are disaggregated by sectors and also into domestic and cross-border M&A sales. The group of the OECD countries is examined. After applying a Generalized Method of Moments (GMM) estimator, which controls for endogeneity of M&A, we find no support of the hypothesis that M&A activity contributes to economic growth, except for growth of the services sector. Both, financial and non-financial domestic services M&A, have a positive effect on services growth. Primary sector and manufacturing M&A have negative effects on their own sectors growth rates. At the aggregate economic level, the impact of M&A on growth is also negative.

1. Introduction

What are the implications of mergers and acquisitions (M&A) for growth? Neoclassical theory is primarily concerned with why M&A occur and views them either as responses to industry shocks, such as new regulation, technologies, liquidity constraints, or competition (Gort, 1969; Mitchell and Mulherin, 1996; Andrade et al., 2001; Sudarsanam, 2003; Andrade and Stafford, 2004; Weston et al., 2004; and Harford, 2005) or as responses to industry life cycles- growth, maturity, decline (Coase 1937; Nelson 1959; and Harford 2005). The implications of M&A for economic growth, however, are left out of this literature.

A second literature stream examines the international aspects of M&A. The last wave of M&A activity is a global one. It is primarily due to cross-border M&A operations. Researchers describe it as a wave of strategic megamergers occurring in industries undergoing deregulation, globalization and technological revolution (Weston, 2001; Ribeiro, 2010). In that regard, M&A are an integral part of foreign direct investment (FDI). A number of studies examine M&A as a mode of entry of FDI (Rossi and Volpin, 2003; Feliciano and

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Lipsey, 2002); and Mody and Negishi, 2001). This literature also tends to on the determinants, rather than the consequences of cross-border M&A. The question about the growth impact of M&A remains unexplored.

To help analyze the potential implications of M&A for economic growth, we can relate the question to the endogenous growth literature. Part of the endogenous growth theory investigates the question of whether increased competition (decreased concentration) leads to growth. The traditional Schumpeterian view has been that the possibility of future monopoly rents motivates firms to innovate and therefore induces economic growth (Aghion and Howitt, 1992; Caballero and Jaffe (1993). The classic economic growth text by Grossmann and Helpman (1991) also shows that competition hurts research and development and therefore growth, if it promotes imitation instead of innovation.

However, more recent studies point out to a positive correlation between competition (measured as number of competitors, or as inverse of a market share or inverse of a profitability index) and productivity growth within a firm or industry (Nickell (1996) or Blundell et al. (1995)). Further, Aghion et all (2005) postulate that the relationship between product market competition and innovation is an inverted U, i.e. "competition discourages laggard firms from innovating but encourages neck-and-neck firms to innovate" (Aghion et. all, 2005).

The above discussion is significant for analyzing the effects of M&A, since M&A lead to increased concentration in the industries where they occur. M&A are often regarded as an alternative to "organic" innovation-driven firm growth. Thus, the question we ask is: do M&A contribute to growth at the aggregate and at the industry level. We would argue that for this question the level of analysis- firm vs. aggregate, is important.

At the firm level, M&A lower average cost of production due to either cost synergies leading to economies of scale or a transfer of superior technologies leading to a downward shift of their average cost curves (Jensen 1988; Scherer 1988; De Bondt and Thompson, 1992). The merged firm is usually better equipped to compete in quantity and as a result captures a greater share of the market. At industry level, M&A could have a crowding-out effect on the rest of the firms in the industry, since these firms have to spread their fixed costs over a smaller share of the market (Aitken and Harrison, 1999). Thus, the overall industry effects of M&A are ambiguous.

The international M&A carry an additional aspect as well. As part of FDI, cross-border M&A are expected to "spill-over" superior technologies, such as organizational and managerial know-how, as well as technical expertise to domestic economies (Borenstein et al. 1998; Doytch and Uctum, 2011a). The argument for that is that in order for a foreign company to survive, it needs to have a competitive advantage to domestic firms. Besides their productivity effect, cross-border M&A sales also have their "traditional" investment effect on domestic economies, i.e. as capital inflows augmenting domestic capital. Previous studies have found that the impact of cross-border M&A sales depends on the industry where they occur (Doytch and Uctum, 2011b).

The goal of the current paper is to examine the growth effects of mergers and acquisitions - both domestic and cross-border (international), by sectors and on the overall economy. The object of the study is the group of the OECD countries, thirty one countries in total. The paper finds evidence most consistent with Nickell (1996) and Blundell et al. (1995). Overall, there is no evidence that merger and acquisition activity in OECD countries

leads to economic growth. All sectoral effects uncovered, except for the services sector, are negative. At the level of services sector, both financial and non-financial services M&A tend to have a positive impact.

The paper is organized further as follows: section 2 examines the conceptual framework and empirical methodology; section 3- data; section 4- empirical results and section 5 concludes.

2. Conceptual framework and empirical methodology

2.1 Conceptual framework

The paper utilizes a growth model based on the neoclassical Solow-Swan, Ramsey-Coopmans-Kass model. The model controls for the gap between the initial per capita output and its steady-state-value and assumes that countries that start off below their steady-states levels of output grow faster than those starting off close to their steady-states levels. Following the standards set by a model an innovation by Mankiw, Romer and Weil (1992), which introduced human capital, next to physical capital, the model includes additional control variables, such as educational attainment and quality of governance.

The implication of neoclassical growth theory is the following dynamic equation in output.[2]

$$\log y_{i\,t} = (1 + \beta)\log(y_{i,t-1}) + \Gamma W_{it} + \varepsilon_{it}$$

(1)

where the subscripts i and t describe the cross-sectional and time dimensions of the panel data, respectively; y_{it} is the per capita output of country i, W_i is a vector containing the log of the "traditional" growth determinants suggested by the Solow growth model, such as population growth rate, technological progress and depreciation rate, human and physical capital (Mankiw, Romer, and Weil, 1992) as well as the more recently developed determinants, such as institutional factors, for example. β is the convergence parameter and Γ is vector, capturing estimates of the effects of the control variables and the key explanatory variable- M&A sales.

2.2. Empirical Methodology

The empirical model we analyze is:

$$\log y_{it}^k = \beta_0 + (1 + \beta_1)\log(y_{i,t-1}^k) + \beta_2 x_{it} + \beta_3 f_{it}^j + \beta_4 \delta^t + \mu_i + \varepsilon_{it} \,,$$

(2)

$$\mu_i \sim i.i.d(0, \sigma_{\mu_i}) \qquad \varepsilon_{it} \sim \text{i.i.d.}(0, \ \sigma_\varepsilon), \ E[\mu_i \varepsilon_{it}] = 0.$$

where i= 1,..,31 and t= 1,..,18, the superscript k stands for a GDP index (k= GDP, primary sector value added, manufacturing value added, and services value added), the superscript j is an M&A index (j= primary sector M&A, manufacturing M&A, financial M&A, and non-financial service M&A). In each sector M&A are sub-divided into domestic and international. Accordingly, y_{it}^k is real per capita output in industry k, in constant year 2000 prices, $y_{i,t-1}^k$ is its lagged level, f_{it}^j is the GDP share of M&A sales into the jth industry.

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[2] Islam, 1995; Caselli, Esquivel and Lefort, 1996; Durlauf and Quah, 1998; Durlauf, Johnson and Temple, 2004.

The last variable is the most relevant determinant for this study, which mainly examines the coefficient β_3.

The row vector x_{it} consists of the most commonly used control variables in the growth literature, such as investment in fixed capital as a share of GDP, real lending interest rate, gross secondary school enrolment ratio, government consumption share of GDP and government stability. δ^t is a time-specific effect, measured by dummies and μ_i is a country-specific fixed effect. (A country-specific random effect would assume an independent distribution of the explanatory variables from the individual effects- an assumption that is violated between $y_{i,t-1}$ and μ_i.)

The combinations between k GDP indexes and j M&A indexes give forty four distinct regressions. We regress four per capita growth rates (aggregate GDP, primary sector value added, manufacturing value added and services value added) on ten kinds of M&A sales (aggregate M&A, primary sector, manufacturing sector, financial services and non-financial service M&A- each kind represented by two measures: domestic and international). In addition, we examine the impact of total M&A- an aggregate for domestic and international on the four growth rates as well.

The method we focus on is the method of "system GMM" estimation. The alternative static methods such as pooled OLS and Fixed Effects are not appropriate for studying growth. A pooled OLS estimation does not account for the time-series dimension of data and the unobserved country-specific heterogeneity; the method of fixed effects still does not control for the potential endogeneity and does not allow for studying the long-run trend in the data, since it computes deviations from time-averaged sample means. Thus, the above static approaches are not a good tool for analyzing a dynamic relationship between variables where time-averaging is conceptually not sensible.

The Blundell-Bond system GMM is specifically designed to capture the joint endogeneity of some explanatory variables through the creation of a matrix of "internal" instruments. It uses both lagged level observations as instruments for differenced variables and lagged differenced observations as instruments for level variables. Both estimators have one set of instruments to deal with endogeneity of regressors and another set to deal with the correlation between lagged dependent variable and the induced MA(1) error term.[3] A necessary condition for both difference and system GMM is that the error term is not serially correlated, especially of second order, otherwise the standard errors of the instrument estimates grow without bound. For this reason Arellano and Bond (1991) have developed a second order autocorrelation test, which I report.

An additional necessary condition for the efficiency of the Blundell-Bond system GMM estimator is that, even if the unobserved country-specific effect is correlated with the regressors' levels, it is not correlated with their differences. The condition also means that the deviations of the initial values of the independent variables from their long-run values are not

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[3] For an application to growth regression of Arellano Bond methodology see Caselli, Esquivel and Lefort (1996) and Easterly, Loayza and Montiel (1997) and that of Blundell and Bond see Levine, Loayza and Beck (2000)

systematically related to the country-specific effects.   These sets of conditions can be written as follows4.

a. The standard GMM conditions of no second order autocorrelation in the error term

$$E[y_{i,t-s}^{k} (\varepsilon_{it} - \varepsilon_{i,t-1})] = 0$$ for s≥2 and t=3,….T

$$E[x_{i,t-s} (\varepsilon_{it} - \varepsilon_{i,t-1})] = 0$$ for s≥2 and t=3,….T

$$E[f_{i,t-s}^{j} (\varepsilon_{it} - \varepsilon_{i,t-1})] = 0$$ for s≥2 and t=3,….T;   (3)

b. Additional conditions of no correlation of the unobserved country-specific effect with their differences:

$$E[(y_{i,t-1}^{k} - y_{i,t-2}^{k})(\mu_i + \varepsilon_{it})] = 0$$

$$E[(x_{i,t-1} - x_{i,t-2})(\mu_i + \varepsilon_{it})] = 0$$

$$E[(f_{i,t-1}^{j} - f_{i,t-2}^{j})(\mu_i + \varepsilon_{it})] = 0$$ (4)

A problem with System GMM estimator can arise if the instruments are too many, leading to overfitting of the model (Roodman, 2006). Unfortunately, there is little guidance in the literature to determine how many instruments are "too many" (Roodman 2006, Rudd 2000). A recommended rule of thumb by Roodman is that instruments should not outnumber individuals (or countries). This is the reason why, we limit the number of lags to a minimum.

3. Data

All variables, except for M&A sales, secondary school enrolment ratio and government stability, are from World Development Indicators (WDI), the World Bank web site and the reports of the Economic Intelligence Unit. The secondary school enrolment ratio is compiled from the web site of, United Nation Educational, Scientific and Cultural Organization and World Development Indicators (WDI). Government stability series are from the International Country Risk Guide reports. The source for M&A sales data is SDC, a Thomson Financial data base.

The four dependent growth variables - GDP, primary sector value added, manufacturing value added, and services value added are percentage per capita annual growth rates in constant local currency. Primary sector refers to industries 1-14 of International Standard Industrial Classification (ISIC), revision 3-1, Manufacturing refers to industries divisions 15-37, and Services correspond to ISIC divisions 50-99. Services include value added in wholesale and retail trade (including hotels and restaurants), transport, and government, financial, professional, and personal services such as education, health care, and real estate services. Also included are imputed bank service charges, import duties, and any statistical discrepancies noted by national compilers as well as discrepancies arising from rescaling.

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[4] In our analysis we used Stata's GMM-style option to instrument the M&A and the lagged output, and the iv-style option to instrument the elements of the x matrix.

Gross fixed capital formation as a share of GDP consists of plant, machinery, and equipment purchases, construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings, land improvements (e.g., fences, ditches). According to the 1993 SNA, net acquisitions of valuables are also considered capital formation.

Real lending interest rate is the difference between the rate charged by banks on loans to prime customers and the annual inflation rate, measured by the GDP deflator. The latter is calculated as the ratio of GDP in current local currency to GDP in constant local currency (base year varies by country).

Gross secondary school enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown.

General government final consumption expenditure as a share of GDP is government current expenditures for purchases of goods and services, including compensation of employees, and most expenditure on national defense and security, excluding government military expenditures, which are part of government capital formation.

Government stability is a variable compiled by the International Country Risk Guide. It has three components consisting of government unity, legislative strength and popular support. It assesses how well the government can carry out its declared programs and can stay in the office. It is an index from 0-12, where an increase reflects an improvement.

M&A sales are defined as the announced M&A sales transactions, where the M&A sale is equivalent to an inflow of capital in exchange for the acquired assets.

The countries included in the study are: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Rep., Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Rep., Spain, Sweden, Switzerland, Turkey, United Kingdom, United States. The econometric analysis is done based on a time-series sample that spans 1985-2008.

4. Results

The results are presented in Table 1. The rows describe the regression coefficients of the M&A sales, starting with total M&A (Panel 1), primary sector M&A (Panel 2), Manufacturing M&A (Panel 3), Financial Services M&A (Panel 4), and Non-financial Services M&A (Panel 5). The "Panels" are further divided into a row for domestic M&A sales and a row for cross-border (international) M&A sales. The columns of the table describe the effects of different kinds of M&A sales on the respective sector growth. The first column corresponds to aggregate growth, the second- to primary sector, the third- to the manufacturing sector, and the last column- to sector of services.

The overall impression of the results is one of negative impact; all but services' M&A significant coefficients are negative. The coefficients of total domestic, total international and aggregate total M&A are negative (panel 1). There is evidence of negative significant impact of total M&A on the services sector growth and on aggregate growth (panel 1, columns 4 and 1). The estimates of the impact on the other two sectors- primary and secondary, are also

negative in sign, but are not necessarily significant. The effect on services can be attributed to cross-border M&A rather than domestic M&A.

Reviewing the results by sectors shows some contrasts. Both primary sector and manufacturing M&A impact the primary and the secondary sectors. However, in the case of primary M&A the effect is due to the domestic mergers, whereas with manufacturing M&A, the effect can be attributed to cross-border M&A (panels 2 and 3, columns 2 and 3). In both of these cases the effects are negative. There is no evidence that intensity of merger activity leads to growth in these sectors.

Services M&A, on the other hand, show evidence of impacting all three sectors. Both financial and non-financial services M&A show evidence of a negative impact on manufacturing growth and a positive effect on services growth. In both cases, these effects are produced by domestic M&A. Therefore, merging of tertiary sector firms, more specifically of domestic tertiary sector firms enhances services sector growth and hinders growth in the manufacturing sector. The evidence about services M&A impact on the primary sector is mixed.

Overall, the evidence does not support a claim that merger and acquisition activity in OECD countries causes economic growth. When the M&A impact is examined at both the aggregate and the sector levels, most of the effects uncovered are negative. The few exceptions are the positive effects services M&A have on their own sector growth.

These findings support a positive correlation between competition and productivity growth at the industry and the aggregate levels, which is line with the studies by Nickell (1996) and Blundell *et al*. (1995). Concentration of firms, therefore, with the exception of the sector of services, tends to hinder growth at both the sector and the aggregate levels.

5. Conclusion

The consequences of M&A remain less studied than the reasons why mergers occur. This study examines the question of whether M&A activity contributes to economic growth or to the contrary- hinders economic growth. This study conducts the analysis at the sector level and analyzes M&A, disaggregated into domestic and international. It examines thirty one OECD countries for the period 1985-2008.

The general finding does not support that M&A activity spurs economic growth. The sector-level evidence suggests that with the exception of the sector of services, M&A tend to be either neutral to growth or cause a negative effect growth. Such a finding supports previous studies done at the firm and the industry levels and does not support the endogenous growth theory hypothesis that increased industry concentration ratios motivate firms' innovation and induce economic growth.

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Appendix

Table 1 Unbalanced panel 1985-2008

Variable	Column 1	Column 2	Column 3 I(0)	Column 4 I(1)
Table Panel 1				
Total M&A Sales	**-0.020****	-0.071	-0.056	**-0.024***
Total Domestic M&A Sales	-0.016	-0.410	**-0.291*****	-0.005
Total Cross-Border M&A Sales	-0.017	-0.004	-0.052	**-0.036***
Table Panel 2				
Primary Sector Domestic M&A Sales	-0.063	**-0.576****	**-0.581***	0.052
Primary Sector Cross-Border M&A Sales	0.300	-0.378	-1.626	[0.0821]
Table Panel 3				
Manufacturing Domestic M&A Sales	-0.286	-0.580	[0.026]	[-0.319]
Manufacturing Cross-Border M&A Sales	0.001	**-0.465***	**-0.458***	-0.001
Table Panel 4				
Financial Services Domestic M&A Sales	0.065	0.452	**-0.608***	**0.114***
Financial Services Cross-Border M&A Sales	[0.116]	**0.792***	0.020	0.182
Table Panel 5				
Non-Financial Services Domestic M&A Sales	-0.039	**-0.748****	[**-0.568**]**	**0.114****
Non-Financial Services Cross-Border M&A Sales	**-0.016***	-0.077	-0.009	-0.023

Notes: †The first entry in each cell is the estimate of the M&A coefficient on output. Figures in parentheses are the z-statistics. Figures in square brackets are estimates obtained when the second order autocorrelation condition in the error of the model is not satisfied. These estimates are reported for completeness. The coefficients and the standard errors are robust to heteroscedasticity and obtained from one-step Blundell-Bond System GMM with instrumental variables. ***, ** and * represent marginal significance levels with less than 1%, 5%, and with equal or less than 10%, respectively.