UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Impact of Firm Performance, Size, and Acquisition on Executive Compensation

Zazy Khan and Van Diem Nguyen

Graduate School
Master of Science in
Finance
Master Degree Project No.2010:131
Supervisor: Stefan Sjögren

IMPACT OF FIRM PERFORMANCE, SIZE AND ACQUISITION ON EXECUTIVE COMPENSATION

Zazy Khan **Van Diem Nguyen**

May 2010

ABSTRACT

Prior economic literature has long debated on the determinants of managerial remuneration. This paper examines the impact of corporate performance, size, and acquisition on CEO's cash compensation of 315 firms listed on the Stockholm Stock Exchange during 2001-07. The analysis adopts multiple approaches including OLS cross-sectional study on period growth, panel analysis on levels through the within approach, and dynamic model with the most advanced methods of difference and system GMM. We find that performance is more important than growth in determining pay changes, but size-related heterogeneity is crucial. Acquisition direct impact on pay is generally undetected.

JEL classification: G34

Key words: Performance; Size; Acquisition; CEO compensation

This work is dedicated to our families.
Their love, support and sacrifice contribute to every achievement of ours.

ACKNOWLEDGEMENT

We are grateful to our supervisor Stefan Sjögren for his continuous support and instruction in this dissertation. He showed us different ways to approach a research question, kept us on track, provided us with constructive criticisms, encouragement and helpful suggestions. His discussion on economic reasoning helped flourishing our ideas and arguments in the paper.

Special thanks are due to Professor Martin Holmen who first inspired the topic of this paper via his lectures, then enabled the study with important data provision and enormous contributions in empirical work. He was always kind and patient, assisting us throughout the analysis.

We wish to express our sincere gratitude to Dr. Roger Wahlberg from whom we learnt the very essential econometric understanding to carry out this research. His excellent assistance in STATA, econometric methods and especially pedagogic material on dynamic models are of great value.

This paper is the turnout of our two-year MSc programme at the Graduate School, School of Business, Economics and Law. We thus would like to thank the school administration for their kind support, making our stay in Gothenburg, Sweden memorable and pleasant.

Finally, we state that we are solely accountable for any flaws that the dissertation may contain.

May 2010

TABLE OF CONTENTS

LIST OF TABLES

I. INTRODUCTION

Executive compensation has drawn great attention from financial economists since the 1980s. It is initially approached as an internal incentive system to alleviate the agency problem caused by separation of ownership and control in modern corporations (Baker, Jensen & Murphy 1988). Enormous effort has been put in understanding pay practices and their connection with firm performance (Murphy 1985, Jensen & Murphy 1990), corporate governance (Girma, Thompson & Wright 2007), and important corporate decisions such as investment (Smith & Watts 1992), financing (Jensen 1986, John & John 1993), dividend (Gaver & Gaver 1993), mergers and acquisitions (Schimdt, Dennis & Fowler 1990, Girma, Thompson & Wright 2006, Cai & Vijh 2007), etc. Despite various empirical approaches and findings, research so far mainly relies on the U.S. (e.g. Lambert & Larcker 1987, Avery *et al.* 1998, Grinstein & Hribar 2004) and the U.K. data (e.g. Main 1991, Girma *et al.* 2006, Coakley & Iliopoulou 2006). Considering potentially extensive heterogeneity in pay practices across countries as well as their changes over time (Murphy 1998), obviously it is interesting to collect more international and updated evidence on these internal incentive systems. This paper stands among very few attempts, and is probably the most recent, to gain insights of actual remuneration arrangements in Scandinavia, and particularly Sweden. The study explores some features of major concern in pay practices through a large panel of 315 quoted firms on the Stockholm Stock Exchange from 2001 to 2007.

For its purpose to keep managers aligned with shareholder's interest, the incentive link in reward systems has consistently been a main concentration. Early studies largely document the absence of merit pay (Medoff & Abraham 1980). The connection, if found statistically significant, provides rather minor economic explanation (Jensen & Murphy 1990). Alternatively, there holds a common proposition that CEO's compensation is mostly determined by firm size (e.g. McGuire *et al.* 1962, Baker, Jensen & Murphy 1988, Kostiuk 1990, Conyon & Leech 1994, Kroll *et al.* 1997). Acquisition, as a major, externally observable and long-term investment decision, while could contribute to value creation, inherently increases firm size. This dual effect induces an implicit association between the transaction and executive income. Furthermore, managers might earn additional return due to increasing firm scope, further responsibility, complexity and risk of managing the takeover, or gaining prestige and more power over the corporate governance schemes. Thus, the influence of takeovers on top pay has also been richly discussed (Schmidt & Fowler 1990, Firth 1991, Avery *et al.* 1998, Khorana & Zenner 1998, Girma *et al.* 2006, Guest 2009).

This paper aims to investigate the impact of firm performance, size and acquisitions on CEO's cash compensation. The analysis adopts multiple approaches from cross-sectional study on period growth, extending to panel analysis on levels through the within dimension of the data, and further allowing for dynamics with the most advanced methods of difference and system GMM. We control for size-related heterogeneity through the firm's relative rank and breakdown of different percentiles in the size distribution. The results are robust to heteroskedasticity and endogeneity. Conclusions drawn upon the two-step GMM estimations are unaffected by instrument count.

As per findings, the incentive link consistently holds throughout the analysis on the full sample. For sub-samples grouped by firm size, we document a declining trend in the importance of merit pay towards larger scale. We consider it as evidence of efficiency loss that cash-based reward systems suffer from expansion. It could either imply higher agency costs associated with increasing operational span (Jensen and Meckling 1976) or suggest the presence of other forms of incentive provision in big corporations.

In contrast with much research (Weigelt *et al*. 1991, Conyon & Gregg 1994, Girma *et al*. 2002), we find that firm size is relatively weaker than performance in determining executive income. Based on a cross-sectional estimation of the seven year change, CEO of the median firm gains SEK 748 for each SEK million increase in market value, but only SEK 223 for each SEK million growth in revenue. Generally, sales elasticity, when found significant, is about 40% - 60% lower than performance elasticity. However, size influence gets strengthened when companies grow larger. This, again, stresses the importance of size-related heterogeneity in understanding pay determinants.

Regarding the post-acquisition analysis, we do not find strong evidence of the transaction's direct impact on executive remuneration. When we seek to isolate the size-enhancement effect of acquisitions, the period change estimation indicates that managers of firms above median size are rewarded for acquisition growth more than for organic growth. The static panel fixed effects model detects additional return for small acquirers only. However, when we allow for potential changes in the unobserved heterogeneity during the study period, the system GMM estimators clearly identify the direct link between managerial earnings and acquisition in the full sample. Vis-à-vis non-acquirers, executives of acquiring firms on average gain 1.17% in the year completing the transaction, another 1.12% in the following year and 1.19% more in the next two years.

The balance of the paper is organized as follows: Section II conducts a literature survey for the pay determinants of interest. A comprehensive but brief review sets ground for theories,

advanced by prior empirical work and winds up with our suggested hypotheses. Section III describes the data formation process, followed by methodological framework. Section IV reports the empirical findings. Robustness check is presented in section V. Finally, section VI draws the conclusion.

II. LITERATURE REVIEW

A. COMPENSATION AND FIRM PERFORMANCE

Relationship between executive compensation and firm performance has received much attention in both theoretical and empirical literature. Under the principal-agent framework, the optimal contract provides risk-averse self-interested managers with efficient incentives to maximize shareholder's wealth. Unfortunately, in practice, it is by far much complicated to adequately specify the appropriate actions that shareholders desire the manager to choose, given the circumstances (Murphy 1998), and consequently, the observable measures of their performance. The use of noisy and manipulable measures and standards in compensation contracts may distort incentives, generating unintended and counterproductive results (Baker, Jensen & Murphy 1988, Murphy 1998).

Empirical work documents a positive correlation between the managerial earnings and various proxies for firm performance. Lewellen and Huntsman (1970), upon deflating both compensation and its determinants by net assets, find that profit is substantially important in determining executive remuneration. Cisel and Carroll (1975) suggest the impact of firm profitability via sales growth and cost control. After improving Lewellen and Huntsman model and controlling for multicollinearity and heteroskedasticity, Smyth, Boyes, and Peseau (1975) conclude that compensation is based on utility function of both sales and profits. Murphy (1985) with a dataset of 500 executives on 73 largest US firms during 1964-81, documents a significantly positive relation between firm performance and executive remuneration as measured by the shareholder's realized return. The author argues that shareholder being the principal in the agency-theory, generally gets more concentration when defining performance in terms of shareholder's returns rather than accounting profits. Regarding remuneration, he employs six components including salary, bonuses, salary & bonuses, deferred compensation, ex-ante value of stock options, total compensation (the aforementioned together with fringe benefits and saving plans). The author suggests to control for the firm and individual specific effects in order to assess performance impact on compensation while estimating the performance-pay relation within time-series and cross-

sectional framework. Extending his debate, omission of firm-performance components e.g. stock, deferred compensation, and granted options in empirical work understate the effects of performance on compensation. Mehran (1995) exploiting a panel of 153 US firms during 1973-83, finds evidence in favour of equity-based executive compensation by firm performance, measured by Tobin's Q and return on assets.

Accordingly, we check for the prevalence of efficient incentive provision in Scandinavian/ Swedish reward systems. Our first hypothesis is thus:

Hypothesis 1: There exists a positive link between firm performance and executive pay.

B. COMPENSATION AND FIRM SIZE

Higher pay in larger firms is probably the most established stylized fact in remuneration research. Several theoretical explanations set ground for this relation. In the neo-classical theory of managerial compensation initiated by Roberts (1959), Marris (1967), and Yarrow (1972), manager is considered as a factor of production, who offers services for his managerial ability and get rewarded equivalent to his marginal product of ability. Based on this formulation, greater talents will lead larger corporations and thus earn higher return. Compliant with the tournament theory, a bigger company implies more players in the tournament, hence a higher prize for becoming CEO (Conyon, Peck & Sadler 2001). Baker, Jensen and Murphy (1988) and Murphy (1998) highlight the prevailing use of surveys in determining compensation. These surveys relate pay to firm size, underlining the remarkably uniform nature of pay – size elasticity across different countries, industries, and firms (see Kostiuk 1990, Rosen 1992). Return to the agency theory, the size impact might signal managerial opportunism since it motivates managers to expand the company beyond the optimal level to enjoy their personal benefits (Jensen 1989).

Cosh (1975) examines the association of chief executive remuneration with firm size and profitability in an analysis of inter-industry and inter-size-class differences on a large panel of 1600 U.K. firms during 1969 - 1971. Upon the OLS regressions on the mean variables, the results depict size as a major determinant of top pay with an explanatory power of 49% on average. Nevertheless, significant differences in the role of size and profit were identified across size groups. In another study of 120 firms with cross-sectional data, Deckop (1988), argue that typically CEO is not authorized to increase sales on the cost of profit but contrarily these results vary for inter-industry models where executive's compensation is strongly correlated with sales. Kostiuk (1990), after applying OLS, fixed effects and between regressions, strongly suggests the positive and stable relation between executive pay and firm

size over time. Lambert, Larcker and Weigelt (1991) undertakes a cross-sectional study on compensation granted to executives of different levels within the corporation hierarchy. The authors conclude that pay raise is less sensitive to size growth despite strong correlation in the levels. Some recent studies based on dynamic panel models (Girma *et al.* 2006; Guest 2009) find weak evidence for the association between the firm performance and executive pay, but their pay-size findings are parallel with much research reporting about its positive association, truncating other determinants.

Our second hypothesis hence focuses on the controversial pay-size matching in Scandinavian/ Swedish remuneration contracts:

Hypothesis 2: Firm growth positively affects CEO compensation.

C. COMPENSATION AND ACQUISITION

Managerial motive to engage firm in acquiring activities may be apparently viewed as profit-maximization but inherently it originates the agency problems (Amihud & Lev 1981, Firth 1991) such as managerial entrenchment (Berger *et al.* 1997, Shleifer & Vishny 1989, Agrawal & Mandelker 1987, Morck *et. al.* 1990), size-related additional benefits (Murphy 1985, Jensen & Murphy 1990), hubris (Roll 1986), diversification (Amihud & Lev 1981, Finkelstein & Hambrick 1988, Rose & Shepard 1997, Berry *et al*. 2002), and empire building (Jensen 1974, Williamson 1964), etc. Jensen (1986) argues that executives' engagement in large corporate takeovers may be to augment their personal remuneration (Baumol 1959, Penrose 1959, Williamson 1964). This can be achieved either via organizational size enlargement or by performance improvement (Dickerson *et al.* 1997, Wright *et al.* 2002)

A majority of extant studies of the managerial literature documents the significantly positive association between the acquiring activities and executives remuneration. Schmidt and Fowler (1990) study indicates that managers engaged in corporate takeovers received, on average, higher remuneration. The increment in compensation is contingent to firm increased risk and corporate responsibilities. Khorana and Zenner (1998) investigate the comparative impacts of large acquisitions on a group of acquirers with a group of non-acquirers executives during 1982-86. They find that an ex-ante managerial expectation is strongly related with the increased firm size for acquirers but not for non-acquirers. They also report an incremental trend in executive pay in post-acquisition period. Grinstein and Hribar (2004) results suggest large acquisition transaction is decisive in determining the executive's bonuses contingent to managerial effort in accomplishing corporate deal. These results are consistent with Anderson *et al.* (2004) who conclude that executive compensation increases following a merger

between billion-dollar banks. Girma *et al.* (2006) document weak evidence of merger impact, presumably indicating the managerial incentive to enlarge the firm size by corporate takeovers. Guest (2009) advances the results and strongly advocates the established argument of acquisition effect on executive compensation. The pay increase, however, is transitory and offset by a decline two years following the transaction.

Firth (1991) findings are interesting with respect to market behavior, observed in post-acquisition period. The executives were rewarded even for those acquisitions; generated negative returns for the shareholders. Bliss and Rosen (2001), Guest (2009) support Firth (1991) stylized facts by their results which report that executives compensation increased even if mergers caused the acquiring firm stock price declined after the acquisition announcement date.

In a similar way, Conyon and Gregg (1994), explain the mechanics of takeovers effect on executives pay. Their results suggest that acquirers' executives are compensated more by acquisition growth than by organic growth (Grinstein & Hribar 2004). A critical assessment is made by Kroll *et al.* (1997), by considering two different streams of research and firm controlling mechanism. They divide the study into two separate theoretical models identifying by owner-controlling firms and owner-manager-controlling firms. The findings are consistent with the hypothesis of increased executive compensation contingent upon the firm size and performance in post-acquisition period. Their findings are in line with Amihud and Lev (1981), suggest that manager-controlled firms are more involved in acquisitions than those firms controlled by the owners.

Nevertheless, there is still considerable controversy about whether and how much legitimacy is linked in theoretical argument and empirical research on acquisition effect on executive pay. Another well weighted portion of researchers do not find clear evidence between the acquisition and CEO compensation relationship. This relationship, when identified, is empirically weak. Avery *et al.* (1998) with the panel of 346 executives data set, examines the hypothesis of acquisition effect on executives remuneration and find no evidence that CEO could increase his or her salary by undertaking the acquisition. In line with prior studies, we test our third hypothesis as:

Hypothesis 3: Managerial remuneration is related to acquiring activities.

III. DATA AND METHODOLOGY

A. SAMPLE FORMATION PROCESS

CEO's compensation data is structurally divided into two main streams; first, in addition to firm characteristics, data on CEO's traits are collected from the firm's annual reports, second, financial performance or accounting data is obtained from the Datastream and Reuters 3000. The final sample consists of 315 firms, during 2001-2007, in total 1774 firm year observations. Using Thomson Reuters M&A database, we checked for acquisitions completed by the sample firms from January 1, 2000 to December 31, 2007. Our acquisition data dated back to 2000 in order to capture the lagged effects of the transactions. A takeover is identified and included in our data set if it is (1) undertaken by firms in our compensation sample, (2) listed as completed with an announcement date and effective date within our suggested sample period, (3) identified as an acquisition of majority interest by Thomson Reuters.

Based on aforementioned stipulations, our acquisition analysis comprises 1279 corporate control transactions by 222 firms, including financial and non-financial, domestic and cross-borders, public and private targets. The table A1 demonstrates, on average, 5.68 takeovers were made per firm over the seven years period. In comparison, other studies e.g. Girma *et al.* (2006) use a sample of 472 acquisitions over the period of 1981-96, Guest (2009) investigates the impact of mergers and acquisitions (M&A) activities on remuneration with 4528 firms carried by 1408 acquirers over the period of 1984-2001, Lourghran & Vijh (1997) use a sample of 947 acquisitions by 639 firms over a 20 year period (1970-1989), Datta, Datta & Raman (2001) employ in their analysis 1,577 acquisitions made by 142 firms over 6 years period (1993-98). Compare to these large economies of the U.K. and the U.S., Swedish economy has considerably limited premises, however, its listed firms appeared relatively acquisitive on average. The geographical distribution of acquisitions over the period is illustrated in Appendix table A1. 507 firms were acquired domestically whereas 772 acquisitions were made overseas by firms publicly listed at Stockholm Stock Exchange. High frequency of takeovers demonstrates the acquisition boom after 2000's. A comparative view clearly distinguishes the geographic dispersion. Increased trend in cross-border takeovers (60.36%) differs than the U.K. study of takeovers made by Guest (2009) on 4528 acquisitions over 1984-2001, and reported that 29% acquisitions are cross-border.

To align with previous methodological work, we adopt the normal convention of defining the CEO compensation as reported pay i.e. salary plus bonuses (Lewellen & Huntsman 1970, Girma *et. al.* 2006, Guest 2009). In order to control for the potential confounding effects of including CEOs with and without options and shares, we deliberately do not include the granted options and shares to CEO in his remuneration package primarily for two impediments; first, missing observations and second, lack of market values for those options. Further details concerning data sources and definitions are represented in Table A3.

Table A2 summarizes the descriptive statistics of the variables. Several important implications could be noticed. Firstly, panel A – E generally show substantial difference between the variable mean and median, indicating positively skewed distribution with prominent outliers. This suggests that a logarithm transform could smooth out the large variances, provide a closer to normal distribution and consequently a better fit. Secondly, panel E signals potential high noise associated with return on assets. Unfortunately, the use of log form is not applicable in this case, since the variable also takes negative values. This in turn favours the choice of stock-based performance as further discussed in the methodological framework. Thirdly, a brief comparison across different size categories (panel F & G) illustrates a number of well-documented stylized facts including: executive pay is size-related (in both levels and percentage change); large firms are more acquisitive; small firms grow faster than large ones. Moreover, panel G figures out that small and below median groups experience much wider dispersion in the annual growth rate of compensation, sales and market value as opposed to those who are large or above median. The statistics consistently depict size as an important source of heterogeneity. Finally, panel G hints some appealing inter-relations among the variables, i.e. firms who are better in improving their stock-based performance, though much less aggressive in extension, report higher increase in compensation. To be more specific, on average, the below median group outperformed the above median by 244% in sales growth but was 18% less effective in enhancing market value, eventually experienced 14% lower pay raise.

B. METHODOLOGICAL FRAMEWORK

1. Model construction and variable characteristics

The paper employs a dynamic model of compensation as follows:

$$\ln pay_{it} = \alpha \ln pay_{it-1} + x'_{it}\,\beta + \varepsilon_{it} \qquad \textbf{(E1)}$$

Applying the first difference transformation, we get:

$$\Delta \ln pay_{it} = \alpha \Delta \ln pay_{it-1} + \Delta x'_{it}\,\beta + \Delta \upsilon_{it} \qquad \textbf{(E2)}$$

The vector x_{it} contains the compensation determinants of interest, i.e. firm performance, size and acquisition. We include year dummies to control for economy-wide shocks over the period. Other pay correlated firm-specific or CEO characteristics (e.g. monitoring quality, managerial ownership, tenure, age, experience entrepreneurial ability etc.) are incorporated in the error term.

In accordance with major prior studies, we use sales as a proxy for firm size (Amihud & Lev 1981, Amihud, Lev & Travlos 1990, Firth 1991[1], Conyon & Gregg 1994, Conyon & Leech 1994, Khorana & Zenner 19980, Murphy, 1999, Girma *et al*. 2002). Core, Holthausen, and Larcker (1999) argues that pay level is increasing function of firm performance. The most common measure, return on asset (ROA), is often criticized to be backward-looking, short-run, noisy, and subject to manipulation (Defeo, Lambert & Larcker 1989, Paul 1992, Murphy 1998). Hence, stock-based performance, e.g. market-to-book (MTB) ratio would be preferable. The limitation of adopting such measurement in this data set is that the market value of equity was recorded on the reported date for the financial statements rather than on the disclosure date. Hence, one may suspect its prospects to incorporate full information on company performance. Moreover, bonuses, the performance-based component of cash compensation, are explicitly related to accounting profitability (Murphy 1998). The link between pay and ROA thus appears straightforward. Nevertheless, assuming that stock markets are forward-looking, current information that influences future profitability will be immediately impounded into stock prices; we expect high correlation between present accounting returns and present and lagged stock returns. Empirical evidence on the connection of cash remuneration and stock-price performance lends credit to this (Jensen & Murphy 1990, Murphy 1998). Therefore, our analysis selected MTB over ROA for three reasons. Firstly, it is able to capture information on accounting-based performance, but less noisy (see Table A2 – Panel E and previous discussion in section A). Secondly, it further

[1] Firth (1991) used both measures as proxy i.e. natural log of sales and natural log of assets for firm size in his suggested model. However, model using total assets as proxy for firm size gives higher R^2 than using total sales/revenues as size proxy.

reflects the market view of the firm value, which, compared to accounting returns, would be unbiased and apparently more analogous to shareholders' interest. Finally, while a year-on-year analysis of MTB growth would proxy the firm's short-term performance, the MTB level is likely to represent the long-term. Since there is evidence suggesting that M&A's impact on executive pay (if any) would diminish after three years following the transaction (Girma *et al.* 2006), we limit our study of acquisition to a three-year span. Equations (E1) and (E2) imply that the size-enhancing and (or) performance improvement effect should be captured through size and (or) performance parameters. Any additional return for the transaction would be observed in the coefficients for acquisition dummies. The association between acquisition and pay is tested in two ways. Firstly, we check the implication on the current CEO rewards if within a period of three years (including the current year) the firm made any acquisitions. Secondly, we see if the firm involved in M&A this year, how it would affect top pay contemporaneously, in the following year and next two years.

The inclusion of the lagged pay (in equation (E1)) or lagged pay change (in equation (E2)) as explanatory variables allows for dynamics in the remuneration process estimation since pay persistence has been discussed and empirically documented in recent studies on executive compensation (Main *et al*. 1996, Girma *et al*. 2006, Guest 2009).

2. Static model specifications

At first stage, nonetheless, we skip the adjustment process for CEO income to begin with a static long-run model, since the presence of the lagged dependent variable (which is correlated with the error terms) will cause the conventional OLS and "within" estimators biased (Nickell 1981). The simple OLS or fixed effect regressions, in our opinion, would help to gain intuition of the pay determinants before moving to more complex methods. Hence, our equation (E1) is simplified as follows:

$$\ln pay_{it} = x'_{it}\beta + \varepsilon_{it} \qquad \text{(E1)*}$$

We further decompose the error terms into $\varepsilon_{it} = \mu_i + \gamma Z_i + \upsilon_{it}$ where vector Z denotes the firm or CEO – specific time-invariant variables, e.g. CEO's education, whereas μ_i represents the unobserved individual effects associated with each CEO and firm, e.g. entrepreneurial ability, managerial responsibility, past performance (Murphy 1985). These omitted variables,

if correlated with x_{it}, will cause the resultant estimates biased and inconsistent (for detail discussion see Deckop 1988, Verbeek, M. 2004, pp.345-350).[2] In our specification (E1)*, endogeneity is a real possibility. Extant studies have highlighted these issues remarkably. Lambert, Larcker and Weigelt (1991) draw special attention when inferring the pay – size relation since it could be simply a proxy for the unobserved connection between compensation and skills. That is, larger firms possibly require better qualified CEOs, and thus pay more. Or, excessively paid remuneration is to compensate higher risk exposure associated with larger scale (Masson 1971). Alternatively, better entrepreneurial ability embedded in a higher MTB can simultaneously justify privileged remuneration (Palia 2001). In addition, pay – performance relation might well depend on managerial ownership in the sense that for CEOs with small stockholdings, their rewards should be more strongly related to performance (Baker, Jensen & Murphy 1988). Similarly, firms with fewer investment options (lower MTB) may face less informational asymmetries and thus lower possibility of managerial opportunism, which in turn, could ease the performance sensitivity in the compensation design (Smith & Watts 1992, Gaver & Gaver 1993, Kole 1997).

However, if the omitted variables are constant over time, endogeneity can be mitigated by differencing technique (Nickell 1981, Deckop 1988, Lambert *et al*. 1991). Therefore, we initiate with a growth model.

OLS cross-sectional study on the changes between 2001 and 2007

Equation (E2)* estimates how acquisitions, the development in firm size and in performance affect pay raise over the study period.

$$\Delta \ln pay_i = \Delta x'_i \beta + \Delta \upsilon_i \qquad \text{(E2)*}$$

Δ denotes the change in the variable from 2001 to 2007, e.g. $\Delta \ln pay_i$ measures the change in log compensation for firm i during the period: $\Delta \ln pay_i = \ln pay_{i,2007} - \ln pay_{i,2001}$. Acquisition dummy is equal to 1 if the firm made any acquisitions from 2000 to 2007, 0 otherwise.

[2] Deckop (1988) discusses in reference with the FE and RE comparison.

Consistent with the assumption that pay correlated CEO characteristics are time invariant, the fixed individual effects are cancelled out in equation (E2)*, leaving the OLS estimators unbiased. Finding evidence for heteroskedastic disturbances, we apply the robust approach to correct for standard errors (Baum 2006 pp.136-138). The coefficients for sales and MTB in (E2)* can be understood as the elasticity of executive cash compensation with respect to sales and performance. Jensen and Meckling (1976) contend that larger operational span reduces the effectiveness of external monitoring, and thus increases agency costs. Pay – performance relation hence might well depend on firm scale. Kostiuk (1990) underscores the importance of the firm size rank-order in determining the size effect on executive earnings. Intuitively, small firms may be more likely to obtain a higher growth rate than large firms, thus sales elasticity may differ across the size distribution. We examine this possibility by using the natural logarithm of the firm's relative sales as a control variable. Relative size is obtained by scaling the firm's sales to the sample median sales for 2001. We further divide the sample into sub-groups according to different size criteria; i.e. below median (relative sales <1) and above median (relative sales ≥ 1); small (sales in the 25th percentile) and large (sales in the 75th percentile).

As the size-enhancing effect of acquisition is of typical interest for research on managerial earnings (Dickerson *et al.* 1997, Wright *et al.* 2002), we attempt to isolate the impact of acquisition-associated growth from that of total expansion. Following Avery *et al.* (1998), we introduce an interaction term between acquisition dummy and size growth netted by sample average growth (i.e. the change in firm's log sales minus the sample average change in log sales: $\Delta sales\_netted = \Delta \ln sales - \overline{\Delta \ln sales}$). Model (E2)* can be fully expressed as:

$$\Delta \ln pay = \beta_0 + \beta_1 \Delta \ln mtb + \beta_2 \Delta \ln sales + \beta_3 relative\_sales + \beta_4 Acq + \beta_5 Acq * \Delta sales\_netted$$

Now the sales elasticity is β_2 for non-acquirers and the sum of β_2 and β_5 for acquirers.[3]

[3] Sales elasticity $= \dfrac{\partial \Delta \ln pay}{\partial \Delta \ln sales} = \beta_2 + \beta_5 Acq$

Acq = 1 if the firm made at least one acquisition during the study period, 0 otherwise.

Panel study on levels through fixed effects model

Next, we expand our analysis to a panel study of the aforementioned pay determinants. We estimate equation (E1)* by the within approach since it controls for the fixed individual effects in the disturbance process through a mean-deviation transform, i.e.

$$\ln pay_{it} - \overline{\ln pay_i} = (x_{it} - \overline{x_i})'\beta + (\upsilon_{it} - \overline{\upsilon_i})$$

The estimators are thus unbiased and consistent. The parametric assumptions about β impose equal effect of a change in x from one period to the other with that from one firm to the other (Verbeek 2004, pp. 345-347). Standard errors are robust to heteroskedasticity. Since the model is in level, relative size, due to its high correlation with log sales, is excluded to avoid multicollinearity.

3. Dynamic model specifications

Turning to our original dynamic specification (E1), differencing method does not eliminate endogeneity since $\ln pay_{it-1}$ in the transformed lagged dependent variable $\Delta \ln pay_{it-1}$ is correlated with υ_{it-1} in the transformed error terms $\Delta\upsilon_{it}$ (Verbeek 2004, pp.361-362, Roodman 2006). Hence, instrumental variables (IV) approach would be appropriate. If the disturbances do not satisfy the *i.i.d*. assumption, estimates produced by the standard two stage least squares are inefficient though consistent (Baum 2006, p.194). Therefore, we apply the generalized method of moments (GMM). The number of instruments induces an equivalent number of moment conditions on the instrument exogeneity, which help to solve for the unknown parameters associated with the explanatory variables. If the number of moment equations equals the number of unknowns, it would be possible to obtain a unique consistent estimator. In this case, the GMM estimator is identical to the standard IV estimator (Baum 2006, p.195). If there are fewer equations than unknowns, the parameter vector is not identified. If there are more instruments than regressors, the equation is overidentified, yielding many GMM estimators. The one with the minimum covariance matrix can be obtained through a multi-step estimation procedure. A consistent estimator is attained in the first step. Then, upon estimating the optimal weighting matrix, one gets the asymptotically efficient GMM estimator (Verbeek 2004, pp.150-151). Since correct moment conditions perform the key role in the consistency and asymptotic distribution of the GMM estimator, it

is important to check whether these required orthogonality conditions are satisfied in the employed data set. This so-called overidentifying restrictions test can be performed by Sargan (1958) or Hansen J (1982) test. Under the null hypothesis, the model is correctly-specified and the overidentifying restrictions are valid (Baum 2006, pp.190-191, p.201). The Sargan statistic is not robust to heteroskedasticity or autocorrelation while the Hansen J is.

As proposed by Anderson and Hsiao (1982), $\ln pay_{it-2}$ or $\Delta \ln pay_{it-2}$ is correlated with $\Delta \ln pay_{it-1}$ but not with υ_{it-1} (assuming no autocorrelation), thus can serve as instruments for $\Delta \ln pay_{it-1}$ in the first differenced equation. Arellano and Bond (1991) suggest a more generalized approach, exploiting also exogenous regressors in the model for additional moment restrictions, which is shown to gain significant efficiency. This is called Difference GMM, which relies on GMM estimation of the transformed model. Based on a method outlined by Arellano and Bover (1995), Blundell and Bond (1998) improve the estimator's efficiency by adding instruments for the data in levels as well. They difference the instrumental variables to make them orthogonal to the individual effects, assuming that fixed effects and changes in the instruments are uncorrelated. This may be more relevant, especially if the dependent variable is close to a random walk, then past changes may be more powerful in predicting current levels compared to past levels in approximating current changes (Roodman 2006). The designed estimator is known as System GMM. It involves a system of moment restrictions exploited in the transformed equation plus those in the original level one.

We apply both Difference and System GMM to estimate our specified model (E1). For the transformed equation, instead of first difference, we use forward orthogonal deviation (FOD) as recommended by Arellano and Bover (1995) for panels with gaps. This method differences the current value by the average of all available future values, thus expunges the fixed effects as does the first difference transform, but gains advantage by minimizing data loss and validating lagged observations as instruments (Arellano & Bover 1995, Roodman 2006). We treat MTB and sales as strictly exogenous conditional on the individual effects, i.e. $E(\ln mtb_{it}\upsilon_{is}) = 0$ for all time indicators t, s. According to Arellano and Bond (1991), we instrument $\Delta \ln pay_{it-1}$ with $\ln pay_{it-2}$ and longer available lags, $\Delta \ln mtb_{it}$, $\Delta \ln sales_{it}$, other exogenous variables, i.e. acquisition dummies and year dummies. We also introduce an external instrument – relative sales to take into account the firm size rank order, consistent

with our earlier discussion on the OLS specification for period growth. For the level equation, $\ln pay_{it-1}$ is instrumented by $\Delta \ln pay_{it-1}$ (Blundell & Bond 1998). Utilizing lag values as instrument raises the importance to test for serial correlation which, if present, would affect the estimator consistency (Arellano & Bond 1991). Hence, a test of second-order correlation in the transformed disturbances is reported. Under the null hypothesis, there is no correlation between $\Delta \upsilon_{it}$ and $\Delta \upsilon_{it-2}$, which in turn implies the absence of correlation between υ_{it-1} and υ_{it-2} (Arellano & Bond 1991). Last but not least, the Difference and System GMM are considered efficient for small T, large N panels; if N is small, the cluster-robust standard errors and the Arellano-Bond autocorrelation test may be unreliable (Roodman 2006). Hence, we do not perform the estimation on subgroups such as below, above median, small, and large as in previous sections. In summary, we estimate model (E1) for the full sample, by both one step and two step Difference and System GMM estimators (using *xtabond2* in STATA, see Roodman 2006). Standard errors are robust to heteroskedasticity and arbitrary patterns of autocorrelation within individuals, and in the two-step estimation, corrected for downward bias according to Windmeijer (2005) approach. Together with the parameters, we report also specification and autocorrelation tests.

IV. EMPIRICAL FINDINGS

A. CROSS-SECTIONAL PERIOD GROWTH

Table 1 summarizes the results for the period growth model. Columns (1) and (2) show the estimates for the full sample, with and without controlling for relative size. Separate regressions for size – differentiated subgroups are reported in columns (3) – (6).

TABLE 1-OLS ESTIMATION ON PERIOD CHANGES

The full sample consists of 315 firms over 7 years, in total 1774 firm year observations, covering 1279 takeovers made by 222 acquirers from January 1, 2000 to December 31, 2007. Table 1 demonstrates the cross-sectional OLS estimation on the variable changes during 2001-07. Only 167 firms are fully observed throughout the period. Change in executive remuneration is regressed against performance change, sales growth, relative size, and acquisition dummy. Panel B adds interaction term in the explanatory variables to isolate acquisition-associated growth. All variables except acquisition are in natural logarithms. ***, ** and * indicate significance level at 1%, 5%, and 10%, respectively. Standard errors are given in parentheses. *Performance* is measured by market to book value (MTB). MTB is computed by the sum of market value of equity and book value of debt divided by aggregate of book value of equity and book value of debt. *Initial relative size* is defined as firm's initial sales divided by the sample median sales for 2001. Firms whose initial relative size is less or greater than 1 is classified as *below median*, or *above median*, respectively. Firms with initial sales in the 25th percentile, or

the 75th percentile of the sample sales for 2001 are considered *small*, or *large*, respectively. *Acquisition* is dummy variable which is equal to 1 if firm made at least one acquisition during the study period, and zero otherwise. *Interaction term* is the product of acquisition dummy and sales growth (netted by sample average growth). Heteroskedasticity is checked by Breusch-Pagan test, if found, robust standard errors are applied. All regressions contain an unreported constant.

PANEL A-OLS ESTIMATION

Independent Variable	*Dependent Variable:* Pay change					
	Full Sample	Full Sample	Below Median	Above Median	Small	Large
	(1)	(2)	(3)	(4)	(5)	(6)
Performance change	0.296***	0.297***	0.288***	0.481	0.342***	0.107
	(0.112)	(0.113)	(0.096)	(0.415)	(0.115)	(0.150)
Sales growth	0.124*	0.119*	0.104	0.149	0.016	0.347*
	(0.066)	(0.067)	(0.069)	(0.122)	(0.083)	(0.177)
Initial relative size		-0.005	0.054	0.001	0.012	-0.138**
		(0.017)	(0.049)	(0.103)	(0.073)	(0.067)
Acquisition effect	-0.093	-0.086	0.075	-0.483	0.249	-0.098
	(0.171)	(0.170)	(0.156)	(0.498)	(0.216)	(0.291)
R^2	0.0325	0.0325	0.1359	0.0285	0.2009	0.2441
No. Of observations	167	167	84	83	44	44
Heteroskedasticity detected	Yes	Yes	No	Yes	No	No
Robust S.E.	Yes	Yes	No	Yes	No	No

PANEL B- OLS ESTIMATION ISOLATING ACQUISITION-ACCREDITED GROWTH

Independent Variable	*Dependent Variable:* Pay change				
	Full Sample	Below Median	Above Median	Small	Large
	(7)	(8)	(9)	(10)	(11)
Performance change	0.290**	0.292***	0.381	0.342***	0.105
	(0.113)	(0.097)	(0.375)	(0.115)	(0.152)
Sales growth	0.021	0.133	-0.125	0.143	0.081
	(0.094)	(0.107)	(0.117)	(0.153)	(1.143)
Initial relative size	-0.002	0.055	-0.004	0.033	-0.144*
	(0.017)	(0.049)	(0.097)	(0.076)	(0.072)
Acquisition effect	-0.091	0.084	-0.300	0.319	0.002
	(0.171)	(0.159)	(0.442)	(0.228)	(0.518)
Interaction term	0.161	-0.047	0.509***	-0.175	0.274
	(0.133)	(0.131)	(0.187)	(0.179)	(1.159)
R^2	0.0356	0.1373	0.0351	0.2205	0.2452
No. Of observation	167	84	83	44	44
Heteroskedasticity detected	Yes	No	Yes	No	No
Robust S.E.	Yes	No	Yes	No	No

The overall sample records significantly positive correlation between performance improvement and pay raise. 10% growth in market value on average contributes to a 2.97% revision in CEO's cash compensation, ceteris paribus. This result resembles the 0.262 pay – performance elasticity for the S&P500 industrials during 1990 – 1996 (Murphy 1998). We also estimate the median performance sensitivity for our sample since it partly reflects how well manager's wealth is tied to shareholder's wealth or "the executive's share of value creation" (Murphy 1998). The figure is obtained by multiplying the period elasticity with the median pay for 2001 (SEK 1.989 million) then divided by the median market value for 2001 (SEK 790.385 million).[4] The period median sensitivity implies a SEK 748 change in managerial income for each SEK million change in the firm market value (an effective sharing rate of 0.075%). Interestingly, when analyzing the pay – performance relation across the size distribution, we find that the sample elasticity is mainly driven by companies below the median scale. The incentive link is robust for small firms but dissolves for above median and large ones. Absent the long-term incentive plans in reward packages and managerial ownership, we do not instantly conclude on weaker monitoring or greater managerial opportunism following expansion. However, the results at least suggest that cash-based compensation contracts lose efficiency as organizational scale increases.

On the full sample, we find evidence consistent with extant research on the positive link between firm size and managerial remuneration (Kostiuk 1990, Weigelt *et al.* 1991, Kroll *et al.* 1997, Girma *et al.* 2002). Though, the change in CEO rewards in our sample is less sensitive to size growth than to performance. For the median firm, each SEK million increase in sales promotes executive earnings by SEK 223. Notably, the sales elasticity for large firms almost triples that of the total sample. Supposing that the same growth rate requires more effort from managers of large firms than those of small ones, it is not surprising to see giants reward their CEOs more generously. The negative impact of relative scale for the large group indicates that within the top size range, the bigger the firm, the less pay raise, ceteris paribus.

[4] Let b be the estimate for pay – performance elasticity, we have:

$$b = \frac{\Delta \ln pay}{\Delta \ln MTB} = \frac{\ln\left(pay_{2007} / pay_{2001} \right)}{\ln\left(MTB_{2007} / MTB_{2001} \right)} = \frac{\ln\left(1 + \frac{\Delta pay}{pay_{2001}} \right)}{\ln\left(\frac{\Delta MTB}{MTB_{2001}} \right)} \approx \frac{\Delta pay}{\Delta MV} \cdot \frac{MV_{2001}}{pay_{2001}}$$

→ pay – performance sensitivity is $\frac{\Delta pay}{\Delta MV} = b \cdot \frac{pay_{2001}}{MV_{2001}}$

Inclusion of acquisition dummy does not improve the explanatory power of the pay growth model, suggesting that top managers do not earn additional returns directly attributed to takeovers. Our approximation for acquisition-accredited growth is also insignificant, except for the above median group (see Table 1 – Panel B). In column (9), the coefficient for the interaction term is positive, indicating that firms above the median scale rewards executives for acquisition growth more than for organic growth. Noting that the coefficient for change in log sales is insignificant, we test for the importance and sign of acquirer's sales elasticity, i.e. ($\beta_2 + \beta_5$). The Wald test confirms the significance of the sum. The one-sided tests show it is positive. Therefore, we conclude that acquirers above median size gain for expansion while non-acquirers do not.

An overall implication is that the connection of performance and size to compensation may be unsystematic across the scale distribution. So could be the acquisition impact. Though our results may subject to restricted number of observations, we believe it signals the relevance of controlling for size-related heterogeneity in remuneration study.

B. STATIC PANEL ANALYSIS

Regarding our panel analysis based on the level equation (E1)*, the within estimates are represented in table 2. The results are generally consistent with major findings in the period growth OLS model. The full sample records highly significant and positive correlation between executive compensation and firm size as well as performance. Increase of observations, compared to the OLS sample, amplifies the importance of sales for below median and small companies, also reports a positive relation between MTB and pay for above median firms. Yet, the incentive link is undetected for large organizations. Neither do we find clear evidence for acquisition impact. Only in column (9), we see that small firms' managers are exposed to a positive lagged effect of acquisitions. Two years following the transaction, takeovers will lead to a difference of 1.16% (at 10% significance) in executive income between acquirers and non-acquirers, ceteris paribus.[5]

[5] The relative effect of acquisitions is obtained by the exponential of its coefficient, i.e. exp(0.150)=1.162

TABLE 2-FIXED EFFECTS ESTIMATION ON ANNUAL LEVELS

The full sample consists of 315 firms over 7 years, in total 1774 firm year observations, covering 1279 takeovers made by 222 acquirers from January 1, 2000 to December 31, 2007. Table 2 reports the fixed effects estimates on the variable levels. Executive compensation is regressed on performance, sales, acquisition and year dummies. All variables except dummies are in natural logarithms. ***, ** and * indicate significance level at 1%, 5%, and 10%, respectively. Standard errors are given in parentheses, and robust to heteroskedasticity. In Panel A, *Acquisition* is a dummy variable which equals to 1 if a firm made at least 1 acquisition within 3 years (including the current year), and zero otherwise. In Panel B, *Acquisition* includes a set of dummy variables presenting the contemporaneous and lagged effects; dummies for *Contemporaneous*, *After 1 year*, and *After 2 years* take value of 1 if the firm made any acquisitions in the current year, the previous year, and previous 2 years, respectively. *Year* dummy is included to control for economic shock. All regressions contain an unreported constant.

PANEL A- ACQUISITION EFFECT WITHIN 3 YEARS

	Dependent Variable: Pay				
Independent Variable	Full Sample	Below Median	Above Median	Small	Large
	(1)	(2)	(3)	(4)	(5)
Performance	0.137***	0.136***	0.154**	0.101**	0.112
	(0.034)	(0.041)	(0.064)	(0.047)	(0.067)
Sales	0.086***	0.099***	0.097	0.093**	0.186*
	(0.026)	(0.035)	(0.64)	(0.039)	(0.102)
Acquisition effect					
Within 3 years	0.002	0.022	-0.012	-0.015	-0.015
	(0.045)	(0.079)	(0.0334)	(0.045)	(0.045)
Year dummies	Yes	Yes	Yes	Yes	Yes
R^2 -within	0.1313	0.0862	0.2813	0.0564	0.2666
R^2 -between	0.4910	0.0871	0.4219	0.0210	0.4662
R^2 -overall	0.3944	0.0958	0.4066	0.0442	0.473
No. of observations	1411	695	716	378	390

PANEL B- CONTEMPORANEOUS & LAGGED ACQUISITION EFFECT

	Dependent Variable: Pay				
Independent Variable	Full Sample	Below Median	Above Median	Small	Large
	(6)	(7)	(8)	(9)	(10)
Performance	0.135***	0.132***	0.156**	0.0954***	0.112
	(0.0347)	(0.043)	(0.064)	(0.046)	(0.069)
Sales	0.0878***	0.104***	0.0972	0.0975**	0.189*
	(0.0258)	(0.035)	(0.065)	(0.0401)	(0.104)
Acquisition Effect					
Contemporaneous	0.0037	-0.028	0.026	-0.117	-0.035
	(0.0421)	(0.096)	(0.027)	(0.018)	(0.03)
After 1 year	-0.0312	-0.071	0.0018	-0.245	-0.0234
	(0.0414)	(0.088)	(0.0262)	(0.156)	(0.036)
After 2 year	0.0215	0.075	-0.022	0.1503*	-0.023
	(0.0283)	(0.053)	(0.0271)	(0.1833)	(0.027)
Year dummies	Yes	Yes	Yes	Yes	Yes
R^2 -Within	0.1323	0.0908	0.02831	0.0828	0.2697
R^2 -between	0.496	0.0916	0.4208	0.0267	0.4546
R^2 -overall	0.398	0.0988	0.4084	0.06	0.46
No. of observations	1411	695	716	378	390

Remarkably, the estimates for the fixed effects models are relatively small compared to those obtained by the OLS. May top pay be less elastic to MTB and sales in a year-on-year analysis than in a seven-year period change? Lambert *et al.* (1991) suggest that compensation's may respond to long-term changes in size rather than to short-term changes. Murphy (1998) discusses the role of past performance on current pay. We test for the explanatory power of the lag structure by including lags one and two of MTB and sales in the full sample estimation, but the results (not reported) do not alter significantly. More importantly, we are concerned about the potential unsolved endogeneity in both the OLS and the within regressions. Our analysis does not control for firms who replaced their CEOs during the period under research, which may change the CEO-specific characteristics of an individual firm. Even for those who retained their positions, the assumed time-invariant factors may be relatively constant within a short period but may not for a longer time span. If the omitted variables that are correlated to pay determinants partly vary over the study period, differencing in the change model or the within approach no longer eliminates the source of endogeneity, and thus the estimators are not guaranteed unbiased and consistent. We address this problem in robustness check section.

C. DYNAMIC PANEL ANALYSIS

Table 3 reports the estimation results for our dynamic model (E1). The Sargan and Hansen J tests of overidentification indicate that the instruments are appropriately uncorrelated with the error terms. Thus, we have evidence of well-specified models and valid instruments. The Arellano-Bond second-order correlation tests also return satisfactory p-values, indicating the lack of autocorrelation in the idiosyncratic disturbance process.

The system GMM and one step difference GMM detect positive correlation between the CEO's current remuneration and its past values. This finding is parallel with recent studies on the U.K. data (Girma *et al.* 2006, Guest 2009), though our quoted firms exposed a marginally smaller degree of persistence in top pay.[6] A low coefficient implies that after a shock, the process returns quicker to its mean. For example, a coefficient of 0.149 (column (8)) suggests that, after two years, the effect of a stimulus on executive compensation diminishes to 2% of its original impact (Verbeek 2004, pp.256-260).[7] Consistent with the full sample estimation results by OLS and fixed effects, managerial earnings are found unresponsive to acquisitiveness.

TABLE 3- DIFFERENCE & SYSTEM GMM ESTIMATIONS

The full sample consists of 315 firms over 7 years, in total 1774 firm year observations, covering 1279 takeovers made by 222 acquirers from January 1, 2000 to December 31, 2007. Table 3 shows the Generalized Methods of Moments estimation results for the dynamic model. Executive pay is regressed on its lag value, performance, sales, acquisition and year dummies. All variables except dummies are measured in natural logarithms. ***, ** and * indicate significance level at 1%, 5%, and 10%, respectively. Standard errors are given in parentheses. Standard errors are robust to heteroskedasticity, arbitrary autocorrelation within individuals, and corrected for downward bias in the two-step estimation according to the Windmeijer approach. *Acquisition* includes a set of dummy variables presenting the within 3-year, contemporaneous and lagged effects; dummies for *Within 3 years, Contemporaneous*, *After 1 year,* and *After 2 years* take value of 1 if the firm made any acquisitions within a 3-year period (including the current year), in the current year, the previous year, and previous 2 years, respectively. *Year* dummy is included to control for widely economic shock.

The difference GMM estimates are obtained from the transformed data. The transformation in use is forward orthogonal deviation. $\Delta \ln pay_{it-1}$ is instrumented with $\ln pay_{it-2}$ and longer available lags, $\Delta \ln mtb_{it}$, $\Delta \ln sales_{it}$, relative size, acquisition dummies and year dummies. The system GMM estimates are obtained

[6] The first order autocorrelation coefficient is approximately 0.28 by Girma et al. (2006), and 0.34 by Guest (2009).

[7] The shock impact after t periods is obtained by α^t, where α is the first autocorrelation coefficient.

from both transformed data and original data in levels. In addition to the instruments for the transformed equation as employed by the difference GMM, for the level equation, $\ln pay_{it-1}$ is instrumented by $\Delta \ln pay_{it-1}$. One-step estimates are consistent but may be inefficient. Two-step estimates are both consistent and efficient. Overidentifying restrictions are tested by the Sargan and Hansen J tests. The Sargan statistic is not robust to heteroskedasticity or autocorrelation. The Hansen J is robust but can be weakened by instrument proliferation. Instrument count is reported for all estimations.

	Dependent Variable: Pay							
Independent Variable	Difference GMM				System GMM			
	One-step		Two-step		One-step		Two-step	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Previous pay	0.183*	0.202*	0.192	0.190	0.139*	0.148*	0.161*	0.149*
	(0.108)	(0.111)	(0.127)	(0.127)	(0.083)	(0.082)	(0.093)	(0.080)
Performance	0.101**	0.096**	0.103**	0.09**	0.107***	0.108***	0.116***	0.102***
	(0.044)	(0.048)	(0.042)	(0.045)	(0.038)	(0.043)	(0.038)	(0.035)
Sales	0.069	0.064	0.048	0.057	0.060	0.050	0.050	0.063**
	(0.046)	(0.041)	(0.040)	(0.036)	(0.045)	(0.036)	(0.033)	(0.028)
Acquisition effect								
Within 3 years	-0.079		0.126		-0.134		0.189	
	(0.231)		(0.203)		(0.319)		(0.204)	
Contemporaneous		-0.033		-0.004		-0.028		0.030
		(0.073)		(0.049)		(0.076)		(0.035)
After 1 year		-0.076		-0.040		-0.070		-0.016
		(0.061)		(0.036)		(0.063)		(0.029)
After 2 years		0.027		0.041		0.034		0.078
		(0.083)		(0.075)		(0.102)		(0.072)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AR(2) test p-value	0.553	0.533	0.694	0.567	0.559	0.594	0.794	0.603
Sargan p-value	0.361	0.471	0.361	0.471	0.083	0.112	0.083	0.112
Hansen J p-value	0.596	0.643	0.596	0.643	0.643	0.701	0.643	0.701
No. of observations	934	934	934	934	1179	1179	1179	1179
Instrument count	24	26	24	26	30	32	30	32

Again, the affirmative link between pay and performance is significantly documented across different versions of the dynamic specification. Surprisingly, firm size now loses its influence on executive income in most cases. Reduced sample size in the dynamic model could be one explanation.[8] Only the two step system GMM estimation in column (8) identifies the positive compensation – size relation at 5% significance level. Several reasons could be supportive. Firstly, as mentioned in the methodology section, adding instruments for the level equation may empower the system GMM estimator compared to the difference one. Empirically, we do see the system GMM magnify the significance and coefficients for the performance variable. Also, it recognizes the pay persistence in the two step estimation (columns (7) – (8)) while the difference GMM method does not (columns (3) – (4)). Secondly, the two-step

[8] Total number of observations is 1411 in the fixed effects model, but drops to 934 in the GMM estimation.

GMM produces consistent and efficient estimators whereas those generated by one step GMM may be inefficient though still consistent. Finally, as opposed to analyzing acquisition impact within a three year period, separate the effect for each year following the transaction may allow more instruments, and thus enhance the efficiency.

Also, it is interesting to compare the estimates provided by the fixed effects static model with those obtained by the dynamic one. Hereafter, we focus on the two-step system GMM results (columns (7) – (8)), but there is no hurdle applying similar interpretation for the other GMM estimations. In the dynamic version, the coefficients β for log MTB or log sales are understood as the short-run elasticity of cash compensation with respect to performance or size. By combining them with α - the parameter associated with lagged pay, we can derive the long-run elasticity as $\frac{\beta}{1-\alpha}$ (Verbeek 2004, p. 368). Hence, according to columns (7) and (8), the long-run performance elasticity is 0.138 and 0.120, respectively. This is close to the estimates of 0.137 and 0.135 in the static equation (see Appendix, Table A4 – Panel C for full comparison). Regarding firm size, the long-run sales elasticity from dynamic model is 0.074 while the static fixed effects estimator suggests just slightly higher: 0.088 (Table A4 – Panel C, columns (2) & (6)). Overall, we find our results consistent throughout different specifications and modeling methods.

V. ROBUSTNESS CHECK

A. POTENTIAL ENDOGENEITY

So far, we have assumed the firm or CEO specific omitted variables which affect both compensation and its determinants to be constant over time. If this assumption does not hold strongly, i.e. the omitted variables may vary over time; removing the fixed effects does not eliminate the source of endogeneity. Hence, we relax the assumption that performance and sizes are strictly exogenous conditional on the individual effects. Instead, we treat them as predetermined, i.e. correlated with past values of the idiosyncratic disturbance υ_{it} but not with its future values. We apply our preferred estimator – two-step system GMM for the full sample. The transformed equation exploits lag structure of log MTB and log sales as instrumental variables while the level equation uses $\Delta \ln mtb_{it}$ and $\Delta \ln sales_{it}$. Other instruments maintain their roles as described in the methodological framework section B-3.

Estimation results are represented in Appendix, Table A4 – Panel A, columns (3) and (4). The overidentifying restrictions are satisfied according to the Hansen J test, but rejected by the Sargan. We note that the Sargan statistic is not robust to heteroskedasticiy; the J statistic is robust but can be weakened by instrument proliferation (Roodman 2006). Hence, we also report the difference-in-Sargan/Hansen (also called the C) statistics which examine for validity of instrument subsets (GMM style instruments, other instrumental variables for the transformed equation, and for the level one). These tests confirm their exogeneity.

Regarding the parameter estimates, they are all amplified compared to the case when performance and size are considered strictly exogenous (columns (1) & (2)). The new results favour the hypothesis that CEO's compensation is size-related. The long-run elasticities with respect to performance and sales (based on column (4)) are 0.205 and 0.105, correspondingly. These coefficients lie between those obtained by the fixed effects and OLS regressions (see Table A4 – Panel A). In case of endogeneity, the least squares method yields upward biased estimators while the within ones are downward biased. Hence, we may infer that firm unobserved heterogeneity could actually change during our study period. Interestingly, the direct link between managerial earnings and acquisition is now clearly acknowledged. That is, apart from any indirect impact through enhancing firm growth or performance, takeovers straightforwardly increase executive cash compensation. In comparison with non-acquirers, acquirers' CEOs on average gain 1.17% right in the year completing the transaction, 1.12% more in the following year and another 1.19% in the next two years (Table A4, column (4)). Here arises the question of potential correlation between acquisition variables and firm heterogeneity. Firms with weak governance are more likely to overpay, as well as involve in takeovers (Harford & Li 2007). Frequent acquirers may often be large companies (see Appendix, Table A2 – Panel F). Overvalued firms might be more acquisitive (Cai & Vijh 2007). Rich cash firms possibly end up spending on M&A instead of paying out to shareholders (Jensen 1986). Therefore, we employ the difference-in-Hansen test to check if acquisition is orthogonal to the error terms ε_{it} in the level equation. The obtained statistic does not reject the null hypothesis, implying that acquisition can be treated as exogenous in our data set.

B. PROBLEM OF INSTRUMENT PROLIFERATION

Roodman (2006) highlights the caution with instrument count when applying the difference and system GMM estimators. The number of elements in the estimated covariance matrix of moments is quadratic in the number of instruments, and thus, quartic in T. Such a large matrix may cause severe estimation problem in a finite sample. If the covariance matrix becomes singular, a generalized inverse will be used to calculate the optimal weighting matrix for the two-step estimation. This could indeed shrink the estimator's efficiency and weaken the Hansen test. Windmeijer (2005) and Roodman (2009) find that increasing instrument count raises bias in the two-step estimates. Hence, we test if our results are affected by reduction in instrument quantities. We repeat the difference and system GMM two-step estimation specified in the methodological framework section B-3, but limit the lag structure of log pay to order three, i.e. $\Delta \ln pay_{it-1}$ is instrumented with $\ln pay_{it-2}$ and maximum with $\ln pay_{it-3}$. By this, six instruments are dropped in each set (see Table A4 – Panel B). We do not find upward bias in our initial coefficients for previous pay (Table 3, columns (3) & (4), (7) & (8)). Therefore, we conclude that our findings are robust to instrument count.

VI. CONCLUSION

The paper investigates important agency-based determinants of chief executives compensation in 315 firms listed on the Stockholm Stock Exchange during a seven-year period 2001 – 2007. We find evidence in favour of efficient contracts that remuneration is tied to corporate performance. The median effective sharing rate, ranging from 0.034% to 0.075%, is much stronger than the 0.002% reported on Forbes executives covering 1974 – 1986 by Jensen and Murphy (1990). More importantly, changes in CEO earnings are found less sensitive to growth than to market performance. Sales elasticity, if statistically significant, is about 40% to 60% lower than performance elasticity. Our finding contrasts much contemporary research weighing firm size over performance in determining pay raise. Nevertheless, we also notice the relevance of size-rank in the established relations. Shifting towards larger operational span, we document a weakening trend in the incentive link whereas an exactly opposite movement in the growth impact. Turning to acquisitions, the general analysis does not gather sufficient evidence supporting its direct connection to pay changes. However, when allowing for potential adjustments in the unobserved heterogeneity

during the study period, we find that acquisitions positively contribute to revision of CEO's remuneration. In comparison with non-acquirers, successful bidders on average gain 1.17% in the year completing the transaction, another 1.12% in the following year and 1.19% more in the next two years.

We note that excluding options granted and inside stockholdings might well understate the pay-performance sensitivity in our research. If incentive plans are heavily used in practice, a more complete study of CEO's total compensation or wealth could provide better insight of the incentive provision, especially in case of large firms where cash-based rewards lose its efficiency. Similarly, it may depict clearer acquisition effect. Moreover, treating acquisitions collectively through a dummy variable possibly render the actual implications unobservable. Suppose that transactions of different types lead to pay changes in opposite directions, pooling all transactions may (partially or fully) offset the individual impacts. Hence, further study may seek to isolate such single effects by classifying acquisitions according to categories, e.g. value-enhancing vs. value-reducing, related vs. diversified, cash paid vs. stock paid, friendly vs. hostile, domestic vs. cross border, public target vs. private target, etc.

In this paper, we conclude that corporate performance is more powerful than revenue growth in deciding pay changes. This differs from the widely perceived dominance of size in the U.S. and the U.K. remuneration literature. Therefore, it is obviously interesting to understand the mechanisms working behind these inter-relations. Promising answers possibly lie in corporate governance e.g. board monitoring, large concentration of institutional shareholders, managerial ownership.

REFERENCES

Agrawal, Anup & Mandelker, Gershon N. (1987) Managerial Incentive and corporate investment and financing decisions. *The Journal of Finance*, vol. 42, no. 4, pp. 823-837.

Amihud, Y. & Lev, B. (1981) Risk reduction as a managerial motive for conglomerate mergers. *The Bell Journal of Economics*, vol. 12, no. 2, pp. 605-617.

Amihud, Y., Lev, B. & Travlos, G., Nickolaos. (1990) Corporate control and the choice of investment financing: The case of corporate acquisitions. *The Journal of Finance*, vol. 45, no. 2, pp. 603-616.

Anderson, T.W. & Hsiao, Cheng. (1982) Formulation and estimation of dynamic models using panel data. *Journal of Econometrics*, vol. 18, no. 1, pp. 47-82.

Anderson, W. Christoper, Becher A. David & Campbell II, L. Terry. (2004) Bank mergers, the market for bank CEOs, and managerial incentives. *Journal of Financial Intermediation*, vol. 13, pp. 6-27.

Andrew P. Dickerson, Heather D. Gibson. (1997) The impact of acquisitions on company performance: Evidence from a large panel of UK Firms. *Oxford Economic Papers, New Series*, vol. 49, no. 3, pp. 344-361.

Arellano, Manuel & Bond, Stephen. (1991) Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies*, vol. 58, pp. 277-297.

Arellano, Manuel & Bover, Olympia. (1995) Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, vol. 68, no. 1, pp. 29-51.

Avery, C., Chevalier, J.C. and Schaefer, S. (1998) Why do managers undertake acquisitions? An analysis of internal and external rewards for acquisition. *Journal of Law, Economics and Organization*, vol. 14, pp. 24-43.

Baker, George P., Jensen, Michael C., and Murphy, Kevin J. (1988) Compensation and Incentives: practice vs. theory. *Journal of Finance*, vol. 43, no. 3, pp. 593-616.

Baum, F. Christopher, Schaffer E. Mark & Stillman, Steven. (2007) Enhanced routines for instrumental variables/ GMM estimation and testing. *Boston College Economics Working Paper*, no. 667.

Baum, F. Christopher. (2006) An introduction to modern Econometrics using Stata, (StataCorp LP, College Station, Texas).

Baumol, W.J., (1959) Business behaviour, value and growth, 2nd edition. *Macmillan*, New York.

Berger, G. Philip., Ofek, Eli. & Yermack, L. David. (1997) Managerial entrenchment and capital structure decisions. *The Journal of Finance*, vol. 52, no. 4, pp. 1411-1438.

Bliss, Richard T. & Rosen, Richard J. (2001) CEO compensation and bank mergers. *Journal of Financial Economics*, vol. 61, pp. 107-138.

Blundell, Richard & Bond, Stephen. (1998) Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, vol. 87, no. 1, pp. 115-143.

Bodolica, Virginia & Martin, Spraggon. (2009) The implementation of special attributes of CEO compensation contracts around M&A transaction. *Strategic Management Journal*, vol. 30, pp. 985-1011.

Cai, Jie & Vijh, M. Anand. (2007) Incentive effects of stock and option holdings of target and acquirer CEOs. *The Journal of Finance*, vol. 62, no. 4, pp. 1891-1933.

Chen, Shijun. (2004) R& D expenditures and CEO compensation. *The Accounting Review*, vol. 79, no. 2, pp. 305-328.

Chen, Xia, Harford, Jarrad & Li, Kai. (2007) Monitoring: which institutions matter? *Journal of Financial Economics*, vol. 86, pp. 279-305.

Cheng, Shijun. (2004) R&D expenditures and CEO compensation. *The Accounting Review*, vol. 79, no. 2, pp. 305-328.

Cisel, David H., Carroll, Thomas M. (1980) The determinants of executive salaries: An Econometric survey. *The Review of Economics and Statistics*, vol. 62, no. 1, pp. 7-13.

Coakley J. Harrison, JS. & Dalton DR. (2003) Failed takeovers attempts, corporate governance and refocusing. *Strategic Management Journal*, vol. 24, no. 1, pp. 87-96.

Coakley, Jerry & Iliopoulou, Stavroula. (2006) Bidder CEO and other executive compensation in UK M&As. *European Financial Management*, vol. 12, no. 4, pp. 609-631.

Conyon, J. Martin, Peck, I., Simon, Sadler V. Graham. (2001) Corporate tournaments and executive compensation: Evidence from the U.K. *Strategic Management Journal*, vol. 22, no. 8, pp. 805-815.

Conyon, J., Martin & Dennis, Leech. (1994) Top pay, company performance and corporate governance. *Oxford Bulletin of Economics and Statistics*, vol. 56, no. 3, pp. 229-248.

Conyon, J., Martin & Gregg, Paul. (1994) Pay at the top: A study of the sensitivity of top director remuneration to company specific shocks. *National Institute Economic Review*, vol. 149, pp. 83-92.

Cosh, Andrew. (1975) The remuneration of chief executives in the United Kingdom. *The Economic Journal*, vol. 85, no. 337, pp. 75-94.

Datta, S., Datta I., Mai, Raman, K. (2001) Executive compensation and corporate acquisition decision. *The Journal of Finance*, vol. LVI, no. 6, pp. 2299-2336.

Deckop, R., John. (1988) Determinants of chief executive officer compensation. *Industrial and Labor Relations Review*, vol. 41, no. 2, pp. 215-226.

Defeo, V. J., Lambert, R. A. & Larcker D.F. (1989) An Analysis of the Executive Compensation Effects of Equity-for-Debt Swaps. *The Accounting Review*, vol. 54, no. 2, pp. 201-227.

Dickerson, P. Andrew, Gibson, D. Heather & Tsakalotos, Euclid. (1997) The impact of acquisition on company performance: Evidence from a large panel of UK firms. *Oxford Economic Papers*, vol. 49, pp. 344-361.

Finkelstein, Sydney & Hambrick C. Donald. (1989) Chief executive compensation: A study of the interpretation of markets and political processes. *Strategic Management Journal*, vol. 10, no. 2, pp. 121-134.

Firth, Michael. (1991) Corporate Takeovers, stockholders returns and executive rewards. *Managerial and Decision Economics*, vol. 12, no. 6, pp.441-428.

Gaver, Jennifer J. & Gaver, Kenneth M. (1993) Additional evidence on the association between the investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of Accounting and Economics*, vol. 16, no 1 - 3, pp.125-160.

Girma, Sourafel, Thompson, S. & Wright W., Peter. (2006) The impact of merger activity on executive pay in the United Kingdom, *Economica*, vol. 73. no. 290, pp. 321-339.

Girma, Sourafel, Thompson, S. & Wright W., Peter. (2007) Corporate governance reforms and executive compensation determination: Evidence from the U.K. *Economica*, vol. 75, no. 1, pp. 65-81.

Grinstein, Yaniv & Hribar, Paul. (2004) CEO compensation and incentives: Evidence from M&A bonuses. *Journal of Financial Economics*, vol. 73, pp. 119-143.

Guest, Paul M. (2009) The impact of mergers and acquisitions on executive pay in the United Kingdom. *Economica*, vol. 76, pp. 149-175.

Hansen, L. (1982) Large sample properties of generalized method of moments estimators. *Econometrica*, vol. 50, no. 3, pp.1029-1054.

Harford, Jarrad & Li, Kai. (2007) Decoupling CEO wealth and firm performance: The case of acquiring CEOs. *Journal of Finance*, vol. 62, no. 2, pp. 917-949.

Heckman, J. James. (1979) Sample selection bias as a specification error. *Econometrica*, vol. 47, no. 1, pp. 153-161.

Henry L. Tosi, Jr. & Luis R. Gomez-Mejia. (1989) The decoupling of CEO pay and performance: An agency theory perspective. *Administrative Science Quarterly*, vol. 34, no. 2 pp. 16-189.

Indjejikian, J., Raffi & Nanda, Dhananjay (DJ). (2002) Executive target bonuses and what imply about performance standards. *The Accounting Review*, vol. 77, no. 4, pp. 793-819.

Jensen, Michael C. & Murphy, J. Kevin. (1990) Performance pay and top-management incentives. *Journal of Political Economy*, vol. 98, no. 2, pp. 225.263.

Jensen, Michael C. (1989) The eclipse of the public corporation. *Harvard Business Review*, vol. 67, pp. 61-74.

Jensen, Michael C. & Meckling, William H. (1976) Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, vol. 3, pp. 305-360.

Jensen, Michael C. (1986) Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*, vol. 76, no. 2, pp. 323-329.

John, Teresa A. & John Kose. (1993) Top management compensation and capital structure. *The Journal of Finance*, vol. 48, no. 3, pp. 949-974.

Khorana, Ajay & Zenner Marc. (1998) Executive compensation of large acquirers in the 1980s. *Journal of Corporate Finance*, vol. 4, pp. 209-240.

Kole, Stacey R. (1997) The complexity of compensation contracts. *Journal of Financial Economics*, vol. 43, no.1, pp. 79-104.

Kostiuk, F. Peter. (1990) Firm size and executive compensation, *The Journal of Human Resources*, vol. 25, no. 1, pp. 90-105.

Kroll, M., Wright, P., Toombs, L., & Leavell., H. (1997) Form of control: A critical determinant of acquisition performance and CEO rewards, *Strategic Management Journal*, vol. 18, no. 2, pp. 85-96.

Lambert, A., Richard, Larcker, F. David, & Weigelt, K. (1991) How sensitive is executive compensation to organizational size? *Strategic Management Journal*, vol. 12, no. 5, pp. 395-402.

Lambert, A., Richard, Larcker, F. David. (1987) Executive compensation effects of large corporation acquisition: The case of risk arbitrage. *Journal of Accounting and Public Policy*, vol. 6, no. 4, pp.231-243.

Larner, Robert J. (1970) Management control and the large corporation.

Lewellen, G. Wilbur & Huntsman Blaine. (1970) Managerial pay and corporate performance. *The American Economic Review*, vol. 60, no. 4, pp. 710-720

Loughran, T. & Vijh, A. (1997) Do long term shareholders benefit from corporate acquisitions? *Journal of Finance*, vol. 52, pp. 1765 – 1790.

Main, M., G., Brian. (1991) Top executive pay and performance. *Managerial and Decision Economics*, vol. 12, no. 3, pp. 219-229.

Marris, R. (1967) Economic theory of managerial capitalism (Macmillan).

Massan, Robert T. (1971) Executive motivation, earnings, and consequent equity performances. *The Journal of Political Economy*, vol. 79, pp. 1278-1292.

McGuire, W. Joseph, Chiu, S.Y. John & Elbing, O. Alvar. (1962) Executive incomes, sales and profits. *The American Economic Review*, vol. 52, no. 4, pp. 753-761.

Medof, James L. & Abraham, Katharine G. (1980) Experience, performance, and earnings. *The Quarterly Journal of Economics*, vol. 95, no. 4, pp. 703-736.

Mehran, Hamid. (1995) Executive compensation structure, ownership, and firm performance. *Journal of Financial Economics*, vol. 38, pp. 163-184.

Mengistae, Taye & Xu, Colin Lixin. (2002) Agency theory and executive compensation: The case of Chinese state-owned enterprises. *World Bank Research Paper*.

Morck, Randall. (1990) Do managerial objectives drive bad acquisition? *The Journal of Finance*, vol. 45, no. 1, pp. 31-48.

Murphy, Kevin J. (1985) Corporate performance and managerial remuneration: An empirical analysis. *Journal of Accounting and Economics*, vol. 7, pp. 11-42.

Murphy, Kevin J. (1998) Executive compensation. Working paper series.

Nickell, Stephen. (1981) Biases in dynamic models with fixed effects. *Econometrica*, Vol. 49, no. 6, pp. 1417-1429.

Palia, Darius. (2001) The endogeneity of managerial compensation in firm valuation: A solution. *Review of Financial Studies*, vol. 14, no. 3, pp. 735-764.

Penrose, E. T. (1959) The theory of the growth of the firm. *Blackwell*, Oxford.

Roberts, D. (1959) Executive compensation. *The free press*.

Roll, Richard. (1986) The hubris hypothesis of corporate takeovers. *The Journal of Business*, vol. 59, no. 2, pp. 197-216.

Roodman, David. (2006) How to do xtabond2: An introduction to "Difference" and "System" GMM in Stata. *Center for Global Development*, working paper no. 103.

Roodman, David. (2009) A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics*, vol. 71, no. 1, pp. 135-158.

Rose, Nancy L. & Shepard, Andrea. (1997) Firm diversification and CEO compensation: Managerial ability or executive entrenchment? *Rand Journal of Economics*, vol. 28, no. 3.

Sargan, J. D. (1958) The estimation of economic relationships using instrumental variables. *Econometrica*, vol. 26, pp. 393-415.

Schimdt R., Dennis & Fowler L. Karen (1990) Post-acquisition financial performance and executive compensation. *Strategic Management Journal*, vol. 11, no. 7, pp. 559-569.

Shleifer Andrei & Vishney W. Robert. (1989) Management entrenchment: The case of manager-specific investments, *Journal of Financial Economics*, vol. 25, pp. 125-139.

Smith, Clifford W. and Watts, Ross L. (1992) The investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of Financial Economics*, vol. 32, no. 3, pp. 263-292.

Smyth, David J., William J. Boyes & Dennis E. Peseau. (1975) Size, growth, profits, and executive compensation in the large corporation. *Holmes & Meier*, New York.

Verbeek, Marno. (2004) A guide to modern Econometrics. *John Wiley & Sons*, Ltd. England.

Williamson, O. E. (1964) The Economics of' discretionary behavior: Managerial objectives in a theory of the firm, Prentice-Hall, Englewood Cliffs, NJ.

Windmeijer, F. (2005) A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics*, vol. 126, pp. 25-51.

Wright, P., Kroll & M., Elenkov, D. (2002) Acquisition returns, increase in firm size, and chief executive officer compensation: The moderating role of monitoring. *The Academy of Management Journal*, vol. 45, no. 3, pp. 599-608.

Yarrow, G. (1972) Executive compensation and the objective of the firm, in the market structure and corporate behaviour. ed. K. Cowling (Gray-Mills).

APPENDIX

TABLE A1-DISTRIBUTION OF CORPORATE TAKEOVERS, 2001-07

The time and geographical distributions of acquisitions over the period are illustrated in Table A1. The sample comprises 1279 corporate takeovers during the period 1 January, 2000, to December 31, 2007, covering both public and private targets. An acquisition is identified and included in our data set if it is (1) made by firms in our compensation database, (2) listed as completed with an announcement date and effective date within our suggested sample period, (3) identified as an acquisition of majority interest by Thomson Reuters M&A. Acquirers consist of both financial and non-financial institutions. Acquisitions are taken into account regardless their mode of financing.

Acquisition Year	Domestic Acquisitions	Foreign Acquisitions	Total
2000	86	122	208
2001	64	96	160
2002	41	69	110
2003	38	81	119
2004	61	63	124
2005	68	99	167
2006	79	123	202
2007	70	119	189
Total	507	772	1279
Annual Average	72.43	110.29	182.71

TABLE A2- SUMMARY STATISTICS

Table A2 illustrates a comparative overview of the descriptive statistics of the variables. The full sample includes 315 firms listed on the Stockholm Stock Exchange, from 2001 to 2007, in total 1774 firm year observations, covering 1279 corporate takeovers by 222 acquirers. Acquisitions completed by the sample firms during 2000-07 are identified through Thomson Reuters M&A database. Cash compensation includes base salary and bonuses, all are collected from annual reports. Firm age is calculated based on the year of firm establishment indicated in annual reports. Number of employees and financial data including balance sheet items (total assets, total debt and total equity), income statement items (total sales (revenues), earning before interest and tax (EBIT), and net income (after-tax profit)) and market value of equity are obtained from Datastream and Reuters 3000. Compensation and financial figures are recorded at year end. Data for non-Swedish firms, if expressed in currencies other than SEK, are converted to SEK using the corresponding year-end exchange rates reported in Reuters. Financial ratios in Panel E are computed upon the raw financial data. *Leverage* ratio is defined as the book value of total debt divided by book value of equity. *Return-on-asset* (ROA) is the ratio of net income to total assets. *Market to book* (MTB) value ratio is measured as sum of market value of equity and book value of debt divided by sum of book value of equity and book value of debt.

Panels A - E report the 2001 and 2007 mean, median, and standard deviation for CEO's cash compensation, balance sheet items, income statement items, other firm characteristics (number of employees, firm age, market value of equity) and financial ratios, respectively. Panels F and G divide the sample into different subgroups by firm size. Firms are classified as small, below median, above median, or large if their initial sales fall below the 25 percentile, below median, above median, or above the 75 percentile of the sample sales in 2001.

PANEL A - CEO COMPENSATION (SEK)

	Year	Mean	Median	S.D.
Salary	2001	3,084,333	1,936,000	4,069,099
	2007	3,323,628	2,328,000	3,063,806
Bonuses	2001	348,889	240,000	276,474
	2007	1,310,049	417,000	2,463,199
Total cash compensation	2001	3,095,962	1,989,500	4,066,352
	2007	4,604,435	3,049,500	4,697,959

PANEL B - BALANCE SHEET ('000 SEK)

	Year	Mean	Median	S.D.
Assets	2001	31,068,833	825,366	182,931,502
	2007	63,528,682	1,717,377	420,869,996
Debt	2001	10,682,333	116,700	65,512,897
	2007	30,987,367	258,570	242,075,509
Equity	2001	4,955,200	451,455	14,449,016
	2007	19,231,901	889,500	166,388,387

PANEL C - INCOME STATEMENT ('000 SEK)

	Year	Mean	Median	S.D.
Sales	2001	9,864,453	1,061,830	28,665,537
	2007	13,037,442	1,320,479	33,093,104
EBIT	2001	668,844	35,378	4,108,498
	2007	2,284,326	167,847	7,567,476
Net Income	2001	203,318	14,957	1,926,538
	2007	2,040,994	104,737	14,329,882

PANEL D - OTHER FIRM CHARACTERISTICS

	Year	Mean	Median	S.D.
Market Value of Equity	2001	9,888,886	790,385	36,865,015
('000 SEK)	2007	14,060,713	1,712,199	37,892,079
No. of Employees	2001	5,890	503	20,175
(persons)	2007	7,038	584	21,709
Age	2001	33	17	30
(years)	2007	37	23	29

PANEL E - FINANCIAL RATIOS

	Year	Mean	Median	S.D.
Leverage	2001	1.26	0.40	4.96
	2007	0.87	0.35	1.98
ROA	2001	-0.20	0.01	0.84
	2007	0.04	0.06	0.14
MTB	2001	2.11	1.35	2.03
	2007	2.45	1.63	3.38

PANEL F - STATISTICS ACCORDING TO FIRM SIZE

	Average cash compensation (SEK)	Total acquisitions	Average MTB	Average leverage
Small	1,729,539	94	3.048	0.538
Below median	1,958,537	277	2.592	0.558
Above median	5,308,544	919	2.052	1.099
Large	7,314,091	662	1.998	1.337

PANEL G - ANNUAL GROWTH RATE, 2001-07

	Cash compensation		MTB		Sales	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Full sample	7.3%	56.5%	2.5%	45.1%	9.0%	49.8%
Small	6.1%	86.7%	2.3%	64.4%	21.8%	80.4%
Below median	6.7%	71.6%	2.3%	55.3%	14.1%	63.1%
Above median	7.8%	37.4%	2.8%	32.2%	4.1%	31.9%
Large	7.3%	37.7%	3.0%	27.4%	2.8%	31.6%

TABLE A3- VARIABLES, DEFINITIONS AND SOURCES OF DATA*

Variables	Description	Sources
Compensation	CEO's annual/fiscal year cash salary & bonuses in absolute figure (SEK)	Datastream Code
Options	Ownership of options	Annual reports of firms
Stock Holdings	Ownership of equity	Annual reports of firms
Firm Age	Year of firm establishment	Annual reports of firms
Total Sales/Revenues	Firm/Institutions fiscal year sales/ revenues from goods and services, in million of SEK	Datastream Code 104
EBIT	Earnings before interest & tax, in million of SEK	Datastream Code 1300
NI	Published after tax-profit, in million of SEK	Datastream Code 623
Total Assets	Book value of total assets of acquirer firm, in million of SEK	Datastream Code 392
Total Debt	Book value total debt of acquirer firm, in million of SEK	Datastream Code 1301
Total Equity	Book value of total Share capital and Reserves, in million of SEK	Datastream Code 307
MV	Market value of equity, in million of SEK	Datastream Code MV
ROA	Net Income/Total Assets	
MTB	(Market Value of Equity + Book Value of Debt) / (Book Value of Equity + Book Value of Debt	
Number of Employees	Employees (workers) of each individual firm over the period	Datastream Code 219
Firm Size	Net sales (revenues) of the firm	

*Accounting figures which were recorded in other currencies have been converted to Swedish Krona according to their respective year-end exchange rate.

TABLE A4 – ROBUSTNESS CHECK

The full sample consists of 315 firms over 7 years, in total 1774 firm year observations, covering 1279 takeovers made by 222 acquirers from January 1, 2000 to December 31, 2007. Executive pay is regressed on its lagged value, performance, sales, acquisition and year dummies. All variables except dummies are measured in natural logarithms. ***, ** and * indicate significance level at 1%, 5%, and 10%, respectively. Standard errors are given in parentheses, and robust to heteroskedasticity. Standard errors in the two-step GMM estimation are also robust to arbitrary autocorrelation within individuals, and Windmeijer corrected for downward bias. *Acquisition* includes a set of dummy variables presenting the within 3-year, contemporaneous and lagged effects; dummies for *Within 3 years*, *Contemporaneous*, *After 1 year*, and *After 2 years* take value of 1 if the firm made any acquisitions within a 3-year period (including the current year), in the current year, the previous year, and previous 2 years, respectively.

Panel A summarizes the estimates given by different econometric approaches. Columns (1) and (2) report the two-step system GMM when performance and sales are treated as strictly exogenous conditional on the individual effects. Columns (3) and (4) represent the two-step system GMM when performance and sales are treated as predetermined. Columns (5) and (6) repeat the fixed effects on the panel data when previous pay is excluded. Column (7) corresponds to the cross-sectional OLS on the variable changes over the period 2001-07.

PANEL A - COMPARISON OF DIFFERENT SPECIFICATIONS

	Dependent Variable: Pay						
Independent Variable	2 step System GMM				Fixed effects		OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Previous pay	0.161*	0.149*	0.253**	0.249**			
	(0.093)	(0.080)	(0.109)	(0.110)			
Performance	0.116***	0.102***	0.143**	0.154***	0.137***	0.135***	0.297***
	(0.038)	(0.035)	(0.059)	(0.059)	(0.034)	(0.0347)	(0.113)
Sales	0.050	0.063**	0.084*	0.079*	0.086***	0.0878***	0.119*
	(0.033)	(0.028)	(0.046)	(0.046)	(0.026)	(0.0258)	(0.067)
Acquisition effect							-0.086
							(0.170)
Within 3 years	0.189		0.217***		0.002		
	(0.204)		(0.083)		(0.045)		
Contemporaneous		0.030		0.16***		0.0037	
		(0.035)		(0.048)		(0.0421)	
After 1 year		-0.016		0.117**		-0.0312	
		(0.029)		(0.058)		(0.0414)	
After 2 years		0.078		0.171***		0.0215	
		(0.072)		(0.060)		(0.0283)	
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	No
AR(2) test p-value	0.794	0.603	0.648	0.675			
Sargan p-value	0.083	0.112	0.000	0.000			
Hansen J p-value	0.643	0.701	0.269	0.333			
No. of observations	1179	1179	1179	1179	1411	1411	167
Instrument count	30	32	80	82			
Difference-in-Hansen tests of exogeneity of instrument subsets							
GMM instruments for level			0.639	0.588			
IV for difference			0.175	0.104			
IV for level			0.480	0.444			

PANEL B – TWO-STEP GMM, LIMITED LAGS

Panel B reproduces the results by the two-step difference and system GMM estimation, but limits the lag structure of log pay as instrumental variables to order three.

Independent Variable	*Dependent Variable:* Pay			
	Difference GMM		System GMM	
	(1)	(2)	(3)	(4)
Previous pay	0.231	0.239	0.16*	0.15**
	(0.053)	(0.149)	(0.092)	(0.074)
Performance	0.087**	0.08*	0.11***	0.11***
	(0.042)	(0.044)	(0.038)	(0.035)
Sales	0.055	0.048	0.062*	0.058**
	(0.042)	(0.037)	(0.036)	(0.028)
Acquisition effect				
Within 3 years	-0.034		-0.009	
	(0.237)		(0.244)	
Contemporaneous		-0.032		0.022
		(0.077)		(0.035)
After 1 year		-0.071		-0.027
		(0.063)		(0.03)
After 2 years		0.024		0.044
		(0.105)		(0.079)
Year dummies	Yes	Yes	Yes	Yes
AR(2) test p-value	0.540	0.512	0.642	0.617
Sargan p-value	0.760	0.851	0.205	0.229
Hansen J p-value	0.598	0.673	0.845	0.859
No. of observations	934	934	1179	1179
Instrument count	18	20	24	26

PANEL C - LONG-RUN ELASTICITIES AND MEDIAN SENSITIVITIES

Panel C represents the long-run elasticity and median sensitivity of executive compensation with respect to firm performance and size based on the estimates from Panel A. For the dynamic model (columns (1) – (4)), based on the short-run elasticity β (the coefficients for performance and sales) and α - the parameter associated with previous pay, the long-run elasticity is derived as $\beta/(1-\alpha)$. The median performance (or size) sensitivity is computed by multiplying the long-run elasticity with the median pay for 2001 then divided by the median market value (or median sales) for 2001.

	2 step System GMM				Fixed effects		OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Long-run elasticity of pay with respect to:							
Performance	0.138***	0.120***	0.191**	0.205***	0.137***	0.135***	0.297***
Sales	0.060	0.074**	0.112*	0.105*	0.086***	0.088***	0.119*
Median sensitivity of pay with respect to:							
Performance	0.0348%	0.0302%	0.0482%	0.0516%	0.0345%	0.0340%	0.0748%
Sales	0.0112%	0.0139%	0.0211%	0.0197%	0.0161%	0.0165%	0.0223%