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Drivers of M&A transaction activity - A macroeconomic perspective

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Abstract

The paper examines potential drivers for the market of mergers and acquisitions transactions in Sweden between the years 2000 and 2023. An OLS regression analysis is performed to investigate how the number of transactions correlates with Sweden's economic growth (GDP) and cost of capital (STIBOR). By further including the control variables unemployment rate, SEK/EURO exchange rate, and political factors, the research is intended to yield a deeper understanding of the M&A activity in Sweden. The findings show statistically significant positive correlation between GDP and the number of M&A transactions, indicating that Swedish economic growth drives the M&A activity. On the other hand, the STIBOR interest rate appears to have a negative effect on the M&A market after observing a statistically significant negative correlation. However after performing several robustness tests, the relationship between STIBOR and M&A transactions seems to be more complex with diminishing statistical significance. Thus, the hypothesis of a positive correlation between GDP and M&A activity is confirmed, while the impact of STIBOR is uncertain.

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1. Introduction & Problem discussion

Estimating the precise drivers of the mergers and acquisitions market is challenging due to the seemingly infinite number of factors influencing the decision to engage in such transactions. The macroeconomic climate, encompassing economic growth and the cost of capital, undoubtedly plays a significant role and must be thoroughly examined to gain a comprehensive understanding of the market.

Acquisitions of existing firms could be one key driver for economic growth by adding value. Value can be created through synergies such as economies of scale and cost savings from operational synergies, efficiency in distribution through logistic synergies or R&D efficiency through shared knowledge and patents (Cordova, 2021). Tamosiuniene and Duksaite (2009) argue M&A transactions to be one vital driver of a healthy economy as it can drive sharing of knowledge and accelerating innovation. Mergers and acquisitions do also help management to generate shareholder value which stimulates- and further increases investment activity, vital for corporate growth (Tamosiuniene & Duksaite, 2009). Creating value through mergers and acquisitions thus requires understanding of the M&A market and what drives incentives for transactions.

This thesis addresses and analyzes what drives M&A transactions, and more specifically focuses on the macroeconomic conditions. There is substantial research about the value drivers in the M&A transaction market. However, there is a gap in the research about the M&A market in Sweden and how macro factors affect the market. Numerous studies have been made in the US market and it would be interesting to have a take on the Swedish market. Even though similar results might be hypothesized, the Swedish market and the American market do have substantial differences in terms of size, and the business cultures deviate substantially. La Porta et al. (2018) explore how investor protection differs around the world and conclude that Scandinavian countries have the best quality of law enforcement governing investor protection compared to other regions. La Porta et al. (2018) continue to argue that Scandinavian countries often have large ownerships, which can result in slower decision making. Furthermore, business environments deviate substantially when considering tax and business regulations, possibly resulting in different business strategies (PWC, 2022).

McBeath & Bacha (2001) investigate the M&A drivers for biotech and pharmaceuticals. An interesting take is that they also focus on hurdles and study the most substantial hurdles for M&A transactions. This opposite view gives a different perspective which is at least as fruitful to understand the market. Haller (2013) investigates what motivates managers to execute takeovers and the key drivers for M&A activity from an internal perspective. Haller (2013) then continues to investigate how much macroeconomic factors affect the M&A market. Håndstad & Solbøe (2021) explore the drivers of M&A activities in Norway looking at the domestic stock market performance, domestic short-term interest rate, and gross domestic product.

Tamosiuniene and Duksaite (2009) analyze what factors co-varies with the number of M&A transactions in 10 different countries, not including Sweden. More specifically, the authors focus on the explanatory variables gross domestic product (GDP) and foreign direct investments (FDI) (inward and outward) as drivers for the number of M&A transactions. The authors find significant support for positive correlation with M&A value, GDP and inward FDI. M&A value and GDP are further argued to be prominent measures for forecasting M&A activity due to the significance of results (Tamosiuniene & Duksaite, 2009). The findings from Tamosiuniene and Duksaite (2009) support the importance of knowledge regarding macro factors and its influence on the M&A market.

The purpose of this paper is to understand what macroeconomic conditions favor the market for corporate takeovers. More specifically, the intention is to analyze how economic growth and the cost of capital, in terms of interest rates, affect the M&A market. Since M&A is such an important factor for economic- as well as corporate growth, the research is an important step to understand how Sweden's economic growth is affected by different market conditions.

To fulfill the purpose and examine the research area, the following research question has been conducted:

"How did market conditions, more specifically GDP and STIBOR, drive the number of M&A transactions in Sweden during the years 2000-2023?"

2. Theoretical framework

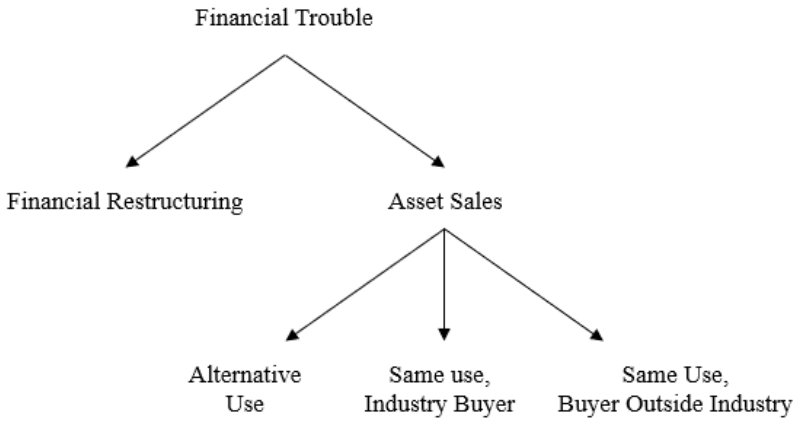
This section aims to give a theoretical framework in order to investigate the proposed research problem. The framework further composes the fundamentals for hypothesizing M&A transaction volume drivers.

2.1. Macroeconomic drivers of M&A transactions

Shleifer and Vishny (1992) study the determinants of the liquidation value of assets. They analyze the drivers of asset prices with a specific focus on financial distress. They argue that markets in expansion are more liquid yielding higher liquidity for assets. Higher liquidity for assets is further argued necessary for transaction activity of corporate firms. On the other hand, downturns in the real economy creates illiquidity which in turn creates difficulties for transactions of corporate firms and leveraged buyouts. Their conclusions indicate that expansion in the real economy stimulates liquidity and thus transactions of corporate firms (Shleifer & Vishny, 1992). Harford (2005) explores the fundamental drivers of merger waves and draws similar conclusions as Shleifer and Vishny (1992). Sufficient capital liquidity arising from booming market conditions are argued necessary for corporate transactions to arise (Harford, 2005). Thus, the business conditions and market in expansion are considered favorable for mergers and acquisitions transactions.

Shleifer and Vishny (1992) also pinpoint the finding that firms in financial distress during a recession tend to sell assets at a discount compared to the value in best use. Figure 1 shows the underlying fundamental turns for corporate assets in times of financial distress where a substantial share can be attributed to asset sales (Shleifer & Vishny, 1992). Firms have different degrees of robustness towards times of financial difficulties. Some investors might find a distressed firm as an attractive investment target. Thus, there is a market for discounted firms in times of recession.

Figure 1: Sales of Corporate Assets during times of financial difficulties



Source: Shleifer and Vishny (1992)

Tirole (2006) stretches the purchase opportunities arising from distressed corporations further and extends the theory from Schleifer & Vishny (1992). Tirole (2006) argues for the market of distressed firms to be significant and that there are incentives for corporate transactions to increase in times of financial difficulties. Market downturns can cause distressed positions for firms, leading to distressed sales and discounted acquisition targets for firms that are better prepared for distressed market conditions. The acquiring firm finds itself in a position with bargaining power which increases incentives for M&A transactions (Tirole, 2006). Considering arguments from Schleifer & Vishny (1992), Harford (2005) and Tirole (2006), a trade-off becomes prominent. The question is whether the increased liquidity in times of good macroeconomic conditions outweigh the bargaining power and incentives for purchase of distressed firms in times of financial distress. Depending on what force is the most prominent, one should be able to conclude what market conditions yield the most mergers and acquisition transactions.

Adra et al. (2020) stretch the reasoning of liquidity further and incorporate the perspective of debt as a significant financing solution for M&A transactions. One of the key findings is that increased cost of capital delimits the possibilities for financing and thus restrain the liquidity position. The study shows evidence of a negative influence from interest rates on the number of takeovers, which suggests that higher borrowing costs may deter companies from pursuing acquisition strategies due to increased financial burden (Adra et al., 2020).

Real Economic Growth

Previous research within the field of macroeconomic effects on M&A activity show various and contradictory results, leaving room for further research. Becketti (1986) observes a negative correlation between GDP growth and the number of takeovers in the US between 1979 and 1984. Contradictory, Choi & Jeon (2010) examine a positive correlation between the same variables in the US during 1980 through 2004. Further, Kumar et al. (2023) find that high economic growth and more specifically growth in gross domestic product increase the bargaining power of corporate firms during M&A negotiation. The study shows an increased number of abandoned transactions due to targets awaiting even better offers from buyers. Hence, higher GDP growth is associated with more abandonments counteracting the deal flow. Uddin & Boateng (2011) observes a positive correlation between cross border M&A transactions with British targets and GDP in the United Kingdom during 1987 to 2006. Thus, the result supports Vishny & Schleifer (1992) and Harford (2005). Antunes (2017) explores the positive relationship further when investigating the correlation between GDP and M&A transactions in the UK market during 1985 and 2015.

Interest Rate

A variety of research regarding financing costs has been conducted in the past, also with a variety of results. Beckenstein (1979) investigates the drivers of mergers post second world war in the US during 1948 and 1975 and found a positive correlation between capital cost, measured as interest rate on prime commercial paper, and corporate mergers. The observed results are argued due to the uncertain market conditions post war, yielding irrational effects (Beckenstein, 1979). Becketti (1986) on the other hand observes a negative relationship between capital costs and corporate transactions which is argued reasonable due to financing of transactions becoming discounted. Melicher et al. (1983) observes similar results as Becketti (1986) supporting a negative correlation between interest rate and the number of transactions during 1947 to 1977 in the American industry.

2.2 Hypothesis formulation

Conflicting hypotheses can be drawn from the theories and empirical results presented which contributes to an interesting starting point of the research area. According to Shleifer & Vishny (1992), a market in expansion where the macroeconomic environment stimulates economic growth, increases liquidity. In turn, this might increase the number of corporate

acquisitions. On the other hand, Schleifer & Vishny (1992) and Tirole (2006) also argue for the possibility that the market for acquisitions of corporate firms is stimulated during times of economic recession due to the fact that distressed firms could be acquired cheaply. Reduced prices have a negative effect on transaction values which results in a trade-off in terms of value. The trade-off is whether deteriorated market conditions and thus reduced prices increase the number of transactions to an extent such that the transaction value increases or if the discount averages out the effect in transaction value or even decreases it. For the sake of this research, the issue is not considered further due to the fact that this research focuses on the transaction volume and hence only the number of transactions.

The contradictory theories were developed about 30 and 20 years ago, respectively, which results in a critical evaluation of using these as fundamentals for the theoretical framework. With M&A being a fast paced and changeable industry might result in theories eroding quickly. However, the factors that affect the market activity should still be the same which makes the theories applicable and relevant. Previous research, as cited by Uddin & Boateng (2011), Choi & Jeon (2010), Harford (2005), and Antunes (2017), collectively suggests a positive correlation between real economic growth and M&A activity. Hence, the first hypothesis is formulated based on this body of research and is specifically examined within the context of the Swedish market.

Hypothesis 1: Swedish M&A transaction activity correlates positively with the Swedish GDP.

Liquidity is argued as a key component for transactions of corporate assets in line with Schleifer and Vishny (1992). In times of low interest rates, financing becomes less expensive and thus liquidity increases. Building upon similar logic and drawing on evidence from prior research by Becketti (1986) and Melicher et al. (1983), the current study is grounded in a similar hypothesis, suggesting a negative correlation between M&A transactions and the cost of capital.

Hypothesis 2: Swedish M&A transaction activity correlates negatively with the 3-month STIBOR interest rate.

3. Methodology

The following section describes the methodology used. The initial step is identifying macro factors with potential effect on the market for M&A transactions. Secondly, the independent variables used in the regression model, along with the data collection process is described. Thirdly, a step-by-step framework for execution of the testing is presented.

3.1 Variable identification

The independent variables identified in the hypothesis formulation are gross domestic product (GDP) and interest rate (STIBOR). They are considered necessary to get an understanding for the market conditions and thus draw conclusions regarding the relationship between transactions and market conditions. However, there are probably close to unlimited factors affecting the market for mergers and acquisitions. For the scope of this paper, the purpose is to get an understanding for what market conditions benefit corporate transactions. As a baseline for the research, a number of variables considered relevant are obtained. Apart from the already stated independent variables, the Swedish stock market performance (OMXS30) is considered relevant as a potential driver of M&A transactions due to the valuation aspect. Further, the Swedish unemployment status (Unemp) can be viewed as a relevant metric for measuring the macro environment and thus, the M&A activity. The consumer price index (CPI) measures the overall price level in the country and thus the inflation level which is highly associated with the macroeconomic trends. To get an international perspective and capture the effects of the Swedish currency, the SEK to EURO exchange rate (FX) is considered. To get a political perspective, a dummy variable (RW) describeíng whether a right wing party has governed the Swedish parliament or not, is considered relevant to include. Lastly, a variable capturing the Swedish population growth (Pop) is considered as it is possible that the M&A activity correlates with the population.

Within the field of econometrics, there are problems related to *multicollinearity.* Issues arise when the independent variables are highly correlated as the regression cannot depict where the correlation is and thus how they correlate with the dependent variable (Cortinhas & Black, 2012). Cortinhas and Black (2012) declare that severe multicollinearity is present when correlation among independent variables amounts to over 0.8. Multicollinearity can be detected using a correlation matrix by identifying potential correlation between the

independent variables. Numerous variables with potential explanatory power for M&A transactions are shown in the correlation matrix below (Table 1):

Table 1: Correlation matrix with macro factors

	OMX	GDP	STIBOR	Unemp	CPI	FX	RW	Pop
OMXS30	1.000							
GDP	0.896	1.000						
STIBOR	-0.493	-0.553	1.000					
Unemp	0.253	0.349	-0.510	1.000				
CPI	0.829	0.966	-0.414	0.381	1.000			
FX	0.562	0.729	-0.295	0.218	0.736	1.000		
RW	-0.098	0.015	0.266	0.271	0.178	-0.016	1.000	
Pop	0.895	0.980	-0.653	0.363	0.925	0.695	-0.067	1.000

Note: The dataset is based on the years between 2000 and 2023. OMXS30 represents the OMXS30 stock market index observed monthly, GDP represents the gross domestic product from the Swedish economy, STIBOR represents monthly value of the three months STIBOR rate, Unemp is the unemployment rate in Sweden, CPI show the Swedish consumer price fluctuations, FX is the exchange rate SEK/EUR, RW is a dummy variable capturing which party governed Sweden, Pop is the monthly value on the total population in Sweden.

The correlation matrix indicates that GDP and CPI has a strong correlation (0.966), and so also GDP and Population (0.980). As noted by Cortinhas and Black (2012), severe multicollinearity becomes apparent when correlations exceed 0.8. Consequently, in order to mitigate the issue, the model excludes the CPI and Population variables. As observed in the correlation matrix, there also exists a notable correlation between OMXS30 and GDP (0.896). Both variables are deemed highly relevant for capturing macroeconomic effects (Engle et al., 2013). Omitting one of the variables can possibly result in *omitted variable bias*. Issues arise when disregarding relevant variables with high explanatory power. Thus, the model can yield biased and misleading results if important variables are omitted (Stock & Watson, 2020). For the purpose of this paper, both OMXS30 and GDP could be argued necessary to reduce the risk of omitted variable bias (Stock & Watson, 2020). However,

OMXS30 and GDP are considered explaining much of the same variation according to the correlation matrix and the risk of multicollinearity is considered predominantly. Thus, OMXS30 is omitted due to GDP being argued explaining more of the general macroeconomic environment and economic performance, excluding speculations, which the paper aims to investigate (Engle et al., 2013). The stock market performance can be an interesting take, but expectations and speculations included in stock prices makes the analysis difficult.

3.2 Test variables

The section below gives a thorough presentation of the variables that are used in the research to try to find what affects the mergers and acquisitions market.

3.2.1 Dependent Variable

The report examines the number of M&A transactions (Deals) and not the value. This is because examining the actual activity in the market is considered more interesting yielding more valuable insights when intended to contribute to the scientific field of corporate finance. It is worth mentioning that M&A transaction values are often not published, which would significantly reduce the number of observations if deal value is used as the dependent variable. The approach of considering transaction value might yield biased results due to large transactions affecting the value considerably. The data of transaction volume is downloaded from Eikon Refinitiv (Eikon, n.d.). A delimitation is made by only considering transactions where both buyers and sellers are Swedish. The argument is that limiting the study, by excluding international acquirers, yields a more precise understanding for the Swedish M&A market. The limitation is considered necessary to draw conclusions regarding macroeconomic conditions effect on transaction activity in Sweden specifically. No limitations are made with regards to transaction sizes to capture the overall market activity. However, partial bids are not included in the dataset as all transactions observed are made up by complete takeovers with acquisition of 100% of the shares in the target company (Eikon, n.d.).

3.2.2 Independent Variables

To be able to examine the research question and fulfill the purpose with linkage to the theoretical framework and examining which of the two contradictory theories that might

apply, the report uses the interest rate, STIBOR, as a proxy for market conditions collected from Swedish Financial Benchmark Facility website (Swedish Financial Benchmark Facility, n.d.). The Swedish Interbank Offered Rate (STIBOR) is argued to be a relevant proxy for macroeconomic conditions as it mirrors the general monetary policy as well as the market circumstances (Sveriges Riksbank, n.d.).

Using the same fundamental arguments, GDP is included to give a thorough reflection of the market conditions which enables linkage to- and conclusions based on the theoretical framework. GDP can be argued one of the best proxies for macroeconomic conditions as it mirrors the entire production in the Swedish economy and thus makes it a relevant measure for market performance. GDP is expected to grow over time with economic growth in the market. To mitigate the effects of natural variation from the anticipated positive trend over time, the model analyzes monthly changes. The source for the data is SCB as they provide authentic and up to date information of the Swedish GDP (SCB, 2023).

3.2.3 Control Variables

Control variables are included to reduce omitted variable bias and make the model more reliable. Three control variables are included, namely unemployment rate, exchange rate (SEK/EUR) and a dummy variable for which party who had majority votes in the parliament.

Unemployment rate is used as the first control variable as it is believed to have a high impact on the market performance and thus affect the M&A activity. Unemployment rates are often used to describe the health of a country's macroeconomic status and are therefore highly relevant in this research. Furthermore, the unemployment rate has not been included in any observed previous research, thereby creating a gap that needs to be addressed.

Although international transactions are overlooked, the exchange rate between Swedish Krona (SEK) and Euro (EUR) is an important factor for economic performance (Hamilton, 2018). Sweden is a relatively small economy, highly dependent on their export (Regeringen, 2023). The performance of the exporting sector is thus highly dependent on the Swedish currency performance. The paper thus includes the exchange rate in order to capture the indirect effect from shifts in currency. A substantial share of Sweden's export is to European countries due to the free trade agreements and limited trade restrictions within the European Union (European Union, n.d.). Thus, the Swedish Krona to Euro exchange rate is deemed

highly relevant for the purpose of this paper. Data is collected from the European Central Bank for legitimate spot exchange rates (European Central Bank, n.d.).

Political governance is proposed to have an effect on the corporate environment due to different perspectives on for example privatization and corporate tax regulations. A political perspective further enhances the analysis and includes an additional perspective on what affects the M&A activity. There is a concern that political changes develop over time and that actions are not significant enough to affect the M&A market within the observed time frame. Furthermore, the issue of political changes taking a significant amount of time before being implemented, needs to be considered. However, the argument is that a right-wing government favors the corporate environment and thus the M&A activity in line with the discussion from Shleifer and Vishny (1992). Thus, the political perspective is considered valid for using as a control variable also increasing the level of explanation.

3.3 Data collection process

The dataset gathered include the number of mergers and acquisitions transactions in Sweden between the years 2000-2023. This period is chosen to get an extensive dataset, improve accuracy and thus validity. The period also covers multiple financial crises which yield strong fluctuations resulting in reduced white noise in the data, and hence stretch testing the correlations (Stock & Watson, 2020). The data of M&A transactions is further based on deal announcements. Hence, to get the most accurate data to measure the activity in the specific interval.

3.4 Regression analysis

The regression is based on a logarithmic model for the dependent-, explanatory-, and the control variables, excluding the dummy variable. The data values are thus transformed to logarithmic values and the interpretation is that if the independent variable is facing a change amounting one percent, the variation in the dependent variable is indicated by beta (β) percent. For the explanatory- and control variables that face negative values, such as the STIBOR rate, a logarithmic transformation with ln (1 + x) is used. The correction is necessary as logarithmic transformations cannot be executed on negative values (Stock & Watson, 2020). A benefit of using a logarithmic model is that the variance diminishes, resulting in a more concentrated and evenly distributed data set. Further, issues related to

heteroskedasticity are mitigated with this method (Stock & Watson, 2020). The regression further uses robust standard errors, also known as Huber-White standard errors which apart from mitigates potential heteroskedasticity issues, reduces autocorrelation and improves inference (Stock & Watson, 2020).

For the model conducted, a 18-month lag is used since it is hypothesized that macroeconomic effects take longer to affect the M&A market, compared to the stock market or real-estate market for example. The length of a M&A deal can vary from a few weeks to several years to execute and are often large projects with multiple parties involved (Gallant, 2021). It is therefore hypothesized that a change in macroeconomic variables one month does not have a great impact on the ongoing transactions in that same month. It most likely does not change due to the uncertainty of the event. Waiting 18 months is therefore a good realization period for the M&A market to understand that the macroeconomics variables have changed and then somehow affect the buyer or the seller in the deal. Choi & Jeon (2010) found that between five and six quarters, equivalent to 15 and 18 months, is the optimal lag for macroeconomic factors to settle and affect the market for mergers and acquisitions.

The generic formula for a multiple linear regression presented below:

$$y_t = \beta_0 + \beta_1 x_{1t} + \beta_2 x_{2t} + ... + \beta_k x_{kt} + u_t \quad \text{with} \quad t = 1,2,...,T$$

Formula 2 - Generic regression formula

Denoted *x*, are independent test variables and *y* represents the dependent variable that is the main subject for research, in this study M&A transactions. The *t* represents the time frame from which the variable data is based on in relation to other variables. The regression error term denoted *u*, captures the deviations between observed and predicted values. Finally, the beta coefficients denote the magnitude of the effect from the independent test variables (Stock & Watson, 2020). In this research, as mentioned above, the regression includes lagged variables of 18 months and an ln-transformation which change the generic formula to the specific below:

$$ln(Deals)_t = \beta_0 + \beta_1 ln(1 + \Delta GDP)_{t-18} + \beta_2 ln(1 + STIBOR)_{t-18} + \beta_3 lnUnemp._{t-18} + \beta_4 lnFX_{t-18} + \beta_5 RW_{t-18} + u_{t-18}$$

Formula 3 - Regression formula with 18 months lag and research specific variables

4. Empirical Results

This section presents the empirical results from the data collection as well as the regression analysis. Further the results are analyzed and used for forecasting 18-months followed by a section of robustness testing in order to increase validity.

4.1 Descriptive data statistics

A detailed summary of the values for each variable is presented in Appendix A to yield understanding for the macroeconomic landscape during the period studied, Januari 2000 to December 2023. The data capture monthly observation frequency in order to get the most observations possible and thus increasing research validity (Cortinhas and Black, 2012). The number of observed values (N) for each variable is thus 288. Table 2 presents descriptive statistics for the variables to get an overview of the data. It is observed that the M&A activity has fluctuated substantially ranging from 28 transactions in the weakest month to 223 during the most intense month. The historically unusual period with negative interest rates in Sweden is captured with the negative minimum value in STIBOR.

Table 2: Variables and descriptive statistics

	N	Mean	Median	Sdv	Min	Max
Dependent variable						
Deals	288	91.049	86.500	32.672	28.000	223.000
lnDeals	288	4.448	4.460	0.364	3.332	5.407
Regular independent variables						
ΔGDP	288	0.004	-0.003	0.022	-0.028	0.044
ln(1+ΔGDP)	288	0.003	-0.003	0.022	-0.028	0.043
STIBOR	288	0.018	0.017	0.017	-0.006	0.053
ln(1+STIBOR)	288	0.017	0.017	0.017	-0.006	0.052
Independent control variables						
Unemp	288	0.073	0.073	0.010	0.049	0.096
lnUnemp	288	-2.622	-2.617	0.136	-3.016	-2.343
FX	288	9.592	9.334	0.758	8.239	11.846
lnFX	288	2.258	2.234	0.077	2.109	2.472
RW	288	0.390	0.000	0.490	0.000	1.000

Note: The data provided include the observation count (N), mean, median, standard deviation (Sdv), minimum as well as maximum values.

4.2 Results from regression analysis

The table 3 shown below, points out the outcomes from the regression analysis. Executing the model yields a R^2 value equal to 0.561, and thus 56% of changes in M&A transaction activity, is explained by the model employed. Stock & Watson (2020) underscore the complexities inherent with analyzing the R^2 metric and evaluating the regressions capabilities

in describing the variations. This indicates that one should consider the R^2 cautiously when interpreting the output.

Table 3: OLS regression results

lnDeals	**Coefficients**
Constant	2.115***
	(0.003)
ln(1+ΔGDP)	2.370***
	(0.001)
ln(1+STIBOR)	-4.054***
	(0.003)
lnUnemp	0.945***
	(0.000)
lnFX	2.177***
	(0.000)
RW	-0.056
	(0.122)
R^2	0.561
F-stat	68.910
p-value	(0.000)
N	269

Note: P-values are noted within parenthesis. The level of significance 1%, 5% & 10% are labeled with ***, ** & *.

4.3 Analysis of regression results

The positive coefficient sign for GDP is consistent with the stated hypothesis that "Swedish M&A transaction activity correlates positively with Swedish GDP". Given that GDP serves as a proxy for a country's economic growth and health, it is logical that more M&A transactions would occur during periods of economic expansion (Dynan & Sheiner, 2018). Notably, with a p-value of 0.001, the variable exhibits statistical significance at the 99% confidence level. It is therefore possible to reject the null-hypothesis. The positive correlation

with economic growth aligns with the argument put forth by Schleifer & Vishny (1992) that economic expansion benefits mergers and acquisitions (M&A) transactions, partly due to enhanced liquidity. The results of the subject study further corroborate the findings previously established by Choi & Jeon (2010), Uddin & Boateng (2011), Antunes (2017) and Harford (2005). The result further indicates that the Swedish M&A market follows the same nature as other markets previously investigated.

The negative coefficient sign for STIBOR is in line with the second hypothesis that "Swedish M&A transaction activity correlates negatively with the 3-month STIBOR interest rate". This indicates that when STIBOR decreases, the number of M&A transactions tends to increase. Notably, the p-value at 0.003 demonstrates statistical significance at the 99% confidence level. It is therefore possible to reject the null-hypothesis related to this variable as well. Decrease in interest makes debt financing discounted which is often used for financing corporate transactions (Adra et al., 2020). Cheaper financing increases demand for corporate loans and increases liquidity. The increased debt financing thus eases execution of mergers and acquisitions (Schleifer & Vishny, 1992). Such findings may be attributed to buyers' ability to assume more debt to finance new acquisitions (Adra et al, 2020). The regression results show evidence for this theory. Further, the results support the findings from Becketti (1986), Melicher et al. (1983) and Adra et al. (2020) who all find negative correlations.

Looking at the findings from table 3 regarding the control variables, the positive coefficient sign for FX indicates that a depreciating SEK relative to the EUR results in an increase in M&A transactions and vice versa. Given that the data collection encompasses only Swedish buyers and sellers, one can infer that investing outside Sweden becomes relatively more expensive compared to investing within Sweden. Consequently, Sweden emerges as a more attractive market for Swedish buyers, leading to a rise in the number of M&A transactions. This argument is further substantiated by Shetty et al. (2019), who examine returns on investments in foreign countries during periods of a strong dollar. Their findings suggest that investments tend to shift away from domestic borders when the country's currency is strong. The weakened Swedish Krona further incentivizes foreign actors to purchase Swedish goods and services (Regeringen, 2023). Thus, Swedish exporting corporations perform better and most likely become more attractive acquisition targets. Hence, the positive relation between transactions and exchange rate.

The coefficient for the unemployment rate reveals interesting findings. The positive sign suggests that a higher unemployment rate correlates with an increase in the number of M&A transactions. Several explanations could account for this phenomenon. Firstly, it's possible that an 18-month lag is insufficient to capture the labor effects on the M&A market, necessitating a longer lag period for more accurate results. It is reasonable that it takes longer for the employment market to settle following a macroeconomic change than for example GDP. To address this point further, it would be interesting to use different lags for different variables. However, for the scope of this thesis, the different lag approach gets too comprehensive with increased risk of falling away from the purpose. Additionally, one can argue that a flexible labor market helps firms to find qualified workers for job openings.

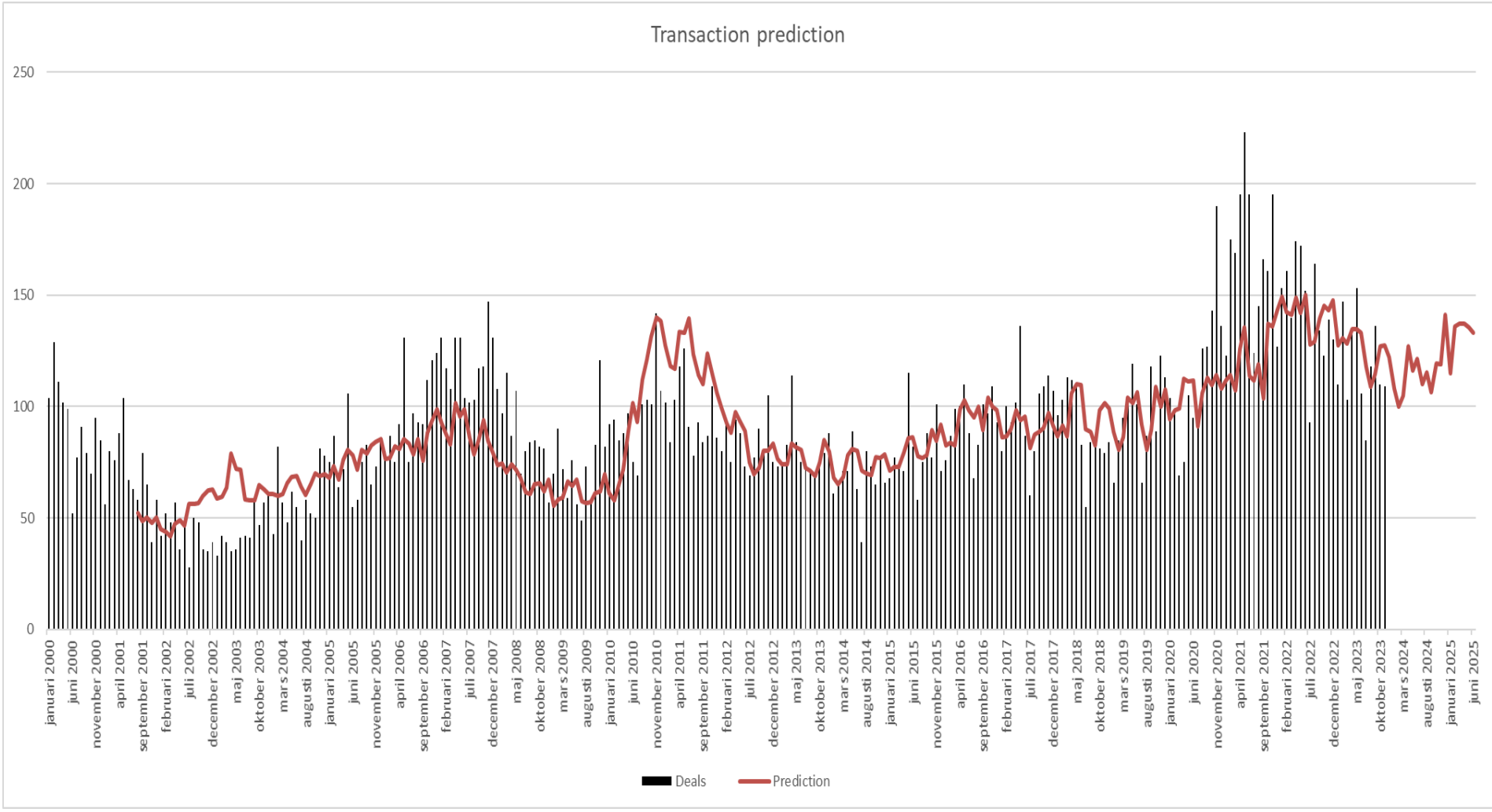
For the dummy variable, RW, the coefficient sign is negative, yet its p-value is 0.122, indicating that it lacks statistical significance in explaining the total number of M&A transactions.

4.4 Forecasting

The multiple linear regression generated can be used to estimate the number of mergers and acquisitions in the market by inputting market data of the independent variables. Furthermore, as the model is based on a 18-month lag, the regression is able to yield a forecasted estimation of the mergers and acquisition market up to 18 months ahead. Although slight offset, the predicted number of deals capture much of the actual number of deals as seen in table 4. The most substantial upturns in 2007, 2010/2011 and 2021 are captured with the regression generated estimation following relatively well. However, it is evidenced that the model lacks some explanatory power which is deemed understandable as a perfect prediction is close to impossible to generate. The two most substantial offsets are related to 2002/2003 and 2020/2021 which both periods can be derived from extraordinary macroeconomic events. The dotcom boom in 2000 resulted in a market with extreme corporate valuations and the aftermath during 2002/2003 featured substantial uncertainty (CFI, 2015). The offset in prediction versus actual deals can be due to sellers still having expectations of what their corporates are worth following extreme valuations in 2000. Although the macroeconomic variables as such were satisfactory, the macroeconomic environment was uncertain and substantial psychological factors not captured by the regression model might have affected the deal count (CFI, 2015). Using the model for

forecasting, one can deduce an upward trend in the upcoming 18-months. The forecast should of course be used with caution due to the fact that omitted factors influence the M&A market. However, the model makes room for speculation regarding the future.

Figure 2: M&A transaction regression estimation versus actual deal count



Note: The bars show the real number of M&A transactions between 2000-2023 and the incorporated line indicates the estimated M&A transactions. The frequency of the data observation is monthly.

4.5 Robustness Testing

Numerous robustness tests are conducted to increase validity and reliability of the regression model conducted. This includes a VIF-test, evidence for the 18-month lag, regression results using single variable OLS, Augmented Dickey Fuller test for stationarity as well as a second regression using a first different approach.

4.5.1 VIF-test

To enhance the reliability of the regression model, a variance inflation factor test (VIF-test) is performed by assessing the explanatory influence of each independent variable on the others (Cortinhas & Black, 2012). This test is utilized to detect multicollinearity among the independent variables, with a VIF value exceeding 10 signifying the presence of severe multicollinearity. Table 5 shows evidence that the model is liberated from multicollinearity issues which increases the validity and robustness of the model. (Cortinhas & Black, 2012)

Table 5: VIF-test of explanatory variables

Variable	**VIF-value**
ln(1+STIBOR)	2.22
lnUnemp	1.88
lnFX	1.39
RW	1.37
ln(1+ΔGDP)	1.00
Mean VIF	1.57

Note: A score of 1 indicates no significant multicollinearity concerns, whereas a score exceeding 10 suggests severe multicollinearity issues (Cortinhas & Black, 2012).

4.5.2 Evidence for optimal lag

To strengthen the model, a test for various lags is performed. Table 6 displays the results of testing the regression without lagged variables, as well as with lags of 6, 12, 18, and 24 months. The analysis reveals that the highest R^2 value is attained with an 18-month lag, consistent with the model's specifications. R^2 can range between zero and one, with higher

values indicating greater explanatory power of the independent and control variables on the dependent variable (Cortinhas and Black, 2012). The result from the root MSE also supports that the 18-month lag is the best lagged period. The root MSE represents the quadratic mean of the differences between predicted and observed values. Hence, the lower the value, the better prediction (Cortinhas and Black, 2012).

Table 6: Regression R^2 & Root MSE for different variable lags

Number of months lagged	Number of observations	R-squared	Root MSE
None	287	0.249	0.31964
6	281	0.323	0.30447
12	275	0.475	0.27072
18	269	0.561	0.24996
24	263	0.548	0.25208

Note: Table 6 displays the results of the regression model with and without lagged variables, including lags of 6, 12, 18, and 24 months. The highest R^2 and lowest root mean square error (Root MSE) are observed with an 18-month lag. However, it's noted that the number of observations decreases as more lags are introduced.

4.5.3 Single variable regression

In order to add further validity to the research and make the model more robust, single variable regressions have been conducted. This in order to verify the coefficients and the significance of each independent variable on the dependent (Cortinhas and Black, 2012). The supplemental regressions are intended to verify that possible multicollinearity does not affect the outcome of the results. Results from the single variable regressions show that all independent variables have similar effects on the dependent variable. The coefficient signs are all the same when run separately as in the multiple regression analysis. All previously significant variables are still significant just as the ones that were not. One exception is noticed regarding the politically related variable of right-wing political orientation (RW). The coefficient gets slightly more significant with a p-value of 0.089. The findings yields additional validity to the research and confirms that multicollinearity does not severely affect

the outcome of the research (Cortinhas and Black, 2012). Exact regression results are attached in Appendix B.

4.5.4 Stationarity & Unit Root test

When studying time-series data, it is important to consider stationarity (Stock & Watson, 2020). Time-series data can often include trend-, cyclical- or seasonal effects creating natural variation and thus yield misleading results if interpreted in a regression analysis. Such time-series data is called non-stationary (Cortinhas and Black, 2012). In order to determine if the data used for the original regression is stationary and thus further increase validity along robustness, an Augmented Dickey Fuller Unit Root test is conducted. The test verifies if a variable follows a stochastic trend and thus is non-stationary. The null hypothesis posits non-stationarity, and if the coefficients are found significant, it allows for rejection of the presence of non-stationarity (Stock & Watson, 2020).

From table 7, the presence of stochastic trends and thus non-stationarity is rejected with a level of significance above 99% for the number of M&A transactions, change in GDP and unemployment. Further, presence of stochastic trends in the exchange rate can be rejected with 90% significance. For the dummy variable RW that states whether the right-wing parties have had majority votes in the Swedish parliament or not, non-stationarity cannot be rejected according to the Dickey Fuller test. However, the non-stationarity issue for the dummy variable is disregarded as such variables are considered subject for stationarity discussions by its nature of taking on values of only ones and zeros (Stock & Watson, 2020). The most interesting finding is with regards to the interest rate variable which indicates that the data could be non-stationary. The implications of this could possibly be that our regression results are biased or spurious. On the other hand, the interest rate as a variable is argued stationary without a stochastic trend. Thinking of interest rates, it is not reasonable to assume a long term trend as that assumption suggests that the cost of capital will be either infinitely positive or infinitely negative in the future. Analyzing the descriptive statistics in table 2, the 3-month STIBOR has fluctuated between -0.6% and 5.2% throughout the years studied. With reference to the US interest rate, the Federal Reserve aims for the goal of moderate positive long-term interest rates and avoid zero percent due to the risk of liquidity trap (Garriga & Werner, 2022). The indication of non-stationarity from the Augmented Dickey Fuller test most likely stems from the variations in STIBOR over the period observed. The fact that STIBOR went from positive at the start of the observed period, turned negative in April 2015,

and remained close to zero until March 2022 makes the data seem stochastically downward trending (see Appendix A.4).

Table 7: Augmented Dickey Fuller Unit Root Test for Stationarity

Variables	**Coefficients**
lnDeals	-0.260***
	(0.000)
ln(1+ΔGDP)	-0.645***
	(0.000)
ln(1+STIBOR)	-0.006
	(0.343)
lnUnemp	-0.062***
	(0.007)
lnFX	-0.023*
	(0.078)
RW	-0.017
	(0.147)

Note: Table 7 presents the results from the Augmented Dickey Fuller Unit Root Test. The level of significance 1%, 5% & 10% are labeled with ***, ** & *.

The reasoning regarding STIBOR being a stationary variable which has faced an extraordinary period yields comfort to the results and mitigates the risk of biased results due to possible non-stationarity. However, awareness has arisen and to further increase validity of the results, a separate regression analysis is conducted to fill gaps of uncertainty. For the new regression, all variables are still lagged 18 months but instead of observing values, the concept of first difference is implemented by observing the monthly change in each variable except for the dummy, RW. Using data made up by change in the variables mitigates the concern of non-stationarity as the time-series data gets concentrated around its own mean and thus any potential underlying trend factor is removed (Stock & Watson, 2020).

Table 8: First difference variable change OLS regression results

ln(1+ΔDeals)	**Coefficients**
Constant	0.000
	(0.980)
ln(1+ΔGDP)	1.654**
	(0.013)
ln(1+ΔSTIBOR)	7.369
	(0.340)
ln(1+ΔUnemp)	0.950***
	(0.001)
ln(1+ΔFX)	1.975*
	(0.085)
RW	-0.006
	(0.851)
R^2	0.074
F-stat	5.210
p-value	0.000
N	269

Note: P-values are noted within parenthesis. The level of significance 1%, 5% & 10% are labeled with ***, ** & *.

Analyzing the results presented in table 8, it is observed that GDP, unemployment, exchange rate and the political dummy variable all have the same coefficient signs and similar significance levels compared to the original model. The model confirms the positive and significant correlation between takeovers and GDP, although the significance level dropped slightly. The results further confirm *Hypothesis 1* in line with the original model as well as the theory by Schleifer & Vishny (1992) and the majority of previous research from Choi & Jeon (2010), Harford (2005), Uddin & Boateng (2011), Antunes (2017) and Kumar et al. (2023). Although one should be cautious when implementing the model for estimating and forecasting purposes, the findings yield validity and robustness to the model and mitigates the uncertainty.

On the other hand when implementing the first difference approach, the interest rate variable STIBOR turns out to be insignificant. The new finding does not indicate the opposite correlation between interest rate and takeover. The takeaway is rather that one cannot reject the possibility of no correlation between the STIBOR and the number of M&A transactions. Uncertainty arises from the results whether there exists a negative correlation as previously observed or if the relationship is biased due to possible non-stationarity in the interest variable. Following the argument that STIBOR has to be a stationary variable without stochastic trend, one can argue that the new results could be misleading. An argument in favor of the new model is that the explanatory power has decreased. Although a high level of explanatory power should be argued great, it can be argued unrealistic that a model with five variables explains 56.1% of all variation in M&A activity as previously stated by the original model. The new model suggests a 7.4% explanatory power from the R^2 parameter which is considered more realistic. The insight provides space for discussion regarding the general validity of the original model but more importantly results in transparency for possible issues when handling time series data.

The new findings cannot be foreseen and the analysis boils down to the conclusion that the research cannot reject the possibility of no correlation between interest rate and takeovers. Thus, the research cannot confirm *Hypothesis 2* although indications of a negative correlation are present according to the original regression without a first difference approach. Further, discrepancy arises with the results in relation to the theory and previous research where the majority provide evidence of a negative correlation (Becketti, 1986; Melicher et al., 1983).

5. Summary & Conclusion

This thesis aims to examine the impact of macroeconomic factors on the number of transactions on the Swedish market. Data stems from the years 2000 - 2023 and is gathered with a monthly frequency, specifically focusing on transactions involving domestic buyers and sellers. The independent variables under investigation are GDP and STIBOR. To mitigate omitted variable bias, several control variables are incorporated, including the SEK to EURO exchange rate (FX), the Swedish unemployment rate (Unemp), and a dummy variable indicating the dominant political party in Sweden (RW). A linear regression model with an 18-month lag is employed to conduct the analysis. To mitigate multicollinearity issues among macroeconomic variables, a correlation matrix is employed to identify and remove highly correlated variables. For instance, variables such as the consumer price index and OMX30 show high correlation with GDP and are therefore removed from the model.

The results from the original regression model align with the two hypotheses i) *Swedish M&A transaction activity correlates positively with the Swedish GDP,* and ii) *Swedish M&A transaction activity correlates negatively with the 3-month STIBOR interest rate*. The regression analysis indicates a significant positive correlation between GDP and M&A transactions, with a significance level exceeding 99%. Additionally, the STIBOR coefficient exhibits a negative sign and a significance level above 99%. Two of the three control variables exhibit significance levels exceeding 99%. These variables are the exchange rate and unemployment rate. However, the political variable displays a negative sign without reaching statistical significance.

With the coefficient of each variable, a prediction diagram is illustrated to show how the model forecasts the number of transactions. The model depicted in Figure 2 closely tracks the actual number of transactions. Since the regression employs an 18-month lag, it forecasts the number of M&A transactions expected to occur in the future. The trend shows that the number of transactions are about to increase in the next 18 months. However, the prediction model does not seem to capture extreme periods very well, such as the dotcom bubble in the early 2000s, the financial crisis in 2008 and the heightened M&A activity during 2021.

Upon testing for non-stationarity, the findings suggest that STIBOR may exhibit non-stationary behavior, potentially disrupting the primary model. To mitigate this issue, a

new model is created where all variables undergo transformation with use of the first difference approach and investigating variable change. Consequently, the significance of STIBOR diminishes. However, the remaining variables exhibit consistent results, thereby reinforcing Hypothesis 1 that *Swedish M&A transaction activity correlates positively with the Swedish GDP.* Further, following the results from both regression models, discrepancy is concluded regarding the correlation between STIBOR and M&A activity. The conclusion is thus that Hypothesis 2, *Swedish M&A transaction activity correlates negatively with the 3-month STIBOR interest rate,* is not confirmed. To finally answer the research question, "*How did market conditions, more specifically GDP and STIBOR, drive the number of M&A transactions in Sweden during the years 2000-2023?"*, it is concluded that an expansion in the real economy with an increase in GDP seems to be associated with an increase in M&A activity. However, the relationship between STIBOR and the takeover activity is uncertain.

6. Future research suggestions

The model developed employs an 18-month lag for all variables and exclusively analyzes Swedish buyers and sellers. For future research, it would be interesting to apply different lags to various variables to determine if the model can capture and explain more. Another suggestion for future studies is to include international buyers and incorporate additional macroeconomic variables that may provide valuable insights for such a dataset.

Focusing solely on macroeconomic factors does not account for the psychological impacts involved in selling a firm. It is plausible to hypothesize that if a similar firm was sold for a certain amount last year, a firm currently looking to sell would expect at least the same amount. During 2021, the firm valuations peaked, and a seller today might expect the same valuation as in 2021, which may not reflect current market conditions. Consequently, they might choose not to sell the company, even though they would have considered selling if they were unaware of the peak valuations. Exploring the extent to which psychological aspects of valuation influence the volume of M&A transactions would be a recommendation for future research. To handle extraordinary market events further, it would be an idea to incorporate a dummy-variable for financial crises to capture the effect from such extraordinary conditions. This would possibly increase the accuracy of the prediction model as estimation issues are related to these periods mainly.

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Appendix

Appendix A

Table A.1

Table A.2

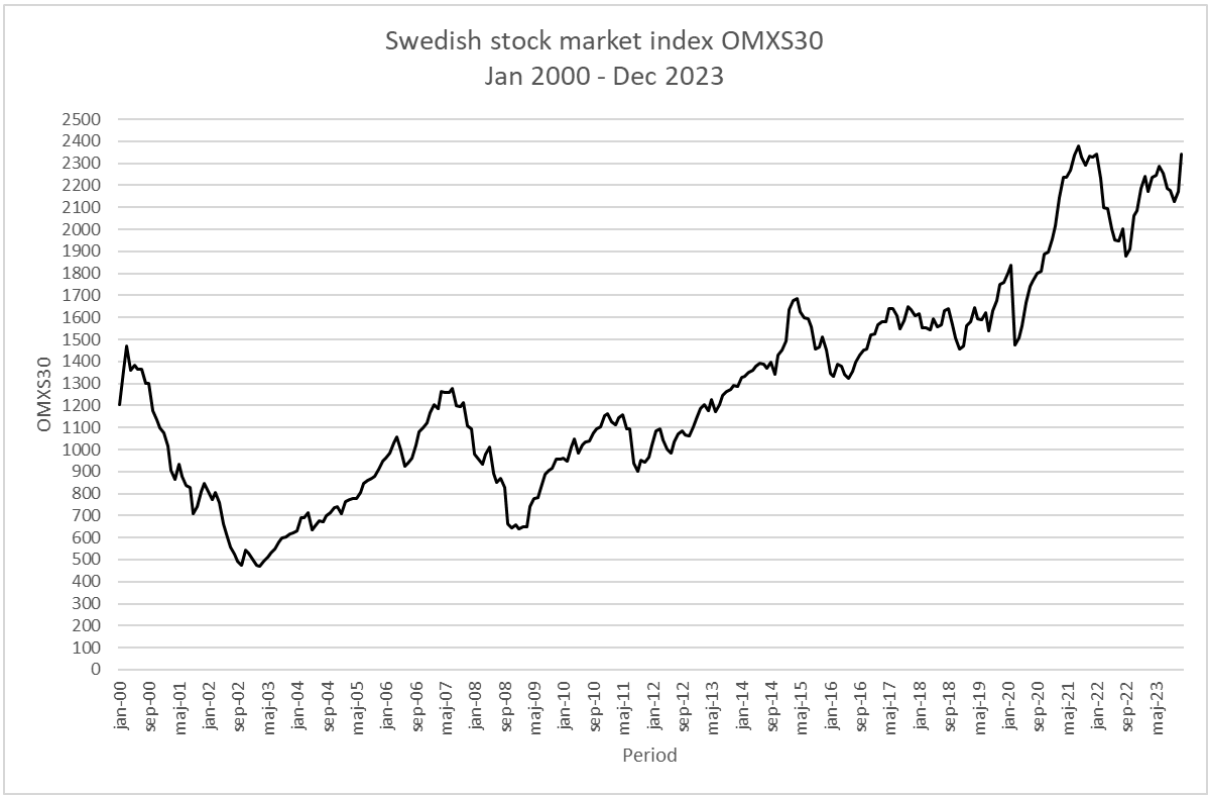


Table A.3

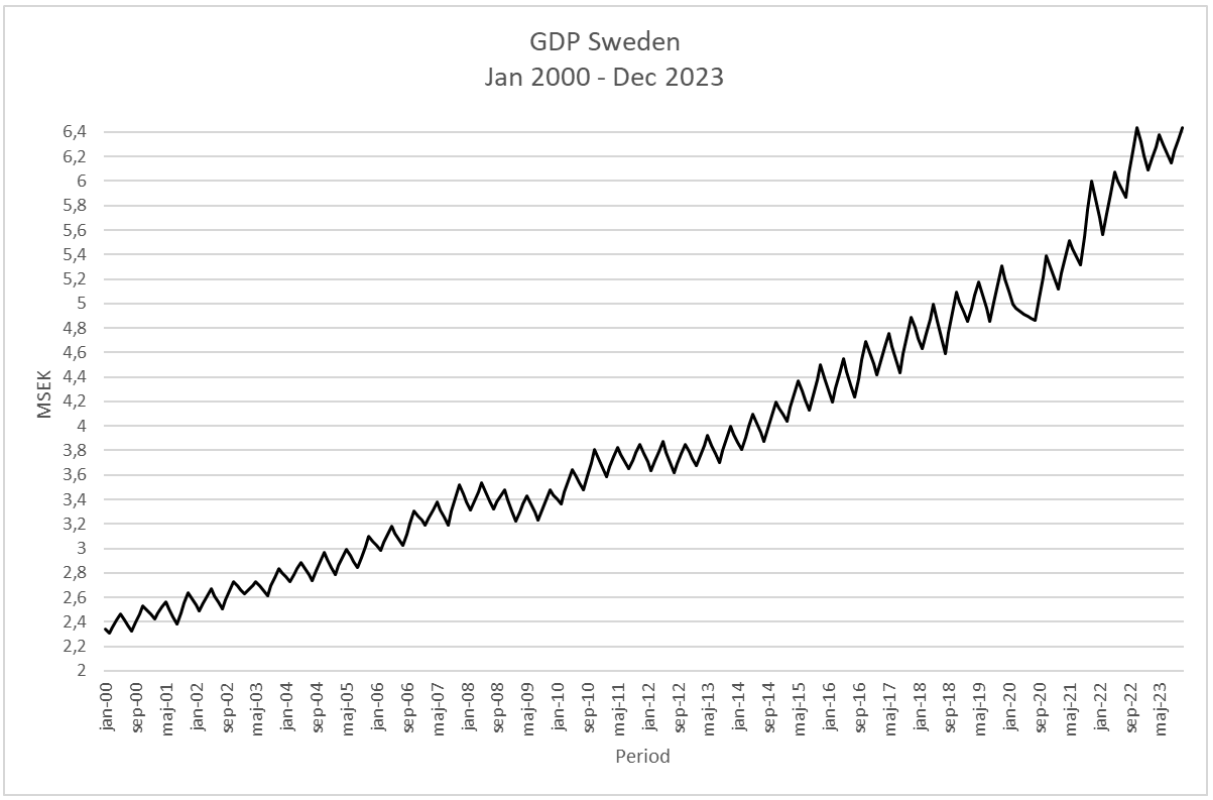


Table A.4

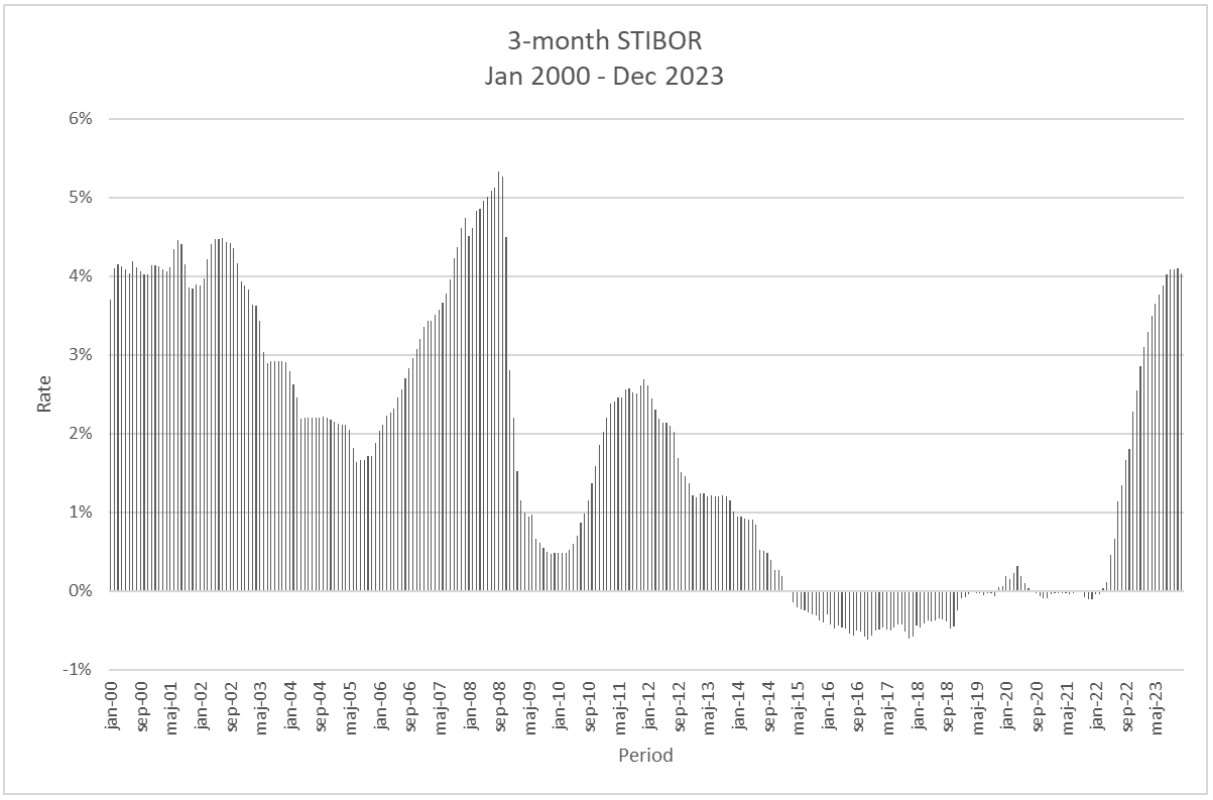


Table A.5

Table A.6

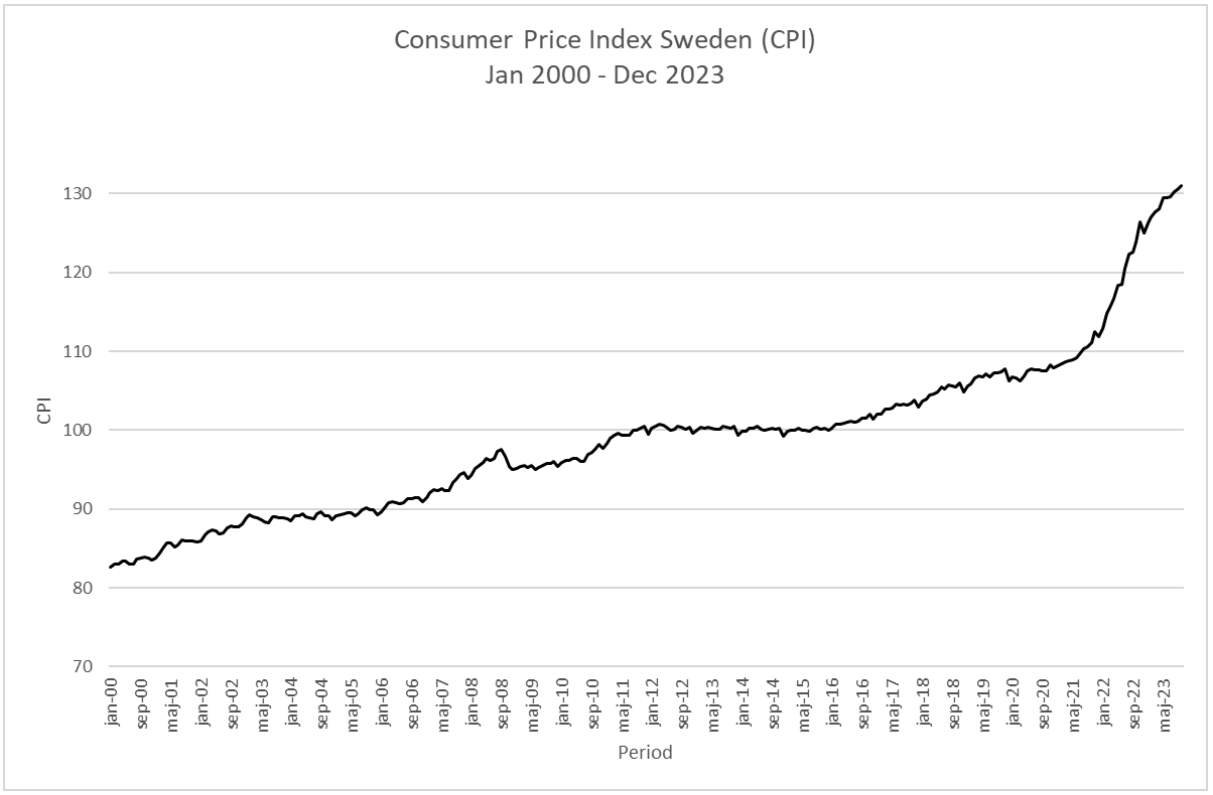


Table A.7

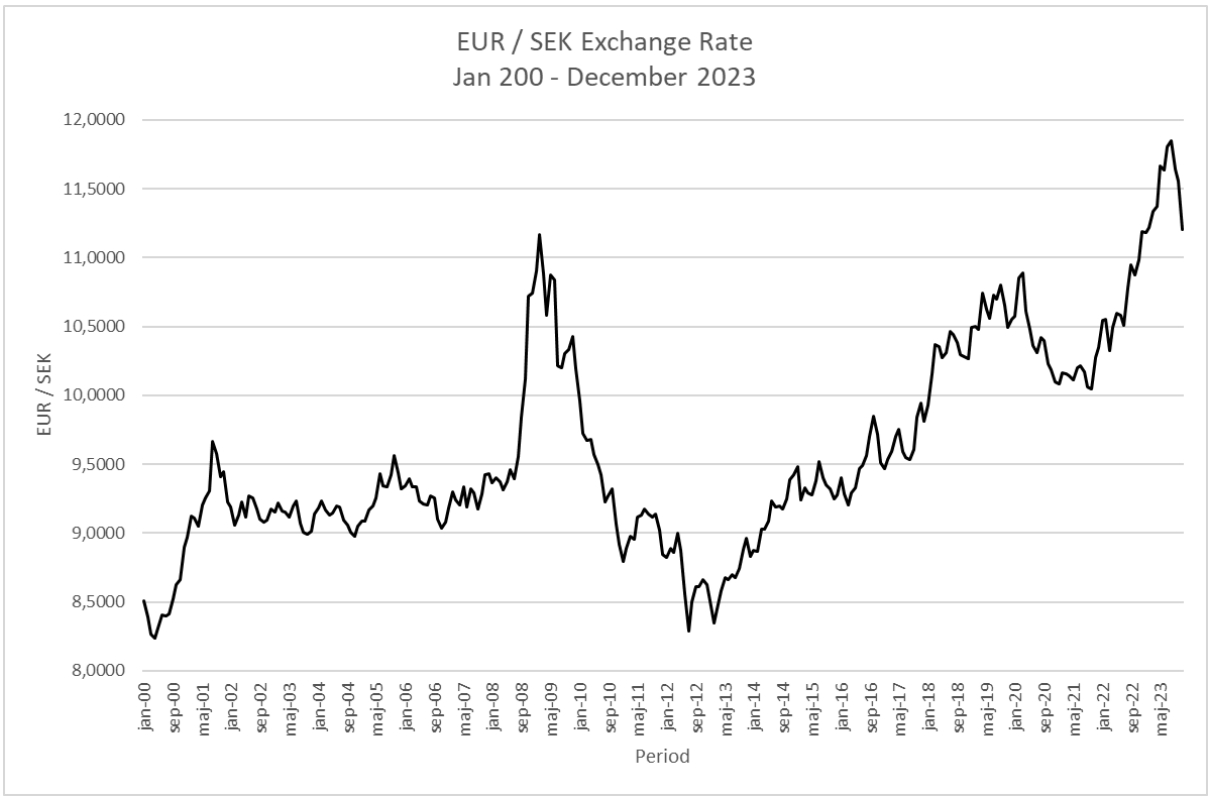
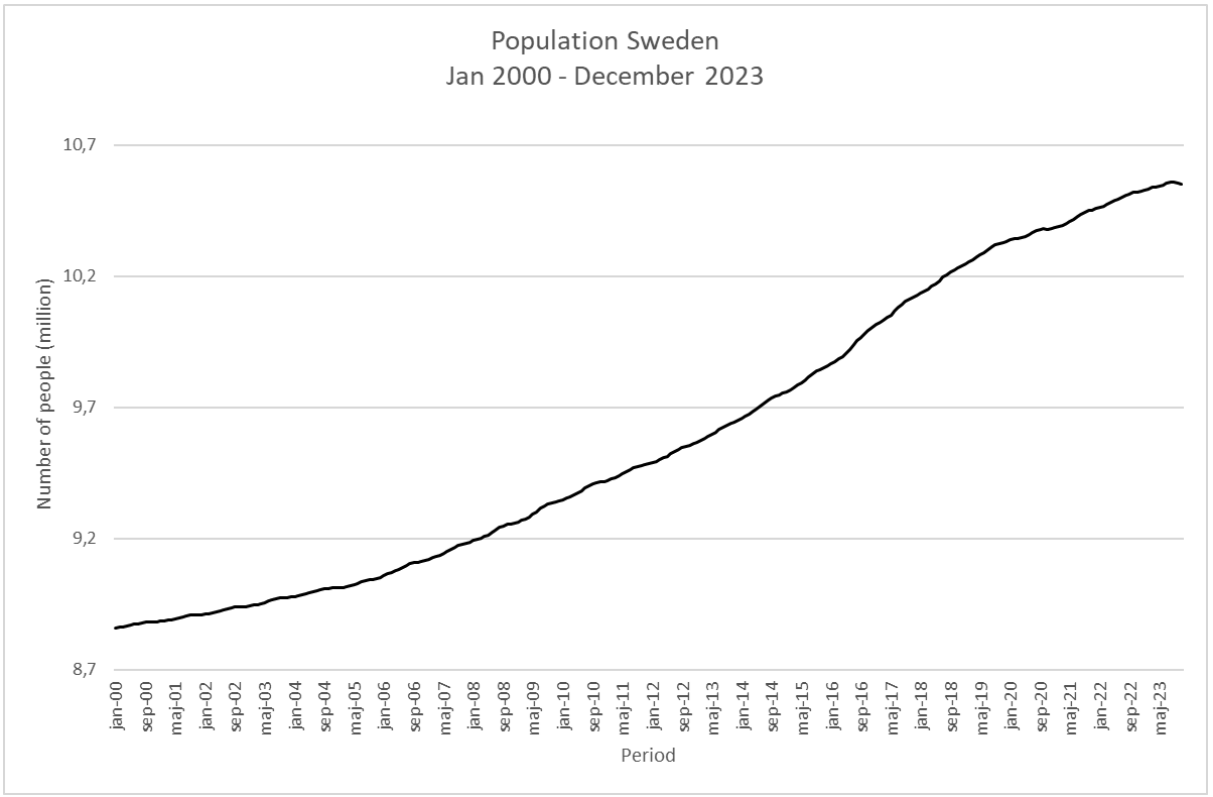


Table A.8


Population Sweden
Jan 2000 - December 2023
Number of people (million)
10,7
10,2
9,7
9,2
8,7
jan-00
sep-00
maj-01
jan-02
sep-02
maj-03
jan-04
sep-04
maj-05
jan-06
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jan-20
sep-20
maj-21
jan-22
sep-22
maj-23
Period

Appendix B

Table B.1

lnDeals	**Coefficients**			
ln(1+ΔGDP)	2.687***			
	(0.008)			
ln(1+STIBOR)		-13.221***		
		(0.000)		
lnUnemp			1.420***	
			(0.000)	
lnFX				3.277***
				(0.000)
RW				

	-0.089*
	(0.089)