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Macroeconomic View of Mergers and Acquisitions in the Technology Industry

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ABSTRACT

The study analyses the overall effect of the mergers and acquisitions occurring as a part of the technology industry involving varied domains. In globalization and emerging markets, there is a growing interest in mergers and acquisitions for strategic expansions. Mergers and acquisitions open multiple economic and strategic factors to study, which makes it a unique and exciting subject of study. The research is conducted using diverse and global organization datasets covering domestic and cross- broader mergers and acquisitions. The research is conducted by analyzing and studying global acquisitions in technology domains. Further, this research estimates the number of cross border mergers and acquisitions in emerging economies and fully developed economies, considering macroeconomic factors of the country like GDP, inflation, interest rates, and forex rates. The technology industry is young and has led to multiple unique innovations. The freshness of the industry with this research brings in a unique perspective and a new model that could be pathbreaking for upcoming acquisitions.

1. Introduction

The study covers the empirical analysis of the performance and tendencies of the Macroeconomic Factors of the countries involved in the Cross-Border Mergers and Acquisitions. There is a broad scope of more research to review the overall dependencies on the effects of macroeconomic factors. The research investigates the effect of macroeconomic factors on CBMAs activities in the international market over the 2006–2016 period. The study that the macroeconomic parameters like the GDP, the exchange rate, interest rate, foreign exchange, and the share prices index affect the inbound and outbound CBMAs. Dunning (2009) mentioned that some extra efforts need to be put to make sure a financially and Strategically viable and successful solution is arrived at, based on various factors and determinants in place. A fair price is paid for the acquired organization and in the development of the contractual arrangements to perform the acquisition.

There are various challenges and problems in the whole CBMA process in estimating the financial Net Asset Value and the ROA on the same. Special care must be taken in the valuation process because of differences in language and culture. Organizations must often seek help from financial and legal advisers in the country where the target organization is headquartered. The primary analysis revolves around the macroeconomic factors of the country with which the organization is associated. The country of creation is a vital determinant in the development of the organization's competitive advantage.

2. Literature review

There is a definite sign of the macroeconomic parameters like GDP, Foreign exchange, Inflation and Interest Rates in selecting the candidate organization from the specific optimum location. Vasconcellos et al. (1990, 1998) and Singh (2017a, 2017b) provided the importance of the macroeconomic parameters, which explain the trends of Cross Border Mergers and Acquisitions activities over time. Dunning (2009) again proposed that the macroeconomic factors that influence the location of certain valuable activities by Global enterprises are one of the main factors helpful in post-merger benefits. Singh (2016a, 2017c) mentioned in his research, described a practical explanation of the relationship between acquisition FDI and foreign exchange and political risks.

Oxelheim et al. (2001) and Singh (2016a, 2018a) pointed out that macroeconomic determinants are the direct control variables or factors of the political risks in FDI. The GDP growth rates and higher interest rates attract more foreign capital as per the research from Green et al. (1997) and Singh (2016b, 2016c), who focused on the trends around the GDP growth and the overall investment potential in a country for the CBMA.

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Dunning (2009) explored that the CBMAs should focus on the choice of the country where the newer market benefits exist that results in a reduction of the expenses. Anand and Kogut (1997) and Globerman and Shapiro (1999, 2002) and Singh (2019a, 2019b) provided a straight relationship between the growth in the year on year GDP results in more FDI. As the growth in GDP, the other factors also have seen the trends towards the performance of the M&A being dependent on these factors of the country.

3. Hypotheses development

GDP

Caves (1993) have suggested an inverse relationship between the macroeconomic parameter like GDP growth patterns in the organizations, help the acquirers determine whether to acquire local organizations or acquire in the foreign markets The relationship between the higher GDP and CBMA is a deciding factor for most of the organizations. They want to diversify across borders to reduce risk. It is prominent in the developed economies across the globe, compared to the other developing nations. For instance, the growth in GDP has some definite pattern seen with the amount of acquisition from the US.

H1: There is a positive relationship between the GDP and CBMAs outflows and inflows.

Exchange Rates

Goergen and Renneboog (2004) have provided a hypothesis that organizations from the economies with appreciating exchange rates should acquire organizations from countries with depreciating exchange rates. This is because the stable currency would cut down the overall CBMA purchase price.

H2a: There is a positive relationship between the higher exchange rate and CBMAs outflows
H2b: There is a negative relationship between the higher exchange rate and CBMAs inflows

Stock price

Evenett (2003), in recent studies, have shown a relationship between Stock price and CBMAs. Melicher et al. (1983) explored in early times that higher stock prices directly implies a better likelihood of the overall growth and performance. McCann (2001) identified that the lesser local stock market index implies the more inbound CBMAs. However, the relationship was not significant statistically. As per the technology industry related to CBMAs, there are scenarios where stock prices have gone down. Moreover, there are periods of a bull market.

H3: There is a positive relationship between stock prices and CBMAs outflows and inflows.

Interest rates

Jeon and Rhee (2008) provided a detailed analysis on the role of interest rates in the case of cross-border investments Tolentino (2010) determined the relation between M&As and interest rates and explained that it has a dependency on the reduced rate of interest, reducing the cost of investment at the own country. Yagil (1996) mentioned that there is an inverse relationship between outbound M&As and lower interest rates. This implied that the interest rate is another macroeconomic factor for the inbound and outbound CBMA.

H4: The money market interest rate and CBMAs outflow and inflows have a positive relationship.

Inflation Rates

The inflation rate is another strong determinant of the performance of the CBMAs. Black (2000) derived the relationship about the lower inflation rate as a powerful determinant of the performance and profitability of the cross-border mergers. Organizations must look for acquisitions in the country with a lower inflation rate. It implies the lower prices of the targets resulting in the more inflows and outflows of the CBMAs.

H5: The inflation rate and CBMAs outflows and inflows have a positive relationship.

4. Research Methodology and Data Analysis

Using multivariate regression analysis, this study estimates the inflow and outflow of CBMAs in the context of the US and India against the several macroeconomic independent variables for these two countries. This includes the gross domestic product, inflation, interest rate, exchange rate, share price. These factors show an effect on both the inbound and outbound CBMA. The data has been gathered for each acquisition that happened between the span of 10 years, during the period of growth in technology organizations, 2006 to 2016 in the technology. In order to have detailed research and analysis from the M&A perspective in the

technology domain, the research needs to focus on both subjective and objective analysis. Picking up an older research-based approach to create an empirical model from the various technology areas related to the recent Acquisitions should help the overall research findings.

The overall research approach in the research is based on the secondary data being used would be in the form of some specific Conditions being taken from the recent M&A. A detailed derivation of the empirical model and then a verification of the primary data and information derived Empirical Model. As most of the Technology-based acquisitions have happened in India and the US (Singh, 2020), the location context of CBMA has been taken as India and the United States of America. The data is in two parts: India context of CBMA and US context of CBMA. The same equation of regression is applied, and estimates for the CBMA inflow and outflow have been estimated to see the dependencies on the Macro-economic factors of the respective nation in the discussion. Also, other factors like inflation, GDP, Exchange rates, and interest rates have been picked up in the context of the two different countries.

5. Variables

Independent Variables

Based on the hypothesis in the previous section, there are four significant independent variables taken for the Regression and Correlation Analysis on the Data for Technology companies in the respective country (India or US) based on the macroeconomic factors like GDP, Inflation rates, Stock price and Interest rates of the acquirer organization country as well as the acquired organization country depending on the inflow or outflow analysis. Exchange rates of the one country concerning the other has been used to estimate the Foreign Exchange rates.

The following definitions have been used here:

RGDP = Real GDP, defined as the absolute value of the real GDP
of the country in context at a constant 2001 market price.
RATEINT = Interest rate
RATEEX = Real exchange rate.
INFLATION = Absolute value of consumer price index (CPI)
SEALL = Stock Price Index Value

Dependent variables

The estimation here is being done for the two main dependent variables based on the hypothesis and the theory related to that. The inflow and the outflow of the value of acquisition are in the discussion here. The purpose is to see the inflow and outflow determinants in the macroeconomic paradigm and to explicitly see the trends in the field of technology concerning the macroeconomic conditions of the two countries between which the cross-border merger and acquisition has been announced. The idea is to find the dependencies of the CBMA inflow and outflow concerning the decision making on any acquisition more practically. The two variables defined here are:

CBMAOUT = value of the purchase of foreign target firms by the acquiring companies
in the host country (India or US).

CBMAIN = value of the purchase of the target companies in the host country (India or US)
by foreign bidding companies.

6. Model Definition

Based on the hypotheses in the previous section, the following detailed empirical study of the link amongst the various macroeconomic variables and the inbound and outbound CBMAs of the various technology organizations, the following two models are used:

$$CBMAOUT_t=a0+b1*RGDP_t+b2*INTRATE_t+b3*EXRATE_t+b4*FTSEALL_t+b5*INFLATION_t+et$$
$$CBMAIN_t=a0+b1*RGDP_t+b2*INTRATE_t+b3*EXRATE_t+b4*FTSEALL_t+b5*INFLATION_t+et$$

The logs of the variables have been used to do a partial elasticity analysis. Thus, the updated relations are:

$$\log(CBMAOUT_t)=a0+b1*\log(RGDP_t)+b2*\log(INTRATE_t)+b3*\log(EXRATE_t)+b4*\log(FTSEALL_t)+b5*\log(INFLATION_t)+et$$

$$\log(CBMAIN_t)=a0+b1*\log(RGDP_t)+b2*\log(INTRATE_t)+b3*\log(EXRATE_t)+b4*\log(FTSEALL_t)+b5*\log(INFLATION_t)+et$$

Here, the time series data has been used to determine whether the variables are stationary or non-stationary. Augmented Dickey-Fuller (ADF) tests have been carried out with logarithms of data series in levels for each variable in addition to the visual inspection of the correlogram.

Table 1 Unit root test for India based companies

Variable	*ADF Test Statistics*	*Comments*	*Order of Integration*
LOGCBMAIN	-2.7966**	Rejected H0	I(0)
LOGCBMAOUT	-2.5435**	Rejected H0	I(0)
LOGRGDP	-4.3498***	Rejected H0	I(0)
LOGINTRATE	-0.6437	Failed to reject H0	
DLOGINTRATE	-4.8732***	Rejected H0	I(1)
LOGEXRATE	-1.4547**	Failed to reject H0	
DLOGEXRATE	-6.1256***	Rejected H0	I(1)
LOGFTSEALL	-1.1934	Failed to reject H0	
DLOGFTSEALL	-7.7634***.	Rejected H0	I(1)
LOGCPI	-4.8763***	Rejected H0	I(0)

** Significant at a 5% level. *** Significant at a 1% level.

Table 2 Unit root test for residuals for India

Variable	*ADF Test Statistics*	*Comments*	*Order of Integration*
ECM	-5.5353***	Rejected H0	I(0)

*** Significant at a 1% level.

Table 3 Unit root test for US-based companies

Variable	**ADF Test Statistics**	**Comments**	**Order of Integration**
LOGCBMAIN	-2.6732**	Rejected H0	I(0)
LOGCBMAOUT	-2.3443**	Rejected H0	I(0)
LOGRGDP	-4.3455***	Rejected H0	I(0)
LOGINTRATE	-2.6437	Rejected H0	I(0)
LOGEXRATE	-1.4547**	Failed to reject H0	
DLOGEXRATE	-5.2632***	Rejected H0	I(1)
LOGFTSEALL	-1.2136	Failed to reject H0	
DLOGFTSEALL	-8.7024***.	Rejected H0	I(1)
LOGCPI	-3.8063***	Rejected H0	I(0)

** Significant at a 5% level. *** Significant at a 1% level.

Table 4 Unit root test for residuals for US

Variable	**ADF Test Statistics**	**Comments**	**Order of Integration**
ECM	-5.7898***	Rejected H0	I(0)

*** Significant at a 1% level.

Tables 1 and 3 show that inbound and outbound cross-border mergers and acquisitions in both the cases are stationary at level data. The GDP, money supply, and CPI are stationary at level. The interest rates , exchange rates are stationary at first difference, thus the data series are integrated to order one. Error Correction Model (ECM) model has been used here to show the long relationship. The ADF test shows that the variables are co-integrated. Thus, an ECM term has been added in the equation later to come out with the following equation below:

$$\log(CBMAOUT_t)=a0+b1\log(RGDP_t)+b2\log(INTRATE_t)+b3\log(EXRATE_t)+b4\log(FTSEALL_t)+b5\log(INFLATION_t)+b6\,ECM(-1)+et$$

$$\log(CBMAIN_t)=a0+b1\log(RGDP_t)+b2\log(INTRATE_t)+b3\log(EXRATE_t)+b4\log(FTSEALL_t)+b5\log(INFLATION_t)+b6\,ECM(-1)+et$$

The reported descriptive statistics in table 5 and 7 includes the top and bottom values of the dependent and independent variables. This time series Data is ranging from the first quarter of 2006 to the last quarter of 2016. On average, for India, the number of inbound CBMAs is higher than the number of outbound CBMAs. On the other hand, for the US, the number of outbound CBMAs is higher than the number of inbound CBMAs. This information has been collected from UNCTAD.

Tables 6 and 8 have the results from the regression of inbound and outbound CBMAs for India and the US, respectively. To test the autocorrelation, the Durbin Watson statistics for both the regression equation has been performed. It clearly shows the absence of autocorrelation here in the table below.

Table 5: Descriptive statistics for the US

Variables	*Minimum*	*Maximum*	*Mean*	*Std. Deviation*
CBMAOUT	279	2160	987	78.650
CBMAIN	143	1126	543	34.782
GDP	13036.64	18707.19	15702.47	1794.04
INTRATE	0.09	5.02	1.20	0.019494
EXRATE	1.47	1.94	1.69	0.773
FTSEALL	1,845.39	4,987.79	3,153.80	1137.726
CPI	201.6	240.007	223.4587	12.95461

Table 6 Regression results for US

Variables	*Dependent Variable: Outbound CBMAs*	*Dependent Variable: Inbound CBMAs*
Intercept	11.413 (4.239) ***	2.876(2.239) ***
RGDP_1	-2.112(-2.623) **	0.5126 (2.5953) **
INTRATE_1	0.3244(1.815) *	-0.0737 (0.3233)
EXRATE_1	1.766(2.763) ***	0.1971 (1.5230)
FTSEALL_1	0.5466(4.553) ***	0.8013 (3.3976) ***
CPI_1	`1.5543 (1.037)	0.6342 (1.1294)
ECM (-1)	-0.4349(2.736)	0.4588 (4.0124) **
Adjusted R2	0. 5737	0.3769
F-values	31.7832 ***	7.019***
DW Statistic	2.3544	3.2132

Figures in parenthesis are t values. * Significant at 10% level of significance.
** Significant at a 5% level of significance.*** Significant at a 1% level of significance.

Table 7 Descriptive statistics for India

Variables	*Minimum*	*Maximum*	*Mean*	*Std. Deviation*
CBMAOUT	8	33	15.33	6.789
CBMAIN	45	116	78.56	21.56
GDP	36321.25	153623.9	86513.78	39181.81
INTRATE	4.00	9.00	7.2	1.65
EXRATE	39	68	51	5.563
FTSEALL	8799.11	29077.28	22187.72	5054.51
CPI	2.23	14.97	7.00	3.36

Table 8 Regression results for India

Variables	*Dependent Variable: Outbound CBMAs*	*Dependent Variable: Inbound CBMAs*
Intercept	17.645 (3.123) ***	5.654 (3.182) ***
RGDP_1	-3.6324(-2.623) **	0.6344 (3.733) **
INTRATE_1	0.5435(1.765) *	-0.090(0.644) *
EXRATE_1	1.0018(2.176) ***	1.0018(2.176) ***

FTSEALL_1	0.8711(4.553) ***	0.8711(4.553) ***
CPI_1	0.9239(1.776)	0.6889(1.663)
ECM (-1)	-0.3247(2.736)	-0.3632(6.012)
Adjusted R2	0.6232	0.4536
F-values	24.678***	8.012***
DW Statistic	2.7834	2.635

Figures in parenthesis are t values. * Significant at 10% level of significance.

** Significant at a 5% level of significance. *** Significant at a 1% level of significance.

7. Results

The results for outbound CBMAs activities show that GDP, interest rate, exchange rate, and share prices are showing a significant effect on the outbound CBMAs. Inflation is insignificant in the case of the outbound CBMAs. The regression parameters : R^2 = 0. 6232, adjusted R^2 = 0.5737 and the f-value significant at 5% level in both the cases. The GDP is significant and showing negative coefficient value, and the outbound CBMAs sounds a little different from the theoretical analysis. The above table shows a significant link between foreign exchange rate appreciation and outbound CBMAs. The stock price effect on the outbound CBMA is in line with the theory. The more the stock valuation, the more M&As in the given region. There is a significant link between the interest rate and outbound CBMAs meaning that more interest rate leads to more outbound CBMAs.

The results for Inbound CBMAs activities show the following. GDP shows significant values in the CBMAs inbound case. This is in line with the research by Vasconcellos and Kish (1996, 1998) that the growth in GDP tends to attract more foreign investments in the form of CBMAs. The concept of FDI by Dunning (1993) also explained the same. The share prices and the inbound CBMA have a significant relation. Another explanation may be due to the globalization of Exchanges like India, making it easier for Foreign investment. Kish and Vasconcellos (1993) although found a negative link between host country stock prices and inbound CBMAs.

Summary of results as follows. The regression results analysis shows the following information.

All the listed Macroeconomic variables have an impact on the inbound and outbound CBMAs in both the countries in the study. The results show that variables like exchange rates, interest rates, and share prices have a positive impact on the outbound CBMAs. The GDP, on the contrary, has a negative impact on the outbound CBMA. The rest of the parameters do affect the decision; however, they do not play a significant role in explaining the impact.

8. Conclusions

The Location advantage becomes the main benefit in the case of CBMA allocation across the various options across the globe. This advantage and its effect on the overall CBMAs investment has been focused on the technology industry specific parameters ignoring some other factors which some studies bring in. Dunning (2009) emphasized the importance of macroeconomic variables as an essential aspect of the CBMA decision is higher now than what it was 20 years ago and called for more studies in that direction.

Li et al. (2003) mentioned that getting into a newer market before the competitors did results in benefits like

- The uniqueness in the market,
- The price skimming,
- Market positioning.

The conclusion here is in line with the research. All the primary macroeconomic factors of the country play a role in deciding the location of CBMAs. In seeking the overall competitive advantage in their own countries, governments need to pay more attention to their macroeconomic policies to help the investment, cutting down on the overall transaction costs of MNCs. The detailed analysis of the macroeconomic factors against the location shows positive results on the Macroeconomic conditions making this the primary determinant for selecting the location. Thus, the decision-makers in the organization end up time their acquisition decisions based on these macroeconomic variables.

Future studies should be able to contribute to linking these macroeconomic factors with industry factors. This should help Utilize the OLI to get a more detailed insight into the reasons for the CBMAs.

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