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Influence of Macroeconomic Environment on Global Performance of Linde AG

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MASTERARBEIT

Einfluss des makroökonomischen Umfelds auf die globale Leistungsfähigkeit der Linde AG

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Abstract

This master thesis was developed based on public information about Linde AG. It analyzed and evaluated macroeconomic factors influencing the performance of the company. Microeconomic and macroeconomic indicators play the central role for the financial management of each global company. Thus, performance measurement is important for understanding the value and extent of the environment. The study of the thesis aims at estimating the extent to which a company may operate on the global market and what factors contribute to its performance the most.

Firstly, the thesis examines theoretical background based on the previous researches. It defines the specific macroeconomic and microeconomic factors and their role in the company's performance. Afterwards the thesis analyses Linde AG activities on domestic and foreign markets. The present structure, the current position in the markets and financial indicators are analyzed. The correlation and regression analysis were developed with the aim to find the links between the company's performance and the macroeconomic environment. It is believed that inflation, exchange and interest rates as well as stock market index have a significant influence on the Linde's performance.

The results showed that the indicators of inflation rate and stock market index play a significant role in the Linde's performance. Thus, when it comes to exchanging rates, more data needs to be evaluated in order to derive concrete conclusions.

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List of Abbreviations

CAES	Compressed Air Energy Storage
CRGDP	Credit Availability
EMEA	Europe, the Middle East and Africa
EU	European Union
FDI	Foreign Direct Investment
FWB	Frankfurt Stock Exchange
GDP	Gross Domestic Product
IEA	International Energy Agency
INFL	Inflation
INTRR	Interest Rate
IP	Industrial Production
KPI	Key Performance Indicator
LAES	Liquid Air Energy Storage
LCU	Local currency unit
LED	Linde Engineering Division
LLC	Limited Liability Company
LNG	Liquefied Natural Gas
NYSE	New York Stock Exchange
PPP	Purchasing Power Parity
QHSE	Quality, Health, Safety & Environment
RBUs	Regional Business Units
ROA	Return On Assets
ROE	Return On Equity
SHEQ	Company's strategies for safety, health, environment, and quality
SRI	Socially Responsible Investment
TES	Thermal Energy Storage

1. Introduction

1.1 Background

The commercial environment where companies operate all over the world is an open system. It receives necessary funds and support from the external sources and exports its products and services abroad. The link is close and integrated thoroughly. The factors from the external environment influencing the commercial functioning can be separated by different levels. For instance, they can be split into national, regional and international, depending on the territory of their origin. Regardless their positive impact and the ability to provide companies with actual prospects for commercial activities, they may also become pressures to the business environment.

Every developing and dynamic business unit tries to use the available opportunities and deals with the threats emerging from the external environment. The economic trends in the world effect every business environment, and it does not matter what their size is, or kind of their activity. Businesses tend to identify and meet the needs of the consumers, as well as to occupy specific niches in the markets. Understanding the possible influence of the external environment helps businesses to take better and more effective decisions. The companies which are establishing the affiliates in the external markets are more than others subject to risk caused by the external factors. They have to deal with the foreign countries and their microenvironments, which are in most cases different from the home ones.

The integration processes require taking into account the macroeconomic factors with the complex venture. For this research four main macroeconomic variables have been taken: exchange rates, stock market index, inflation rate and interest rates. Interest rates were not included in calculations for the regression and correlation analysis.

1.2 Problem examined

The growing economic integration in the world markets and sufficient macroeconomic fluctuations require from the corporate to pay more attention to the macroeconomic factors and their links with the businesses. The effect of exchange rates is increasingly being studied since the mid-1970s. Changes in local currency have all the chances to lower the cost of export products and increase external demand and sales for exporting companies. When the impact of inflation and the interest rate on the stock prices is considered, the increase in the expected value of inflation has the potential to lead to a strengthening of politicians, which has the potential to negatively affect the stock prices. Regarding the economic and financial integration prevailing in the modern world, no business stays aside from the global economic environment. Thus, the effect to which the external environment influences the businesses can be of different extent.

The Linde Group is a German multinational chemical company. This is the largest industrial gas company in the world in terms of market share, and also in terms of profits. Now Linde Group contains of 2 main commercial areas: gas (medical and industrial gases) and engineering. The macroeconomic environment, thus, is of a great importance for Linde's performance. The empirical study of the thesis is mainly based on the company's annual and financial reports as well as the studies of the American and European economists. Data is collected from various sources, including: books and journals in the theoretical framework, newspapers, company's published reports, press releases, catalogues, bulletins, brochures, presentation, Internet resources, etc.

1.3 Objectives

The main study objective is to assess the macroeconomic factors on the corporate performance of Linde AG. The concrete objectives are the following:

- To determine the impact of inflation rate on the corporate performance of Linde AG.
- To discover if there is a link between corporate performance and exchange rate.
- To explain how local equity market index influences the corporate performance of Linde AG.
- To define the correlation of macroeconomic indicators with the corporate performance and to analyze preventive actions which decrease the risk exposure of Linde AG.

1.4 Research Methods

The study investigates the influence of the macroeconomic environment on Linde's performance through comparative analysis and synthesis, functional and dynamic analysis, scientific abstractions, deduction and induction; systematization and generalization; comparison and analysis of the characteristics and reasons for international activity of the company. The influence of the chosen macroeconomic factors

– stock market, inflation rate and exchange rates – is observed through regression and correlation analysis. The information is based on Linde’s published reports and presentations, annual financial statements, available research data of the market, the scientific works of foreign economic experts, Internet resources, recommendations of international experts and periodical literature.

1.5 Practical Value of the Thesis

Given the growing tendency to globalization and financial and economic integration that prevail today in the markets, Linde AG cannot claim to stay aside from the global environment. The specific of the industry where Linde AG is operating is critical for taking the macroeconomic factors into account. Therefore, exploring the effect of economic indicators on the return could be very helpful for the company’s performance. The results of the thesis may be used for investor’s decisions and for predicting the financial results of Linde AG.

1.6 Structure of the Thesis

The theoretical framework of the master thesis is provided in the second chapter, which was mainly collected by desktop research. The theoretical part contains overview of the internal and external factors which influence the corporate performance.

The third chapter includes the general overview of the Linde AG performance and activities, both in Germany and abroad. The business model, targets, strategy and potential mergers were discussed, as well as Linde’s current position on the global market. Furthermore, the financial results of the company were analyzed for the period of 10 years. The information was further used for the model in the fourth chapter.

The fourth chapter provides the regression and correlation analysis of the chosen macroeconomic factors – stock market index, exchange and inflation rates. The model aimed at evaluating their influence on the company’s performance. The results received are promising and can be used for further studies.

2. Impact of Macroeconomic Indicators on the Corporate Performance

2.1. Explanatory Variables and Hypotheses Development

A decent study of performance analysis considered the work of Hansen and Wernerfelt, which includes 2 models of the company's profitability: first one is dedicated to performance of the company based on economic issues; the other – on organizational aspects. The model grounded on economic components represents the classical view of the economy, and stands on that point that mainly external market circumstances influence the company's financial future. The model grounded on organizational issues represents the sociological and behavioral paradigm. Eventually, the outcome of this study proves the meaning and autonomy of these 2 factors in explaining performance subject.[1]

Hendrickx, Bromiley and Brush demonstrate, in fact, that both the company, for example, and the industry into which the company enters, have every chance to influence profitability, only that the company itself has a greater impact. Thus, they noticed the important impact of microeconomic aspects on company's productivity, which, apparently, is more than the impact of the industry.[2]

Other authors studied the indicators of productivity by determining whether these aspects explain market or accounting values (Hirschey and Wichern). They noticed, in fact, that between market and book indicators there is a big difference because the markets values reflect the real market situation and distinguish the prospect vision and accounting values – just historical interpretation. More such, they see that there are a number of important points connected to the dimension of necessary features, such as the tension of spending on research and development, television advertising, leverage and expenses of the industry.[3]

Also, there should be mentioned that companies are influenced by internal and external indicators simultaneously as they perform in an open system. Ownership structure, cash flow, and capital structure are those factors that can explain the company's performance indicators, level and commercial health of the market. However, corporate profits and losses are not entirely guided only by the features of the company, but partly related to its environment (macroeconomic aspects). So the productivity of macroeconomic environment can simply affect a company's performance indicators as well its success and failure. These studies have explained a number of stylized precedents about the strong impact of macroeconomic indicators such as exchange rate differences, interest rate shift, inflation, supply of money, and gross domestic product (GDP) on the risk of failure.[4]

Credit availability and the cost of debt as well as monetary policy has a great influence on all sectors of the economy and this could affect an ability of the company accessing external sources of funding. Fiscal policies influence a company's capital expenses, its after-tax net cash flow, and potentially the demand for its goods and consequently its survival. Also, rises in the inflation rate and nominal interest rate intensify the aggregate levels of default or failure, because companies are financed with the help of variable rate debt and in future could be unable to raise their borrowing and, therefore, unavoidably bump into liquidity risk as an outcome of cash shortage. So, inflation both expected and unexpected may affect corporate success and failure. Still, unexpected inflation could be recognized in the misallocation of corporate resources.

Another macro policy aspect is the banks' credit and lending policy. The banking sector has a significant place in corporate finance.[5] This is especially the case for small companies, which are more exposed to insolvency than large ones. Under the credit channel theory, the direct effect of monetary policy on interest rates is augmented by endogenous variations in the external finance premium that affects a company's ability to access bigger amount of funds. The change in the external finance premium is influenced by the change in the monetary policy that raises or declines interest rates and in the common course. Therefore, a bank's credit policy could be an additional indicator in explaining insolvency risk, but data of the relevant motives is hard to come by. So, this factor could be essential in the determination of corporate performance.

Linkages between both macroeconomic environment and corporate success or failure depend upon which macroeconomic indicators are most strongly related to the field and how these linkages function. Determining how macroeconomic linkages affect both corporate performance and risk of the default would help to develop more effective management strategies which would maximize a company's functioning and decline risk of the default.[6] The macroeconomic circumstances should, therefore, be taken into account when analyzing a company's operating and risk of the default.

There are several key macroeconomic indicators which were used during the modeling in further chapters. The inflation rate (INFL) is expected to have predictive power for commercial amalgamations and continuance. Unforeseen variations in interest rates (INTR) can damage a company's equity capital and cash flow, which could unfavorably impact on the company's persistence and performance. Unanticipated fluctuations in inflation (INFL) have a negative impact on company profitability, as unexpected inflation could result in the misallocation of resources. Both INFL and INTR lead to escalates in interest payments, the company's expenses, and real wages. Consequently, profit is reduced and default probability is increased.[7]

Banking credit policy could have an important impact on company's performance and failure. In case monetary institutions have the necessary liquidity ratio to respond to their own liabilities, during this time they have every chance to handle the situation smoothly. Because banks work in a fairly rival environment, it has become indispensable to pay attractive rates to depositors to raise liquidity level. A large number of municipal bank loans stress the economy. The administration has not only to bind such bank loans, but also to put concrete control over the funds. To ensure the strength of the banking system will require a measured macroeconomic environment, which adds to the effective and efficient recovery of savings and investment. The effectiveness of the banking system, especially in the field of transparent fiscal policy, monetary policy, as well as financial stabilization must be maintained by macroeconomic activities. The ability to forecast and get away from the risk to cover losses through the emerging risk contains a significant meaning for banks' prosperity.[8]

The lending activities in the economy affect corporate performance and default risk, as companies depend on banking credit facilities as external sources of funds. The credit channel theory indicates that credit availability (CRGDP), measured by change in bank credit facilities to variations in GDP, is positively connected to a company's profitability (performance), as the availability of credit encourages companies to invest, while unavailability of credit could cause valuable investment opportunities to be missed.[9]

Exchange rates influence profitability on almost all directions. At the company level, monetary assets embodied in a foreign currency unit and international sales or other operations beyond the stage are considered to be more indisputable methods of transfer.

However, from the macroeconomic prospects, exchange rates still have an opportunity to affect the profitability of non-traded domestic companies (i.e. without profits or foreign currency expenses) due to their impact on external competitiveness and internal macroeconomic circumstances, such as unsteadiness in total employment, demand and output. In this way, a potentially wide-spread circle of companies has the opportunity to undergo swings in exchange rates, autonomously from their direct monetary influence. Exposure is oriented as the slope indicator, which appears as the regression outcome of the stock returns on the exchange rate fluctuations. Depending on the correlation course between mentioned 2 variables, monetary influence can be negative, zero or positive (theoretically, the company's profit cannot correlate with the exchange rate). The idea that bigger companies are more influenced by stronger currency changes has caused a distinctive offset in most early studies in regard to big exporters or USA multinational companies and abroad. Some researchers have proved, in fact, that the impact escalates with the growth of the company's volume.[10]

Companies which sell internationally have all the chances to benefit the domestic currency's depreciation. Assuming that virtually there are no fluctuations in the exporting company's sales, this company gets benefit, because its costs are not directly influenced by fall, but its profits grow in ratio to the currency's devaluation. The financial doctrine further means that the domestic currency's cheapening will cut the international products value that the company exports, and simultaneously rising its competitiveness. In addition, companies which sell internationally incline to be larger companies, and, as shown, they hedge their own exposure to the risk of exchange rate changing. To the extent that domestic companies compete with other companies that import products from abroad, the currency fall could lead to escalation of their competitiveness, raise the demand for the products that they sell, and to have a positive net influence on their supply prices.

2.2. Macroeconomic Variables

Since the world stock markets are becoming more and more integrated, and because of different states want to develop their own practice of reporting autonomously one from another, in real time the need to overcome the international information gap is sharply felt. Over the past 3 decades, there has been a tense discussion about what information companies would have to release. In addition to this, information is required to allow for intertemporal comparisons for both individual companies, for example, for all companies (comparative analysis) and government limits.

There are 3 linked aspects in the company's macroeconomic environment which have a big impact on the corporate performance and have been analyzed during this research: interest rates, stock market index, exchange rates and inflation rates.

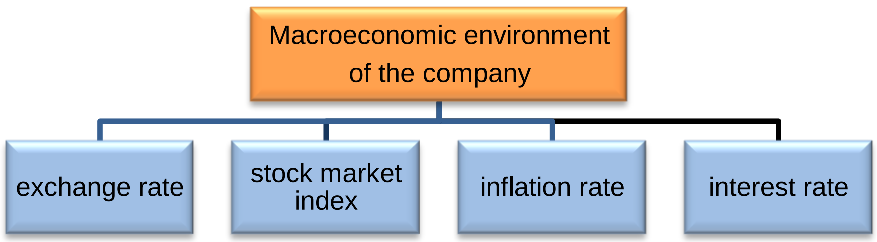


Figure 1. The macroeconomic environment of the company used for deeper analysis[11,1]

Taking into account the increasing economic and financial integration that has been formed now, no one company has the opportunity to insist more on not being influenced by what is happening in the universal financial arena. Not paying attention to this, the current external reporting is not related to indicating to what extent the profit is generated as a result of the vacillation of the company's macroeconomic environment in the direction of the reporting period.[12]

Without this information, outsider shareholders have virtually no chance to find out what happened to the stable profit and, consequently, the internal competitiveness of the company. With regard to the results of the volatile macroeconomic environment, current accounting practices do not permit them to achieve one of the leading goals of external reporting, that is, to provide information for monitoring purposes to shareholders and other interested parties. Extensive efforts over time to create accounting benchmarks or improve the practice of reporting on macroeconomic impacts for almost all reasons did not justify themselves. The full alignment is urgently required for simultaneous consideration of the effects caused by changes in all these variables.[13]

[1] Interest rate indicators were not taken into account during the correlation analysis in the 4th Chapter

In the mid-1970s the increasing volatility in exchange rates triggered an intensive debate about how to report the effects of changing exchange rates. The debate focused on two issues: methods for evaluating foreign assets and liabilities in individual companies, and methods to use when a foreign entity was to be consolidated with the group account. A key document in that debate was Standard No. 8 issued by the Financial Accounting Standards Board[2], which was followed by SFAS 52 (1981).[14]

The accounting for exchange rate fluctuation has over time focused on the conversion of assets, liabilities and cash flows outside the home jurisdiction. Hence, implicitly this means the focus has been on the effects of nominal exchange rate changes. The unresolved issues concern the inclusion of effects of real exchange rate changes and an increased recognition of competitive exposure.[15]

The concept of exchange rate risk refers to the risk as uncertainty. If investors knew in advance the value of a foreign stock at specific time, there would be no uncertainty. Unfortunately, it is impossible to make such forecasts with sufficient degree of certainty. In this case, exchange rate risk refers to unpredictable variations in a currency's purchasing power relative to its initially expected value at some specific future date.**Ошибка! Закладка не определена.**

It should be noted that exchange rate risk and currency exposure are not synonymous. While currency risk is associated with uncertainty, currency exposure is associated with what the individual company may have at stake. Hence, from the company's point of view, exposure is the sensitivity of the firm's value to changes in the exchange rate. Reducing a firm's exposure to this long-run version of economic exposure is possible but more difficult than protecting the firm from short-term currency fluctuations, which can be hedged. **Ошибка! Закладка не определена.**

In order to determine the value of a firm, an investor must determine the present value of operating free cash flows.[16] If fluctuations in foreign currency exchange are unexpected for the company, they will influence the future cash flows and therefore the market capitalization

[2] SFAS 8 (1975)

of the company. The relationships between foreign exchange rate and the company's value depend on what assets and liabilities has the company abroad i.e. in the foreign currencies. Fluctuations in foreign exchange can influence a company in many ways. The most obvious cases are the foreign sales, financial assets and liabilities and other operations in foreign currencies. However, from a macroeconomic perspective, exchange rates also can impact the profitability of non-trading domestic firms (i.e. with no foreign currency revenues or costs) through their effect on foreign competition and domestic macroeconomic conditions such as fluctuations in aggregate demand, employment and output. As a result a company can be significantly influenced by the fluctuations in foreign exchange rates regardless of its foreign operations.[16]

In most of countries, inflation continues to be an issue for financial life. The highest inflation rates seriously worsened currency values of many countries over the past 2 decades and led to the emergence of fresh models of financial behavior. However, the effect of inflation on the effectiveness of any financial unit is not fully recognized in posted financial statements. Companies continue to talk about historical data on costs, not providing additional information about the possibility of managing to defend personal economic capital from the erosive possibility of price increases.[17]

Some of the costs of inflation for companies are shown and explained below:

1. Menu Costs.

   These are the expenses of changing price lists. If inflation becomes high, then enterprises will need to renew prices more often. The high inflation rate can make a huge damage, because it makes it more difficult to find products which can be sold. However, modern technology can easily influence changing prices now. Nowadays there is no need to change prices by hand, but there is a possibility to renew bar codes, and it takes less time.[18]

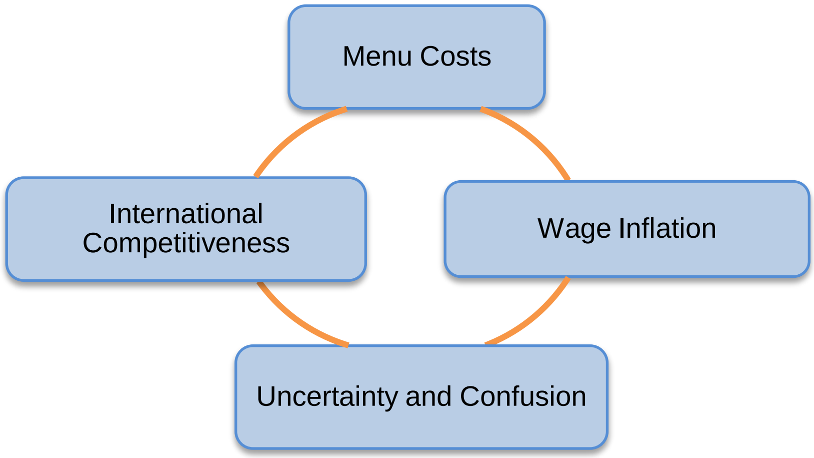


Figure 2. Inflation costs

2. Wage Inflation.

   Sudden inflation could lead to the need to re-negotiate wages with employees. However, this salary growth has all chances to be harmful for the company, and it cannot carry additional expenses. [18]

3. Uncertainty and Confusion.

   In case if the inflation is higher than expected one, the investment costs will be constantly changing. This makes companies unwilling to invest, because they have doubts about future costs, wages and future demand. This, in particular, is the problem with sudden price inflation, which increases the primary products costs price. This is probably the biggest concern of inflation for companies – high inflation leads to uncertainty can lead to lower growth. Companies cannot plan their budget and project strategic decisions.[18]

4. International Competitiveness.

   In situation when inflation is higher than in other states, this will put companies into less competitive position than international rivals will have; this is extremely significant for exporters. A higher degree of inflation will lead to a depreciation of the exchange rate too; this will help to restore competitiveness, but at the cost of more high-priced imports and lowering living standards.[18]

However, in some cases, inflation can be useful. Many economists, businessmen, and politicians maintain that moderate inflation levels are needed to drive consumption, operating under the larger, overarching assumption that higher levels of spending are crucial for economic growth.[19]

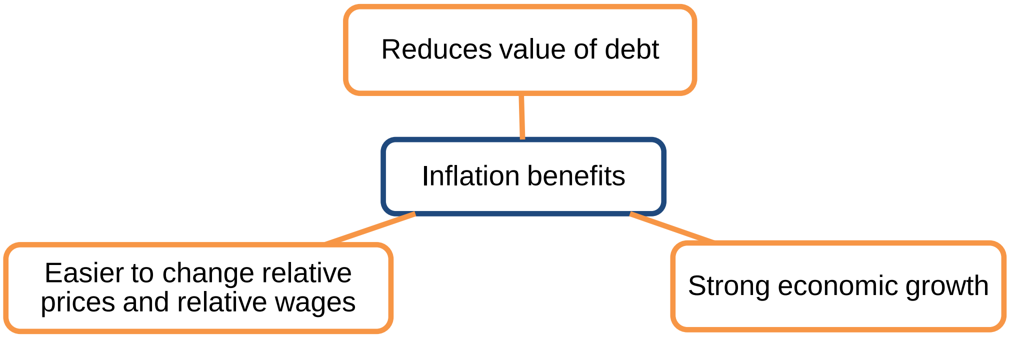


Figure 3. Inflation benefits

1. Reduces the value of debt.

   If a company has large liabilities, moderate inflation might help to decrease the real value of debt. This happens because under the inflation the nominal value of sales will be rising and thus it will be easier to pay the debt back. Although it normally works only for moderate inflation. In case of high inflation and hyperinflation, interest rates are rising as well, making it harder for companies to cover their financial liabilities.

2. Strong economic growth.

   Strong economic growth usually is paired with at least moderate inflation. On the contrary, inflation below 1% is often accompanied by slow economic growth.

3. Easier to change relative prices and relative wages

   Moderate inflation makes it easier to change relative prices and relative wages. For example, if you have inflation of 0%, it is hard to cut nominal wages for unproductive workers. But, if inflation is 2%, it is easier to have pay freezes and effective real wage cuts for unproductive workers.[18]

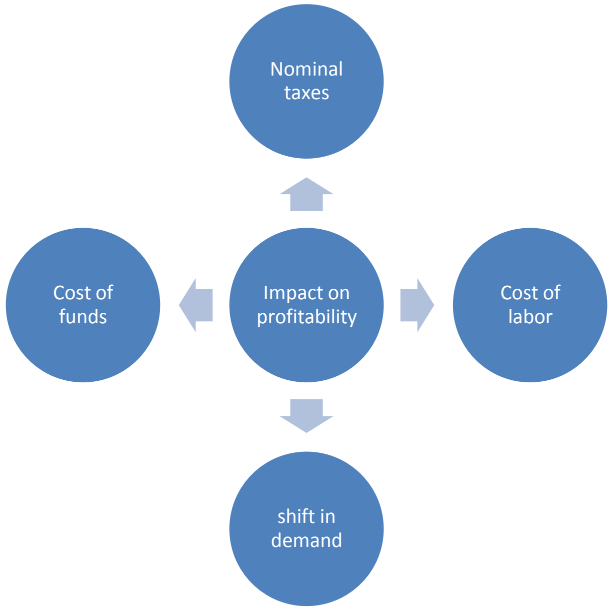


Figure 4. How does inflation affect profitability

Inflation has the ability to influence the profitability of companies in 4 different ways:

1. It changes the cost of funds used to finance the business;
2. It increases the costs of labor, raw materials and products;
3. It affects the tax bill to be paid
4. It causes shifts in demand levels. [20]

Generally, in most cases the higher inflation rates result in higher interest rates. It should also be noted that there are huge differences in inflation rates between countries worldwide which also contribute to the currency fluctuations. However, the change in the interest rate has the opportunity to affect the commercial side of the company, for example, through their impact on the demand for capital goods.

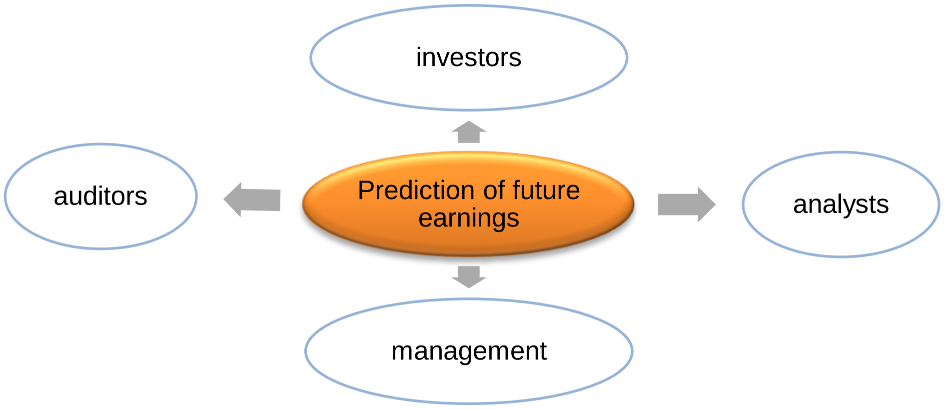


Figure 5. Objects of interest for the prediction of future earnings[21]

Prediction of future earnings is of interest to investors, analysts, management, and auditors. Investors make their investment decisions based on their evaluation of future earnings. For investors the return on their investments is highly valuable, and a well performing business can bring high and long-term returns for their investors.

Analysts advise clients on a range of valuation relevant matters including investments, new issue valuation, and takeover valuation. Furthermore, financial profitability of a company will boost the income of its employees, bring better quality products for its customers, and have better environment friendly production units. Also, more profits will mean more future investments, which will generate employment opportunities and enhance the income of people.[22]

Management is vitally concerned with future earnings prediction for budgetary and control purposes while auditors would benefit forms profit forecasts in their analytical reviews of clients financial statements.

Figure 5 presents the common model for corporation's profit generation. Rate of return on assets as the best decomposition of ROE for the goals of future profitability forecast.

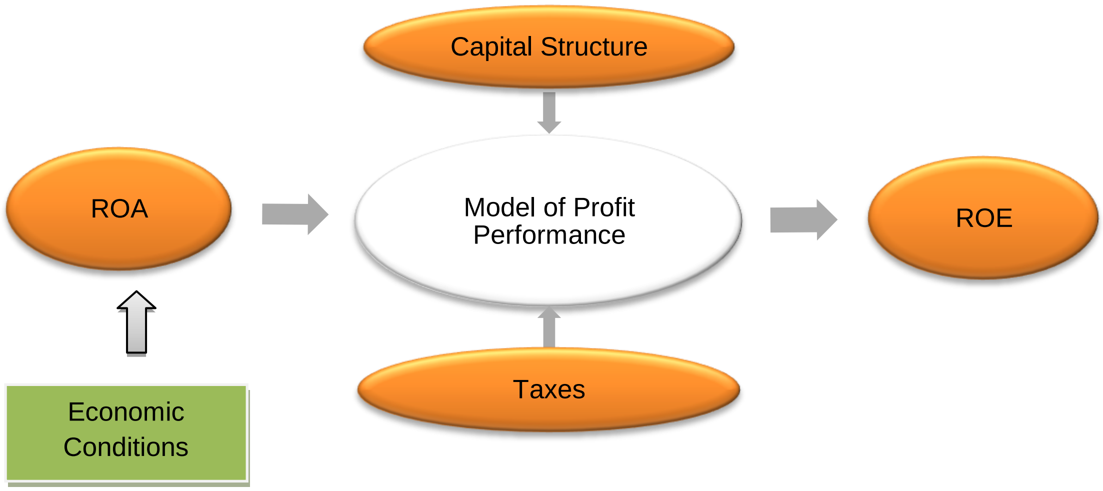


Figure 6. Model of Profit Performance[23]

The essential model components is a fundamental operating capability of a company (ROA), leakages of earnings through both payments to capital, and the final return to equity holders. Economic condition of the country can affect performance of the company on multiple fronts.

Cost of borrowings can negatively influence the company's capability to generate finances and invest in projects. Prices of utilities, high costs associated with plant and machinery due to either deterioration of currency or import costs, high inflation rate and low-income level of people can decrease the demand for industrial products and consequently negatively impact the company's performance.[23,24]

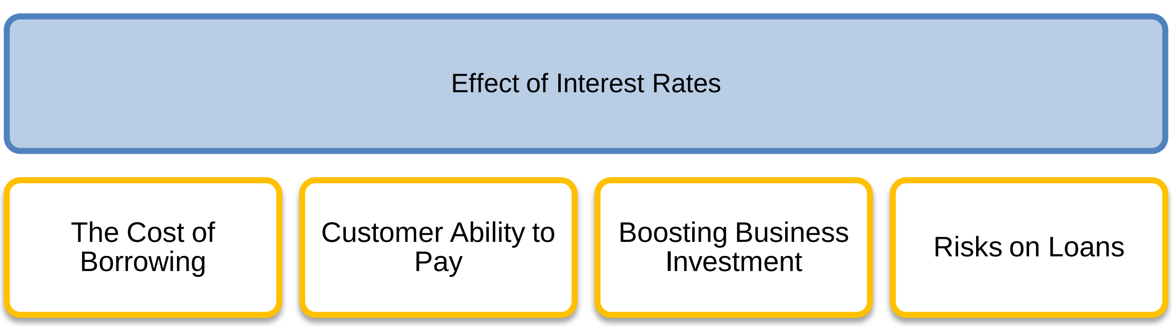


Figure 7. The Effect of Interest Rates on Business[25]

There are four major effects how the interest rates affect businesses:

1. Cost of borrowing.

When interest rates rise, banks charge more for business loans. This means businesses must use more of their earnings to pay interest on their loans.

2. Customer Ability to Pay

   Customers have to pay interest on their personal loans, home loans and car loans. The higher the interest, the less money in customers' pockets. This can reduce their ability to buy products and services, so businesses may suffer from a decrease in sales.

3. Boosting Business Investment

   Businesses can invest their excess cash in interest-bearing accounts to make more money. During periods of high interest rates, businesses earn more from these investments. When rates are low, businesses may be more likely to use their cash for new equipment and plant improvements. While this can be good for equipment sellers and construction firms, banks lose out.

4. Risks on Loans

   When banks don't see an opportunity to make a reasonably-high interest rate on their money, they become less likely to take risks on loans. Businesses therefore can't borrow money for start-up and expansion expenses. Business can slow down to a crawl because there's no way to fund innovation. In addition, short-term loans to cover cash-flow problems can be hard to come by. This could cause businesses to be unable to deliver goods and services to their customers because they don't have the cash to continue operating.[25]

2.3. Microeconomic Variables

Performance of a company or an industry is essential because it reflects the results gained over a time. The performance of the company is influenced by microeconomic and macroeconomic variables. Microeconomic variables are the internal company - specific variables. Management can regulate these variables. The attention should be concentrated on the microeconomic variables, which could be supervised by the management. The practice of collective management is structures and behavior that determine how a business entity becomes goals, develops strategies and intentions, keeps under control and reports on its own productivity and manages its own risk. Scientists still believe, in fact, that good practices of collective management increase the efficiency of the company.[26]

There are 2 models of the model of the shareholders of the corporate structure and the model of the stakeholders. The shareholder model focuses on developing the wealth of owners, while the stakeholder model embraces nuances that are more sweeping and concerns the well-being of all stakeholders and the joint performance of the company.
There are 5 foundations of collective management:

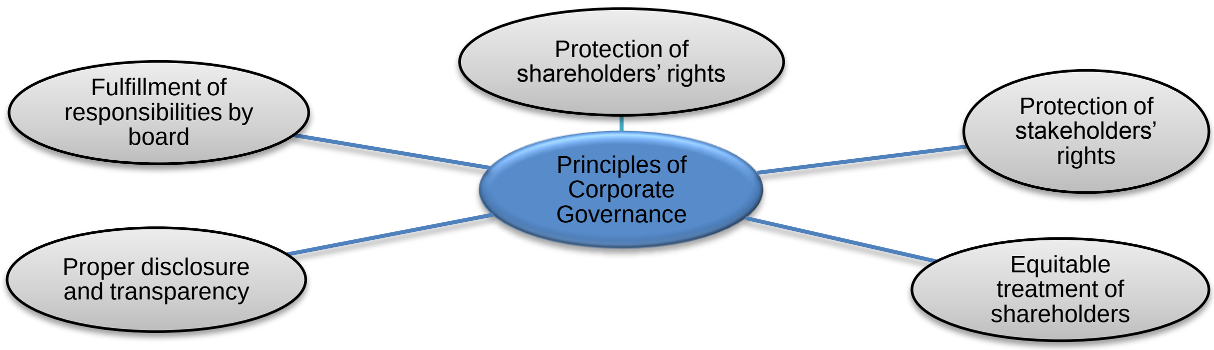


Figure 8. Principles of Corporate Governance[27]

In a study conducted by Javed and Iqbal (2007), the impact of collective management on company performance was studied by creating data indexes, transparency, and disclosure of information about payments, as well as shareholder data and ownership. The results of the study show an important link between indicators and outcomes, with the exception of transparency and disclosure.

Internal property is still positively associated with the company's recovery, but the back is dependent on its volume. Internal property positively affects the productivity of the company. The internal property has a tremendous impact on the economic choice of managers, while personal property is impossible to affect the choice. The impact on the debt politician is still versatile due to the contradictory conclusions of scientific workers. Some scientists report a positive relationship between internal property and long-term, while others report a bad attitude, and, accordingly, the duty is not affected by the internal or institutional property. In accordance with the guess about the consolidation, company-managed companies have more low debt ratios compared to institutionally controlled companies.[28]

The company's ownership structure still has a huge impact on productivity. This paradox has been repeatedly subjected to empirical testing, in fact, that internal property leads to long results of the company's work.[29] And the concentrated owners and institutional owners lead to the best control and forecast of the board of directors and once they force them to collect lucrative plans for securing future profits. However, small packages of promo actions on the part of the population do not support long-term intentions, these owners in the leading are interested in short-term benefits, and not in the general upswing of the company, and the same applies to a small or generally non-mandatory property. In this way, the membership design must be painstakingly balanced for a good work of the company.

Any branch is demanding a significant amount of resources, be it territory, labor power or the serious introduction of all-important money. This money can be generated from within the state (retained earnings) or from external sources (loans and bonds). The conclusion about the choice of the source of financing is based on the price associated with them and the company's cash structure. These costs can be either foreign exchange or non-monetary.[30]

The construction of cash is still considered an indispensable moment that determines the company's performance. The construction of funds refers to the matching of debt and equity financing. In the event that more debt financing meets a particular risk of ruin, but there are still some tax and monitoring benefits related to debt financing.[31] It still softens the incident of agencies by reducing the company's free currency stream. You have to attend to a comparable cash structure that generates the greatest benefit for the organization because the very smallest financing of promotions increases the control over the owners to a significant extent.[32]

In the case of domestic funds, it is actually said that they have the highest probable price for the company because gaining the opportunity has an opportunity to influence the shareholders' confidence because in an unfortunate case it would be distributed as a dividend. Dividend announcements have an important impact on the value of promo actions.[33] Actually, as for external borrowing, they are considered the cheapest source of financing due to tax benefits. But they still have specific costs, these as interest payments, and it is widely recognized that the price of outdoor facilities is directly proportional to the amount of these funds, and the borrowing of political figures of the company's cash structure follows in the footsteps to take into account.

Another important factor that influences the compilation of funds is the economic state of the company. To start, for the investment at the expense of undistributed benefits, the company must receive the necessary benefits, which has the opportunity to please its own owners and to satisfy investment requests. Secondly, creditors adore investing in profitable companies and projects; they tend to invest in companies that have all the chances to somehow guarantee the payment of their own responsibility.[34,35]

Risk management of the company has the opportunity to further influence its effectiveness. Dangerous companies are located to entice traders only to risk. Risk and return matters must be managed in this way so that traders receive the associated and expected returns with the risk they bear. Some of the properties of the company are associated with the highest productivity of the company. These include the magnitude, pace of recovery, dividends, liquidity, and sales. Forms that have a more elevated rate of recovery have all the chances to resolve for themselves more high-quality equipment, and after that, the assets and dimensions of the company gradually grow. In this way, as a company, for example, and its people support the goals of a friend. But a large number of studies on individual determinants of the company were conducted, but quite a few designed all the moments. There is a significant gap between developing countries. In Pakistan, a number of studies have been conducted, timed to determine the determinants of productivity; in 2010, a study was made of the impact of finance models on company performance.[36]

3. The Linde Group: Analysis of Activity on the Domestic and Foreign Markets

3.1. Business model and potential merger of Linde Group

Linde Group is considered the main large supplier of industrial, technological and special gases and is one of the most profitable engineering companies. Goods and services from the company can be found literally in any branch and field.[37]

The group is made of 3 departments:

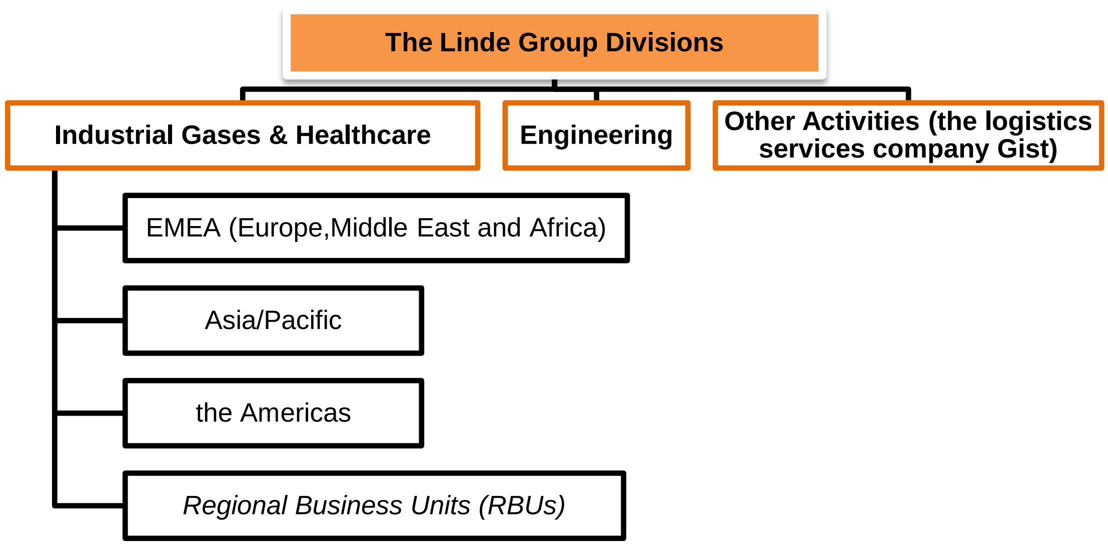


Figure 9. The Linde Group Divisions[38]

Linde factories are exploited in many fields: in the chemical and petrochemical industries, for the extraction of air gases, in oil fertilizer ad refineries plants, for the production of synthetic gases and hydrogen, for the production of noble gases and for natural gas processing.

Figure 10. The Linde Group Engineering Entities[39]

The main factors in the work of the Linde Group are Quality, Health, Safety and Environment. The activities of QHSE is broken down into proper main spheres:

· QHSE in the installation process and plan designing
· QHSE at production sites
· QHSE at construction sites

Having more than 1000 patents for technological processes and 4000 completed industrial projects of the factories, Linde is entering the number of major international contractors. Customers worldwide trust Linde's superior performance, competence in planning and reliability.[56]

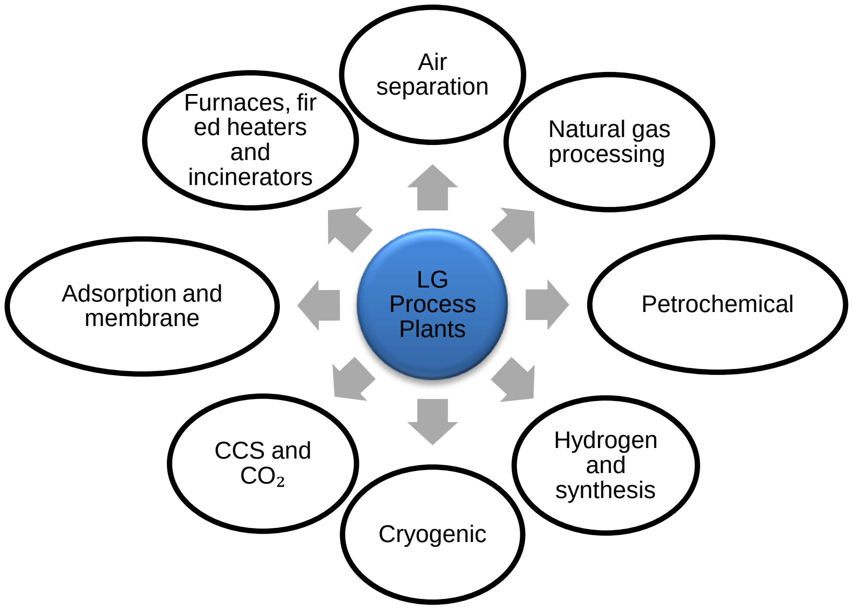


Figure 11. The Linde Group Process Plants[40]

Linde Group is considered as a major favorite in the international gas market. The company invites a wide range of abrasive and liquefied gases, as well as chemical preparations and is considered to be the partner of choice in the most diverse sectors of the industry economy.

Linde gases are used, for instance, in the energy sector, chemical processing, steelmaking, welding, and environmental protection as well as in the food industry, electronics and glass production.

Linde Gases Department manufactures and spreads atmospheric gases nitrogen, oxygen, and argon, all of which are produced at the company's personal refueling facilities. The range of products still varies from acetylene, hydrogen, carbon monoxide and carbon dioxide to shielding gases for noble gases, welding applications, and high-purity special gases.

The company gives customers modern technical equipment, wide-ranging support services, and security products.

3.1.1. Business Model

The Linde Group is the company that operates on the global markets with such divisions as Gases, Engineering and Other Activities. The Gases Division proposes a wide range of chemicals, as well as, liquefied and compressed gases, and is considered to be the partner of choice in a wide variety of sectors of the economy. Within this division, Linde identifies its own work in the following product areas:

- On-site
- Liquefied gases
- Cylinder gases
- Healthcare

So the business models in the gases industry are defined by the distribution method: on-site, bulk or cylinder, and customer size. Linde's integrated approach leverages the full potential across all three business fields.

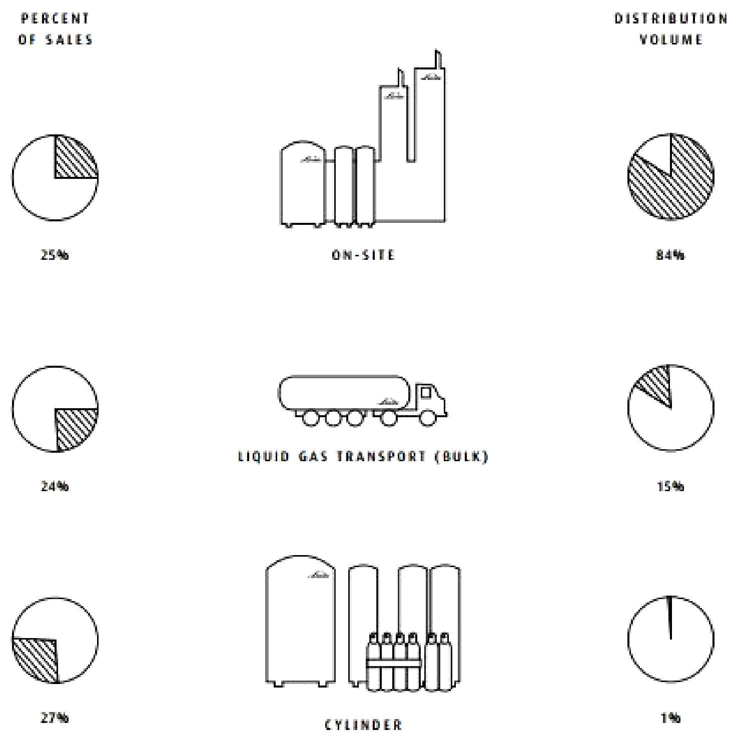


Figure 12. The Linde Group Business Model[3,41]

3 The Healthcare segment accounts for the remaining 24 percent

By volume, the cylinder business accounts for just a fraction of the gas generated at the various facilities. Nevertheless, cylinders generate the most sales and have the highest margins. In on-site case of offers, buyers are usually consuming through the on-site production factory, and in other product areas, gases are delivered to the client in gas tankers or cylinders.

The Group is also financing the expanding of its own healthcare business (medical devices and gases, clinical care and related services) and is considered the major player in the development of environmentally friendly hydrogen manufacturing technologies. The Healthcare segment accounts for the remaining 24 %.[59]

The Healthcare commercial corporation is considered as a mass primary supplier of healthcare services that specialize in the integrated way of respiratory care path. The company's products and services affect the patients' lives and healthcare experts in the continuum of care from the polyclinic to the house. Linde markets its own health care commercial in more than 60 countries, and all company's goods and services meet the highest standards of quality, safety and productivity, as specified by the official government bodies and authorities.[42]

The Engineering Division of Linde works very well all over the world, and paying special attention to promising sectors of the market, such as plants for the production of natural gas based on olefins, air separation plants and plants for the production of synthesis and hydrogen gas. Unlike literally all of its own competitors, the company has the opportunity to rely on personal immense technological know-how in planning, building turnkey industrial companies and project development. Linde plants are used in a lot of spheres: in oil fertilizer and refineries plants, in the chemical and petrochemical industries, for the production of synthetic and hydrogen gases, for air gases' recovering, for processing natural gas and in the pharmaceutical field. The engineering department either supplies plants to the client, or to the gases corp, which controls the plants on behalf of the client under the gas supply contract.[43]

Other Activities involve the operations of logistic services Gist Company[4]. Gist practices on distributing refrigerated food and beverage products and its key markets are the UK and Ireland.

Also, Linde is still developing and implementing systems and installations for use in gases field around the world in several technology centers. Apart from this, the Group offers its own customers with technical equipment and complete support services. There should be mentioned that the Linde Industrial Gases commercial division is considered to be the world biggest supplier of welding and safety goods.[44]

3.1.2. Targets and Strategy

The Linde Group strategy is aimed at a long-term revenue growth and concentrates on expanding its own international business with support for up-and-coming goods and services.

Within the program for the focus restructuring during recent periods, Linde has taken major actions towards organizational correction to introduce structures that will still provide prospective effective procedures. From 2015 to 2017, namely in the 3-year period, this program is aimed at reducing expenses by approximately 180 million Euros.

Linde still set off the LIFT program in the fall of 2016, in order to guarantee the success of his own business in a long-term opportunity. The company schedules to apply this initiative for the subsequent optimization of its own set of products and services, which connects the intentions to resell the supplier of logistics proposals Gist Company. In addition to revising the range of products and offers offered, the company's regional work is still under the microscope. The company will leave the non-representative regional markets. All in all, the regional responsibility will be further consolidated, in order to speed up all sorts of necessary measures of the regional restructuring. Linde is going to facilitate cross-sectional functions and even more to bring the processes of making conclusions and areas of responsibility to the active commerce.

[4] Gist Limited is a supply chain company with a long history, spanning over 100 years

Another nuance is to ensure the competitiveness of Linde Engineering. This will include the test of the structure of expenses, the improvement of the technological base, the extension of the scope of proposals and the subsequent standardization of manufacturing.

The company is eager to use the LIFT program in order to decrease expenses by approximately 370 million Euros a year from 2019.[45, 89]

3.1.3. Potential Merger

In August 2016, the officially talks started about the merging process between the American company and its American competitive Praxair, which is by the way the biggest gas supplier in the world, because this case was publicly announced. Meanwhile, in September, the negotiations were temporarily stopped for an indefinite period. Then Praxair began negotiations with Linde about a possible merger only in the middle of December the same year.[46]

In April 2017, Linde again banned the appeal for a vote of shareholders at his own annual general meeting in May – actually, this was the 2nd time when the company vetoed the request from Praxair. Next month (May 2017), both companies agreed in principle on a full share merger of equals to the required amount of $ 75 billion, but the collision will still need the endorsement from Praxair's and Linde's top management and board of directors, and if this deal is supported it would be created a new holding company. In the beginning of June, both companies agreed to proceed the merger.[47]

There should be mentioned that the Elemental and Noble Gases, as well as Industrial Use Gases markets, are already highly concentrated ones regarding M&A (merger and acquisition) issues in 2014-2017 and these 2 companies are considered to be the biggest entities by market share size on this market. So after closing the deal the newly created company would compete with another major player on mentioned markets, namely Air Liquide company. In order to expand its own presence on the market, in May 2016 the French gas company (Air Liquide) bought American company Airgas for proceeding better competition in North America area. But still, the deal between the Linde Group and Praxair is bigger by the value of merger than Air Liquide's one ($ 13.4 billion only) and in any case put the last one in the shade. In elemental & noble gas and industrial use gases markets, IBISWorld is considering the fact that this merger of giants supposes to be not the last one. By reason of the dangerous market situation that coming out from the market leaders small companies also try to tighten the business links between each other to rise own market share stay competitive. Consequently, in the next 3 years, the intensity of the market shares will grow even more.[48]

It is supposed that the merge of Linde-Praxair companies will have a big influence on elemental, noble and other industrial gas markets. Unfortunately, for customers, the concentration of market shares on the gas market is already high: 4 major producers, counting Praxair and Linde companies, control more than 50.0% of market profits. It leads to price regulation from suppliers' side by reason of the market share escalation. With this aim, the cost-based rivalry among contractors is being moderated, which actually means that clients from the main parts, such as the building enterprises, beverage producers, and healthcare providers, can miss control throughout business dialogues after the end of the merging process.[49]

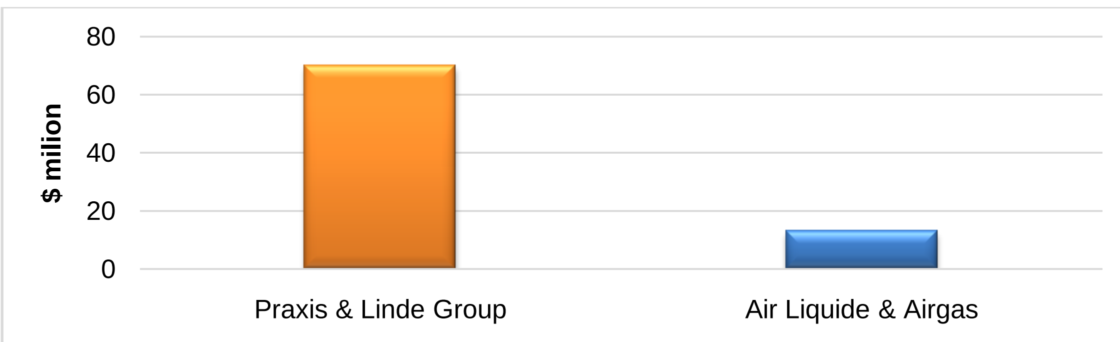


Figure 13. Value of Recent Gas Market Mergers[67]

3.2. Current Position on the Global Market

In Europe, the Middle East and Africa area, also known as EMEA, in the first 3 months of 2017, the Group's profit amounted to 1.478 billion Euros, which is 4.8% upper than the first 3 months of 2016 at 1.410 billion Euros. On a similar base, profit grew by 4.4 %. Operating profit was 462 million Euros, which is 7.4% higher than in the 1st quarter of 2016 in the amount of 430 million Euros. Operating margin increased to 31.3% (2016: 30.5%). Measures to improve productivity, presented in 2015 and 2016, added to this raise.

Progressive tendencies were observed in the EMEA section in practically all fields of production. Looking at the company's commercial activity from one side, where the company delivers gases to the major clients, the Group managed to attain recovery in the Middle East and Eastern Europe as well as for Northern Europe as an outcome of the factory start-ups. In the fields of cylinder gas merchandise and liquefied gases, profits grew in almost all localities.

Linde made a profit in the Asia-Pacific section for 3 months before March 31, 2017, in the amount of 1.073 billion Euros, which is actually 10.7% upper than the same indicator for the first 3 months of 2016 which was counted as 969 million Euros. On a similar base, profit grew by 4.9 %. With a joint benefit of € 268 million, operating profit was 5.5% upper than the previous year's one€ 254 million, while operating margin was 25.0% (2016: 26.2%). There should be indicated the fact that the indicator for the previous year contained a one-time weight from the trade of properties.

In the Asia-Pacific section, progressive tendencies were still observed in particularly all fields of manufacturing. Sure the size and rise of tariffs were attained, especially, in the commercialization of liquefied gases. In the southern part of the Pacific Ocean, the deterioration in profits was postponed. Furthermore, the presented events in costs reducing show the 1st success signal in this area and led to an escalation in operating profit measured up to the previous year.

In the Americas sector, earnings grew by 1.0% in the 1st quarter of 2017 to 1.297 billion euro (2016: EUR 1.284 billion). Subsequently, altering the exchange rate impacts and the configuration of the natural gas costs, profits dropped by 5.3%. Measured up to the previous year, operating profit grew by 0.3% to 323 million Euros (2016: 322 million Euros). The operating margin was 24.9% (2016: 25.1%).[50]

Earnings and revenue tendency in this section were touched by a lot of influences working in various courses. Progressive tendencies were once more observed in liquefied gases commercial and 1-site business in North America region. In contrast, in the Healthcare commerce in North America, the impact of lowering prices in 2016 accordingly to municipal tenders is now being obviously dropped. Logically, the Linde Group's trade of 2 Lincare affiliate companies in the3rd quarter of 2016 had a bad effect on profits.

The circumstances in different states of South America, mainly in Venezuela and Brazil, didn't significantly recover in the 1st quarter of 2017. The financial condition in the mentioned area is characterized by the highest inflation and the lowest rates of growth. The tendencies in the field of goods in South America were progressive, but the recovery attained is from a quite low base in the previous year.

3.3. Governance and strategic objectives of the Company

Linde Group has 2 strategic objectives: to decline the dangers to commerce and status and to benefit from the abilities arising from the consideration of sustainability – both in commercial activities, for example, and in relations with stakeholders. Therefore, Linde goes along with the major bases of sustainability, which is considered one of 4 foundations integrated into the Spirit of Linde. Linde Spirit determines the main values of the company.[51]

In order to support these fundamentals, the Linde Group has proposed a number of promises for the serious businesslike vigor that the Linde Group will sell with the support of mass management systems.

Work on corporate responsibility corresponds to international standards and advice that the Linde Group accepts and supports which include[70]:

- The UN General Declaration of Human Rights
- OECD key foundations for multinational companies
- The ILO's main labor standards
- The main pillars of the UN in the field of business and human rights
- Foundations of the UN Global Compact

Integration into core business	Continuous improvement
In developing corporate responsibility, the Linde Group evaluates the major commercial activities and the life cycle of goods. The Linde Group can help its clients grow more sustainable actions and wait that suppliers and contractors will join in proceeding to the goals of sustainability.	Linde always analyzes how sustainable development allows the Group to use its commercial capabilities and reduce challenging issues. Linde operates with the help of KPI (key performance indicators) in order to assess the performance of sustainability around the world and to define certain goals.
Engagement with stakeholders	**Transparency**
The Linde Group adapts the corporate responsibility processes to expose the stakeholders' and people's needs.	The Linde Group publicly and systematically informs about the achieved progress in the major fields of corporate responsibility.

Table 1. The Linde Group Main Principles[52]

Linde develops new applications as a share of business operations in a close cooperation with its own customers and taking into account their specific needs. The Linde Group pays particular attention to the environmental impact of production processes. Apart from this, Linde Group focuses on the fact that it is more energy efficient to arrange technological processes and installations and to reduce emissions – both in personal transactions, for example, and for customers.

Linde made the group Clean Energy in 2011. The task of this team, which works in various business areas, is to develop innovative products and processes that can help economically viable repeatable energy sources, reduce the introduction of natural resources and reduce emissions that are harmful to the environment.[53]

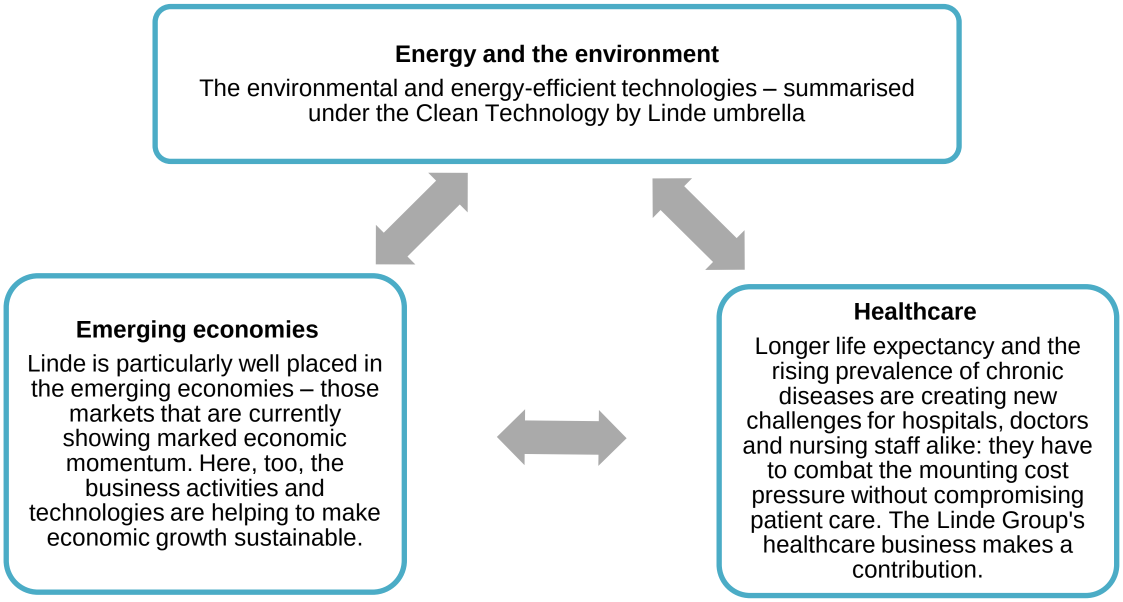


Figure 14. Business opportunities[53]

Every year Linde awards the Linde Group Patent & Innovation Award for the best innovations. With this merit, Linde accepts the best patents registered within the year in any of the appropriate categories: technological discovery paid opening and business innovation. Award-winning patent orders are often directly related to the service of protecting the climate in general and the environment in particular.[55] Examples include innovations in the field of renewable energy sources and new technologies to increase production capacity. The favorites of this award became members of the Linde Innovators Club.[54]

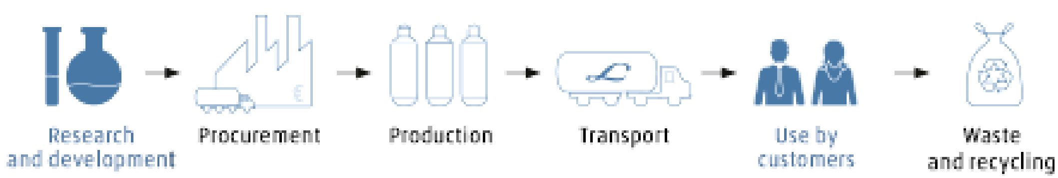


Figure 15. Responsibility along the value chain[55]

Linde grows resolutions that raise the value of customers and make a contribution to sustainable development. The company's technologies make a difference to the sustainable solutions for the tasks facing the society components, such as environmentally friendly mobility, energy security, and demographic configurations. Linde's business strategy corresponds to these 3 megatrends – all of them are significant enough for sustainable development, both for business and for humanity.

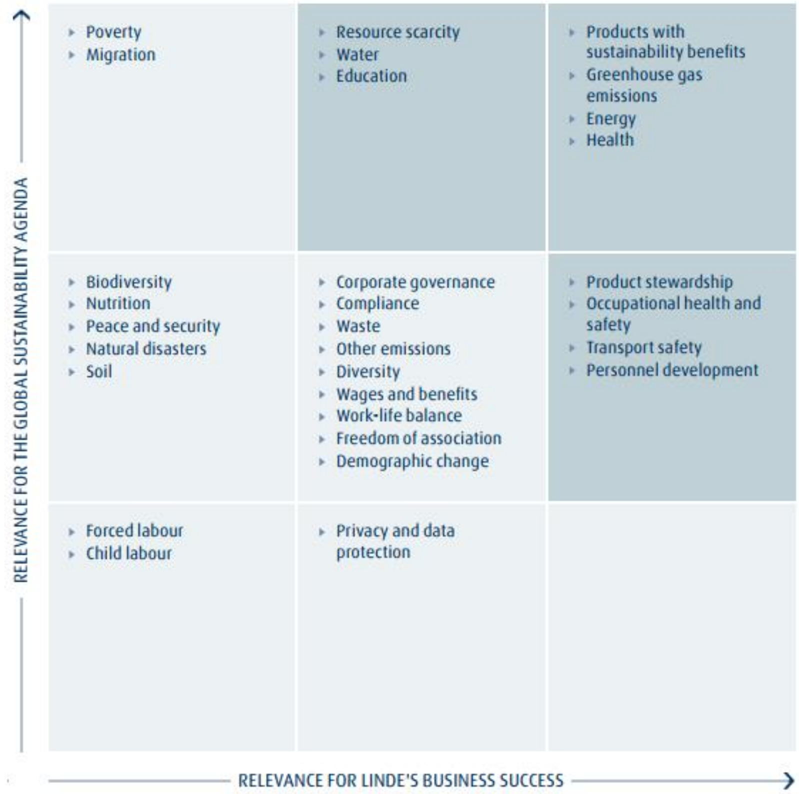


Figure 16. Relevance of sustainability topics for Linde[56]

Linde supports the UN Global Compact. Every year the Linde Group reports on how the Linde Group brings together the 10 foundations of the Global Compact into its commercial processes.

The reporting of the Linde Group corresponds to the aspects of the expanded meaning of the UN Global Compact in order to get this highest standard for the disclosure of progress in sustainable performance.

3.3.1. Business and Governance

Linde constantly identifies, evaluate and minimizes risks. The system of collective risk management of Linde Company covers commercial, environmental and social risks. These include safety and environmental risks, risks to personnel, risks to the reputation of the company, legal risks, risks associated with possible political, legal or social shocks, and the risks associated with pandemics.

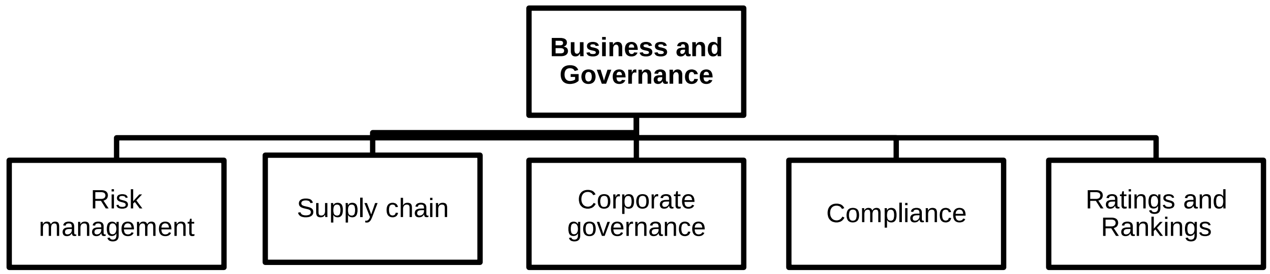


Figure 17. Business and Governance[57]

SHEQ management systems are aimed at identifying and minimizing risks in the areas of safety, health, environment, and quality. Management systems are tightly coordinated with processes in the appropriate areas of business. The company still connects contractors and other suppliers within the management systems.[58]

The Linde Compliance Program is predetermined to prevent misconduct, to detect violations of laws or the guiding principles of the company and, if necessary, to take measures to destroy every violation. Along with quality, cost, and availability, the main points in choosing suppliers still include protection of the environment, a social responsibility, as well as good commercial practices.

Linde buys the biggest part of required goods and services at the district level in that state where they are needed. This eliminates the necessity for added shipping with further emissions into the environment. Cooperation with district companies also helps to pursue consolidation with the regional economy. Serious corporate governance is considered the key to the company's long-term success. Linde follows in the footsteps of the Collective Management Code of Germany, submitted by the Governmental Commission, as amended, and in very most probable degree corresponds to the guiding principles of the Code.[73]

Linde has established a company to ensure compliance with legal provisions and voluntary promises. The challenge is to prevent all types of infringements.

Dow Jones Sustainanility Index	In September 2016, Linde was listed in the global Dow Jones Sustainability Index (DJSI World).
FTSE4Good Index Series	Linde is a component of the FTSE4Good Index Series, an equity index series honoring companies meeting globally recognised corporate responsibility standards.
CDP	Linde was admitted to the regional Carbon Disclosure Leadership Index for Germany, Austria and Switzerland.
Oekom research	Oekom research has given Linde AG an overall B- rating (Prime status).
STOXX Global ESG Leaders Indices	Linde is represented in the EURO STOXX Sustainability Top 40, representing the largest sustainability leaders in the Eurozone, and the STOXX Global ESG Leaders Indices – a series of equity indices covering environmental, social and governance aspects.
Ethibel EXCELLENCE	Linde has been reconfirmed as a constituent of the Ethibel Sustainability Index (ESI) Excellence Europe since 20/03/2017.
Global Challenges Index	Linde is a member of the Global Challenges Index. The index contains 50 stocks of global companies, as well as small and medium-sized enterprises, that promote sustainable development through their product and service range.

Table 2. Ratings and Rankings[59]

The money market is increasingly considering how reverently companies conduct business with investments that still reflect aspects of sustainability (such as SRI[60] – socially responsible investment). Linde is represented in a number of funds, indices, and ratings of SRI. Some selected rankings and ratings are presented above.

3.4. Analysis of the Financial Results of the Linde Group Activity

Linde has a broad range of financing tools at its disposal to take advantage of the international capital markets i.e. a syndicated credit facility, senior bonds, a Medium-Term-Note Programme and a Euro Commercial Paper Programme. Capital market financing plays a central role in the funding strategy of the Group.[61]

In January 2017, Linde placed EUR 1 bn senior notes with a 5-year maturity. The bond, with a coupon of 0.250%, was priced at 22 basis points over Euro-MidSwaps. The proceeds from the transaction were used for general corporate purposes and the refinancing of debt maturities. With this bond issue Linde has raised long-term funds at record low interest rate levels.

The liquidity of the Group is guaranteed by a currently undrawn EUR 2.5 bn revolving credit facility maturing in 2020. It is a syndicated facility which has been arranged with 33 German and international financial institutions and was signed in July 2013. This backstop facility contains no financial covenants.[62]

Strong capital markets presence and long-dated maturity profile.

- Approx. 80% of total financial debt due beyond 2017
- Approx. 30% of total financial debt with maturity longer than 5 years
- Excellent access to capital markets: intermediate and long-term financings at record low levels63

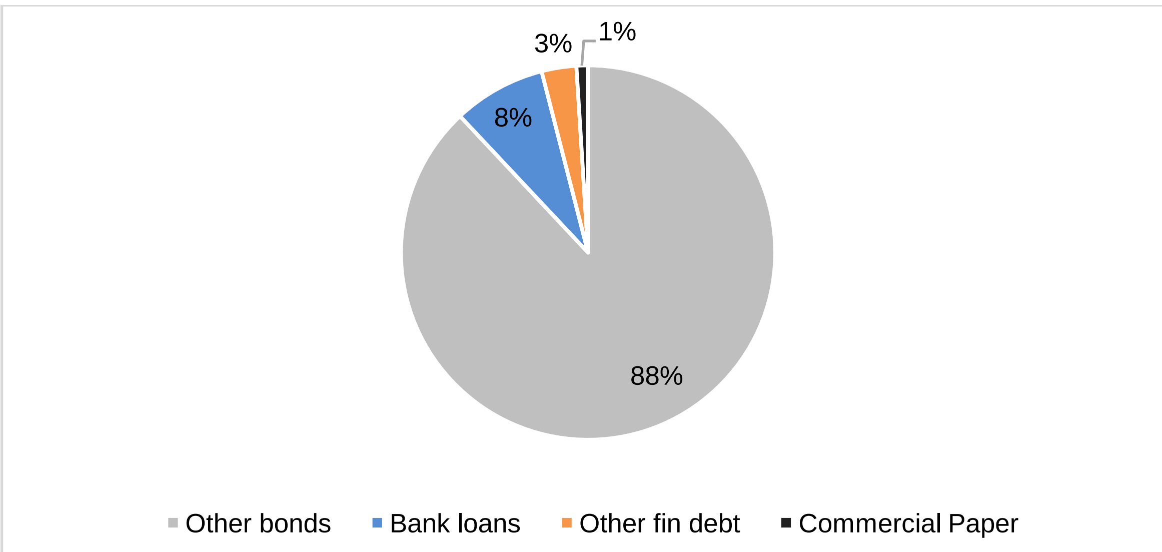


Figure 18. Gross financial debt by instrument[63]

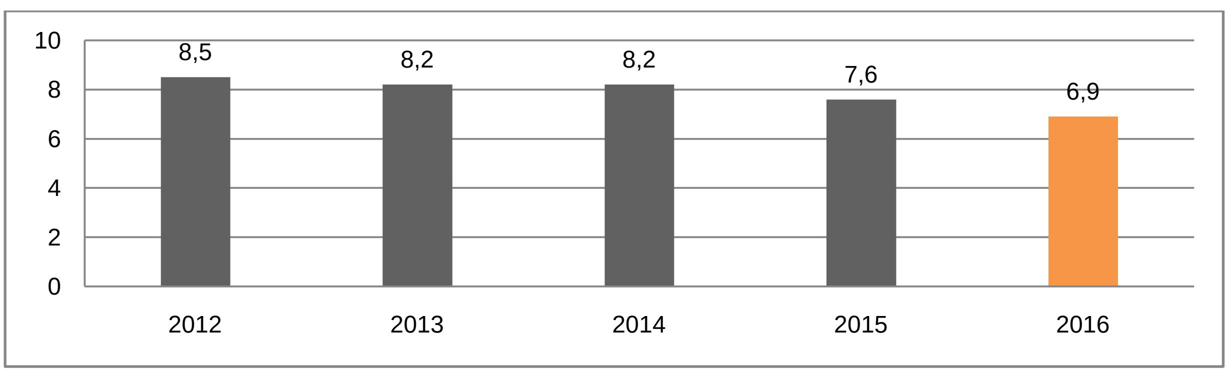


Figure 19. Net debt, €bn[64]

Linde's funding tool box includes a Medium-Term-Note Programme (medium and long-term debt), a Euro Commercial Paper Programme (short-term debt), a syndicated credit facility and subordinated bonds (hybrid capital).

The Linde Group is rated by the rating agencies Moody's, Standard & Poor's (S&P) and Scope Ratings (Scope). An external credit rating is a key prerequisite to access international debt capital markets at attractive funding costs. Linde has publicly communicated a target credit rating in the "strong investment grade" area to investors. This goal is based on, among others, the Group's stable business model, its solid financial position and very conservative liquidity management.[65]

Subsequently to Linde's announcement to call early and redeem two subordinated hybrid bonds (EUR 700 m and GBP 250 m) in May 2016, Moody's and S&P affirmed their A2/P-1 and A+/A-1 long-term and short-term issuer ratings with stable outlooks.

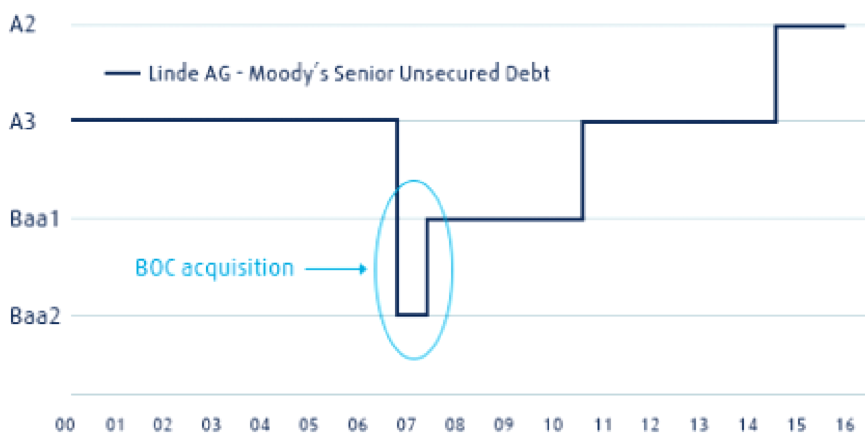


Figure 20. Moody's rating history[65]

In August 2016, the European rating agency Scope assigned an inaugural issuer rating (long-term) of A+ with stable outlook to Linde. The short-term rating is S-1+ - the highest category under Scope's methodology.[66]

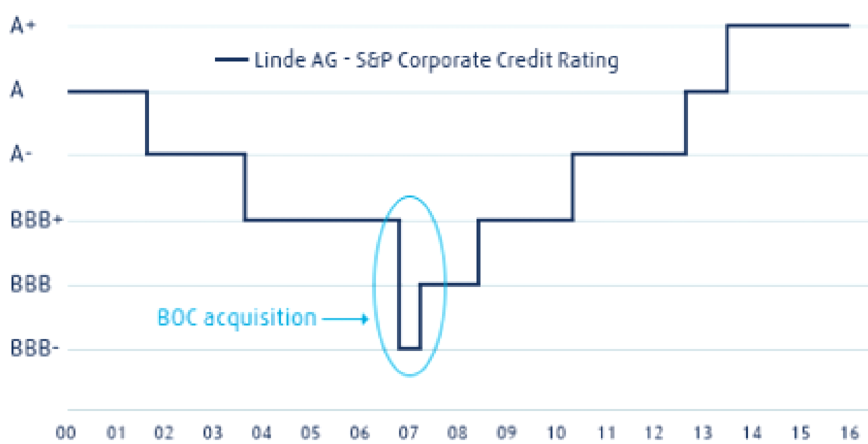


Figure 21. Standard & Poor's rating history[65]

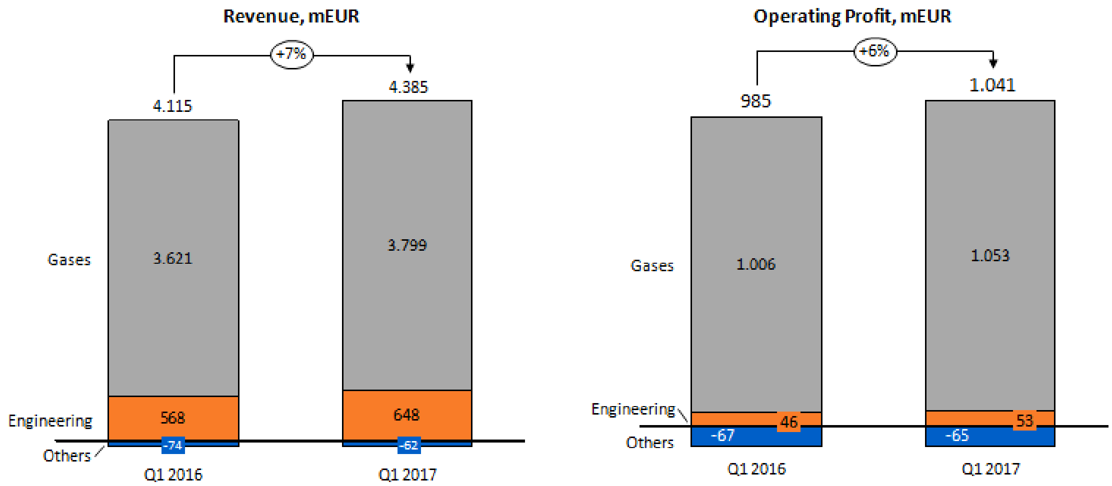
The positive rating trend over the last years was primarily based on Linde's excellent business risk profile in terms of stability and profitability as well as the Group's conservative financial policy. The "stable" outlook on all three credit ratings reflects rating agencies' expectation that Linde will continue to balance investment spending and shareholder / bondholder interests.

3.4.1. Dynamics of Financial Performance

The Linde Group saw positive business trendsin the first quarter of 2017, achieving increases in both revenue and earnings compared to thefirst quarter of 2016:

- Group revenue increases to 4.385 billion euros (up 6.6%; up 4.2% after adjusting for exchange rate effects)
- Group operating profit rises to 1.041 billion euros (up 5.7%; up 3.1% after adjusting for exchange rate effects).[66]

In the first quarter of 2017, Group revenue from continuing operations rose by 6.6% to 4.385 billion euros, when compared with the figure for the first quarter of 2016 of 4.115 billion euros. Themain factors contributing to this increase were positive trends in the EMEA and Asia/Pacific segments and higher revenue in the Engineering Division. Group operating profit fromcontinuing operations rose by 5.7% to 1.041 billion euros (2016: 985 million euros).[82]



<u>Gases</u>
Revenue was driven by organic growth, currency and natural gas price effects

<u>Engineering</u>
Positive revenue development

<u>Gases</u>
Margin improvement of 20bp to 28% after adjusting for higher natural gas prices

<u>Engineering</u>
Stable margin in line with guidance of around 8%

Figure 22. Dynamics of Financial Performance[67]

After adjusting forexchange rate effects, Group revenue was 4.2% higher than in the prior-year period.Group operating profit after adjusting for exchange rate effects increased by 3.1%. At 23.7%, the Group operating margin was similar to the figure for the first quarter of 2016 of 23.9%.

The Group is expecting to achieve an increase in revenue after adjusting for exchange rate effects in the 2017 financial year of 3%, although the challenging market environmentcould result in a decrease of up to 3%. After adjusting for exchange rate effects, operating profit should be on a par with or up to 7% higher than the figure achieved in 2016.

4. Modeling the Impact of Macroeconomic Indicators upon the Linde Group Performance

4.1. Statement of the Research Problem

The role of indicators in the decision process to measure economic performance and efficiency is undeniable. The importance of these indicators has led to an increase of the methods throughout companies measure their performance. The purpose of this chapter is to discuss the correlation and influence of various macroeconomic factors on Linde AG and its performance.

Linde operates in more than 100 states all over the world and proposes its clients a variety of goods and services.[38] Trends in the macroeconomic environment and economic conditions in the various regions have a significant influence on the Group's business situation. This chapter describes and analyzes how overall economic performance can influence and hinder Linde's net sales.

Such factors as local equity market index, exchange and inflation rates have different tendencies during the economic performance, so they will be investigated to see how these macroeconomic factors influence Linde AG.

4.2. Objectives of the Empirical Study

The objective of the empirical study is to find correlation between three main variables which were identified as crucial for performance evaluation, namely local equity market index, Inflation and Exchange rates.

4.3. Research Hypothesis

According to the objective stated above, following hypothesis should be verified:

Hypothesis 1: Inflation decrease and local equity market index increase positively influence a company's performance.

Hypothesis 2: The increase in banks' credit facilities leads to a better performance.

Hypothesis 3: Exposure is specified as the slope coefficient that results from regressing stock returns on changes in the exchange rate.[68] Firms with international sales are more likely to be exposed to fluctuations in the exchange rate. Firms with debt in foreign currency will be affected by changes in exchange rates.

4.4. Methods of Research

To analyze and examine the link between the macroeconomic environment and the company's performance was turned to the graphical and empirical analysis based on correlation and regression analysis.

The analysis includes the following steps:

1) establish causal links between the studied traits (identification and selection factors including those that most affect the resultant figure);
2) building a graphical model to show the relationship between the macroeconomic environment and the company's performance;
3) formation of correlation and regression models (information support analysis, select the type and form of communication, drafting model);
4) determining the correlation characteristics;
5) statistical evaluation of connection parameters (economic interpretation, evaluation of the significance of correlation coefficients)

It is proposed to analyze the revenue data of Linde Group for 10-year period, 2006 to 2016. Correlation and regression analysis are estimated in the study based on the following parameters:

- Company Performance: the dependent variable is measured using following variables.
- Inflation: as measured by the consumer price index reflects the annual %age change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.[69]

- Exchange Rate: the price of a nation's currency in terms of another currency.
- Stock market: Local equity market index valued in local currency unit (LCU).[70]

Macroeconomic data was taken from the databank of Global Economic Monitor (GEM). Inflation refers to the worldwide indicators, while exchange rate and stock market refer to German indicators.

A sample of 10-year-old data was selected for the analysis. The sample contained total Linde's revenue, and the revenue specification for gas and engineering divisions, two main sectors for the company. Data was collected from Linde Group official financial publications (Annual Reports) and official statistics on the economic indicators.

4.5. Empirical Analysis

The section presents the empirical findings and analysis of the data.

4.5.1. Descriptive Statistics

The descriptive statistics of dependent variables and explanatory variables are reported in the following Table. It shows the average indicators of variable computed from the financial statements and deviations from those averages.

Linde Revenue, 2006 – 2016, EUR mln[71]											
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total Revenue	10,803	12,306	12,663	11,211	12,868	13,787	15,28	16,655	17,047	17,345	16,948
Gases Division Revenue	8,421	9,209	9,515	8,932	10,228	11,061	12,591	13,971	13,982	15,168	14,892
Engineering Division Revenue	1,958	2,75	3,016	2,311	2,461	2,531	2,561	2,879	3,106	2,594	2,351
Inflation, consumer prices (annual %)[72]											
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016

INFL	4,487	5,345	8,95	3,044	3,513	5	3,852	2,784	2,762	1,595	1,614
Exchange rate, new LCU per USD extended backward, period average[73]											
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
EXCHR	0,8	0,7	0,7	0,7	0,8	0,7	0,8	0,8	0,8	0,9	0,9
Stock markets, LCU per USD, period average[74]											
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Stock market	100,5	127,4	105,8	85,6	105,5	112,5	116,9	141,6	162,6	187,1	173,8

Table 3. Dependent variables and explanatory variables, 2006 – 2016

The following charts can help visually perceive the figures in the tables above and estimate the trends of their development. The main goal is to provide the first summary insight of the relationship between macroeconomic indicators and Linde's performance in the period from 2006 until 2016.

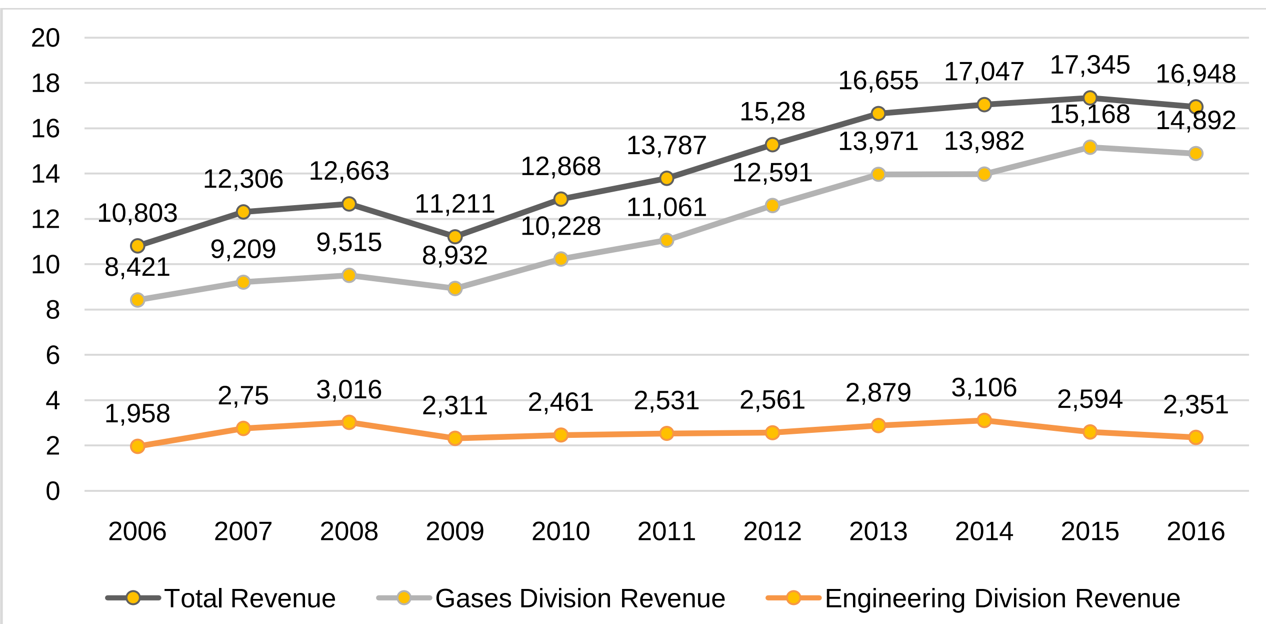


Figure 23. Linde Revenue, 2006 – 2016, EUR mln[5]

5 This Figure and the subsequent ones were constructed in Microsoft Excel based on data above

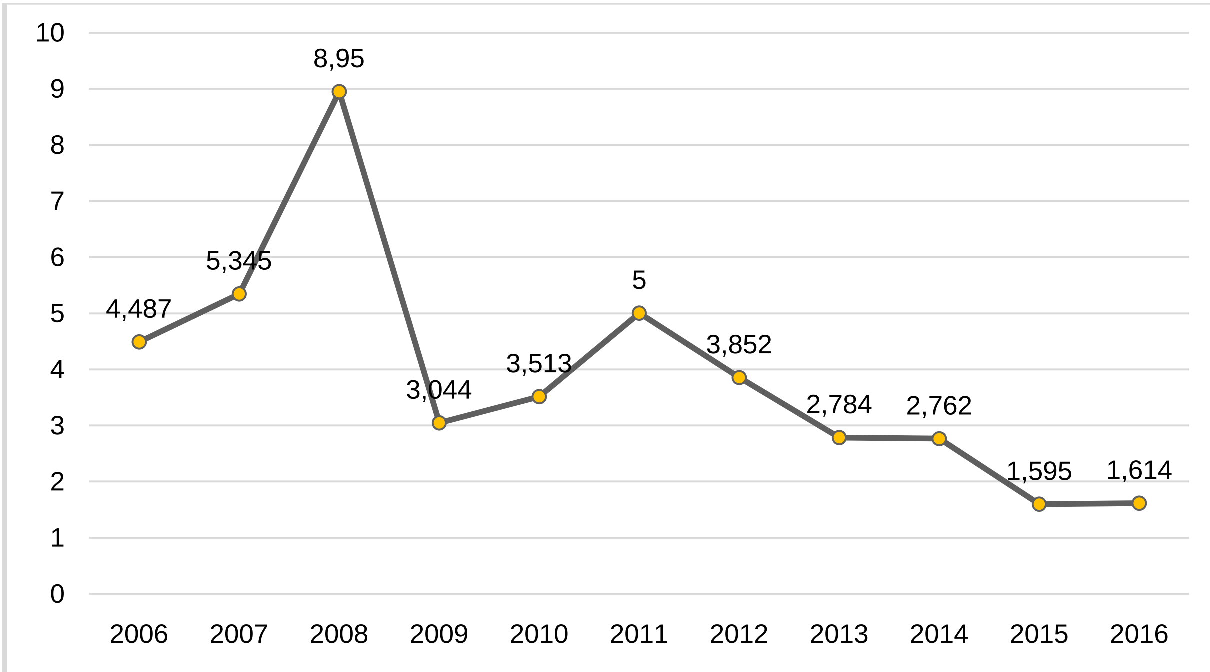


Figure 24. Inflation, consumer prices (annual %)

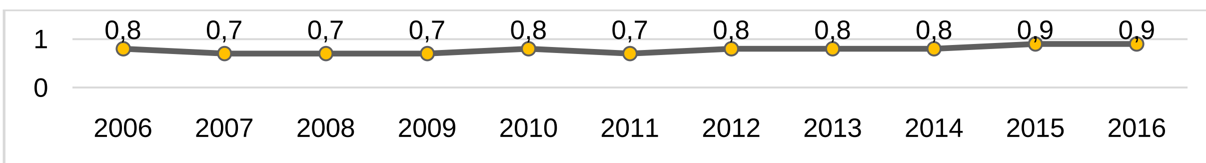


Figure 25. Exchange rate, new LCU per USD extended backward, period average

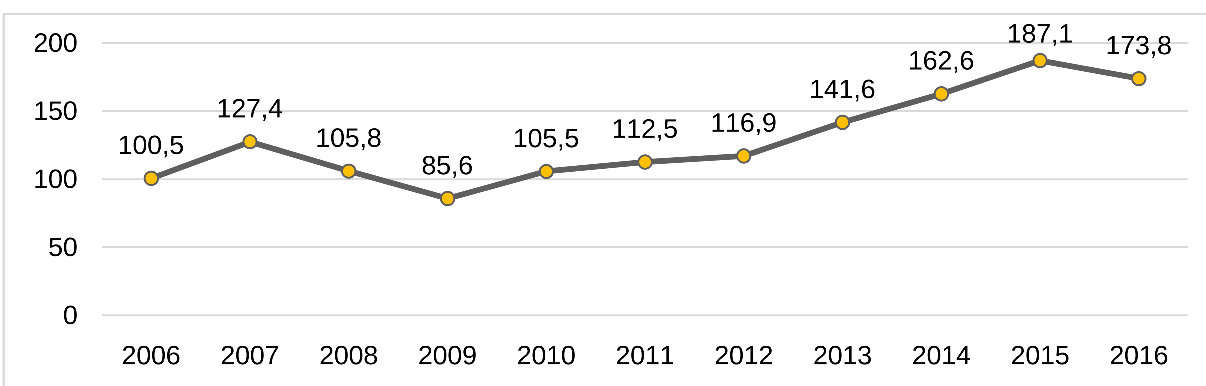


Figure 26. Stock markets, LCU per USD, period average

The charts show that despite the fact that all variables move in the similar trend, the rate significantly differs, which could mean that macroeconomic factors are not the main determinants of Linde's performance.

Nevertheless, it must be mentioned, that the figures do not demonstrate the contribution of macroeconomic factors in the company's performance in general, they only show the relationship between these variables.

For the further deeper study, the empirical analysis based on the correlation-regression model is applied.

4.5.2. Diagnostics Tests

Correlation and regression analysis are related in the sense that both deal with relationships among variables. The correlation coefficient is a measure of linear association between two variables. Regression analysis involves identifying the relationship between a dependent variable and one or more independent variables. A model of the relationship is hypothesized, and estimates of the parameter values are used to develop an estimated regression equation. Various tests are then employed to determine if the model is satisfactory. If the model is deemed satisfactory, the estimated regression equation can be used to predict the value of the dependent variable given values for the independent variables.[75]

The Linde AG Group performance, the dependent parameter (Y) would be the total Revenue as it was measured in the study, while macroeconomic indicators would be the independent parameter of interest (X).

At the end of the analysis, there would be assessed 5 the most important regression coefficients namely: the coefficient of correlation ®, the coefficient of determination (R2), the adjusted coefficient of determination, the standard error, the importance coefficient (F). Each coefficient's characteristics are given below[76,77,78]:

The coefficient of correlation (or multiple R) reveals a linear link between 2 parameters assessed in the range of -1 to 1, the positive linkage between the dependent and independent parameter would be much stronger if the correlation is close to +1and vice versa.
The correlation that equals 0 reflects the absence of the linear link between parameters.

The determination coefficient (R2) reflects the quantity of situations variability of Y (in this one - the volume of consumed energy) can be characterized by the FDI inflow. When the equation of regression is more significant, the variation coefficient becoming higher.

The adjusted coefficient of determination (adjusted R2) specifies the influence of R-square alterations on the determination coefficient. The R-square downside is that it increases when you add new parameters (although this does not necessarily reflect improving the regression model quality), while normalized R-square could be reduced with the presentation of new model parameters that have no an essential impact on the dependent parameter. When adjusted R-square is not much changed from the determination coefficient, there can be concluded good model quality.

The standard error identifies as a range of the dependent parameter around the regression line. The model quality will be better in that case when the error will be smaller.

The ratio of significance F checks whether a model (regression) meets experimental data and whether the included in the equation independent parameter is enough. The ratio of significance F is under 0.01, it represents that the result is highly significant. If the F is in between 0.01 to 0.05 it's a significant result. If the ratio is above 0.05, the result is not important.[76,77,78]

To pre-determine the direction and strength of association between the dependent variable and the model factors were used correlation analysis abilities built-in data analysis in Microsoft Excel.

Analysis of regression and statistical indicators made it possible to identify the intensity of characteristics influence “inflation decrease + stock market index increase + exchange rates decrease→ total revenue increase”. For this purpose, the correlation was built with the trend below.

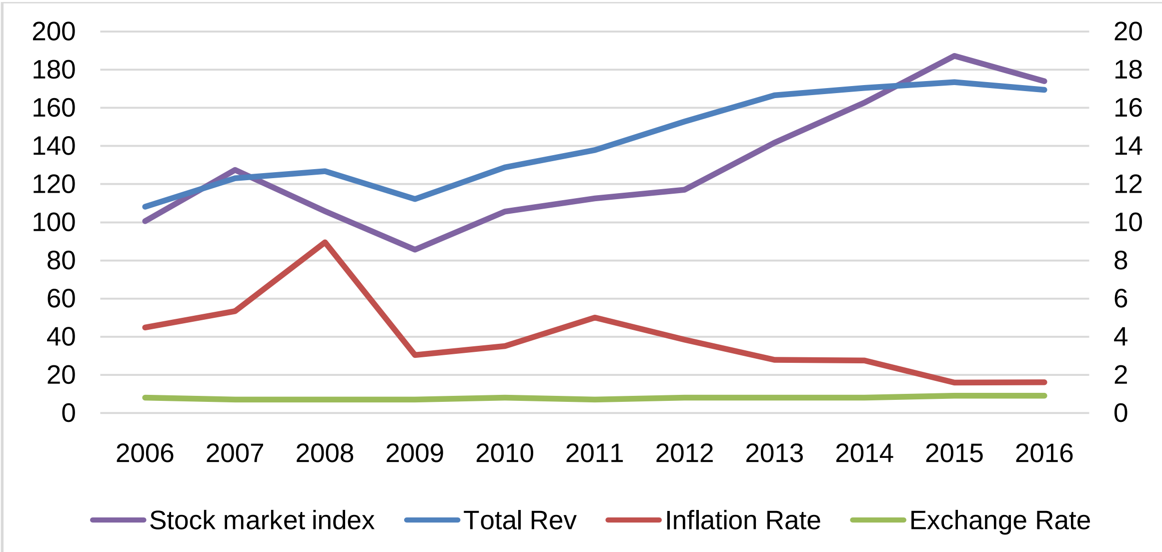


Figure 27. Correlation between revenue and macroeconomic indicators, 2006-2016

The above data indicates that between exchange rates and revenue growth there is a weak link, strong but not decisive link between inflation rate and revenue growth and a significant link between stock market index and revenue growth.

Thus, there exists a scale of connection between these four parameters:

- if the inflation decreases, the revenue grows
- if the stock market index increases, the revenue grows
- no strong connection between exchange rates and revenue growth of Linde

The correlation model reflects the extent of statistical linkage, R=0.7919. Under Chaddock Scale, the measured dependence can be characterized as high (R=0.7919 and belongs to the interval [0.7 – 0.89]).

Determination coefficient	**Quality characteristic**
1,00	Functional connection
0,90—0,99	Very High
0,70—0,89	High
0,50—0,69	Salient
0,30—0,49	Moderate
0,10—0,29	Weak
0,00	No connection

Table 4. Chaddock scale

The outcome of the further regression analysis, made by using the “regression” function in Microsoft Excel is presented below.

Regression Statistics	
Multiple R	0,88989807
R Square (D)	0,791918575
Adjusted R Square	0,702740821
Standard Error	1,347279451
Observations	11

Table 5. Regression Statistics

Dispersion Analysis					
	Df	*SS*	*MS*	*F*	*Significance F*
Regression	3	48,35714221	16,1190474	8,880225638	0,008757874
Residual	7	12,70613343	1,815161918		
Total	10	61,06327564			

Table 6. Dispersion Analysis

	Coefficients	**Standard error**	**t-statistics**	**P-values**
Revenue	7,034991462	7,688946348	0,9149487	0,390646679
Inflation Rate	-0,117928154	0,299116956	-0,394254328	0,705128518
Exchange Rate	-0,585909376	10,34223485	-0,056652105	0,956405496
Stock market	0,063151876	0,01983857	3,183287609	0,015419943
	Lower 95%	**Upper 95%**	**Lower 95,0%**	**Upper 95,0%**
Revenue	-11,14647754	25,21646046	-11,14647754	25,21646046
Inflation Rate	-0,825227362	0,589371053	-0,825227362	0,589371053
Exchange Rate	-25,04140872	23,86958996	-25,04140872	23,86958996
Stock market	0,016241111	0,110062641	0,016241111	0,110062641

Table 7. Correlation Coefficients

Except displaying density, the correlation coefficient plays another important role – through coefficient of determination (D) it describes the variation in dependent variable and is explained by the independent variables. In case, D = 0.7919, which means 79.19% of the variation in final Linde's revenue could be explained by the independent variables inflation + exchange rate + stock market index, while the remaining 20.81% are other factors – Gross Domestic Product (GDP), Industrial Production, global economic trends, the number and quality of human resources, efficiency capital, quantity and quality of natural resources, the effectiveness of public administration efficiency technologies etc.

Separately, it is necessary to draw attention to the significance indicator F. Within the study it was obtained the significance F = 0.00875787406, that result is significant. In other words, a model sufficiently corresponds to the experimental data included in the equation.

There have also been received coefficients, which can help to build the regression line. In the calculations the regression line is: Y = Total Linde's revenue = 7.034991462 – 0.117928154*Inflation – 0.585909376*Exchange Rates + 0.063151876*Stock market index
These coefficients can also be used for predictions.

4.6. Analysis of the Results

The aim of the study and the correlation and regression analysis was to evaluate the impact of macroeconomic indicators on the Linde Group's performance. To achieve the pre-defined objectives, a systematic, logical, comparative, horizontal and vertical, correlation-regression analysis was used.

To examine the impact of macroeconomic factors on the company's performance, the following macro indicators were selected: stock market index, inflation and exchange rates. It was found that the greatest impact on Linde's performance was made by inflation rate and stock market index. Exchange rates seem to have the least impact on the company's performance.[79]

The usage of macroeconomic indicators such as stock market index, inflation and exchange rates is sufficient to assess the main factors affecting the business environment.[80] However macro indicators such as export growth, tax burden or the average monthly salary are also important for evaluating the economy, as well as many others not used in the model.[81]

Before analyzing the results received in the regression and correlation analysis, it would be useful to stop by some assumptions of the model chosen, to understand the possible areas of the topic which could be misinterpreted.

For correlation, both parameters should be random ones, but for regression, only the response parameter Y should be random. When carrying out research hypotheses or calculating confidence intervals for the characteristics of regression, the response parameter must have a Normal distribution, and the variability of Y parameter must be similar to any predictor variable dimension. The same conclusions should be exposed in the examination of zero Hypothesis when correlation = 0, but for interpreting confidence intervals for the coefficient of correlation, both parameters should be normally distributed. Both regression and correlation suppose that the link between the 2 parameters is linear.[82]

- Hypothesis 1 - confirmed

Inflation decrease and stock market index increase positively influence a company's performance.[82]

The stock market affects individual businesses by influencing consumer spending and providing the chance for stronger returns on capital costs. Consumers spend more during bull markets because they feel wealthier when they see their portfolios rise in value. During bear markets, they pull back on spending, fearing an erosion of wealth and purchasing power as the value of their investments contracts. A rising stock market also increases the value of stock as a currency, enabling a business to raise more capital by issuing shares or even to use stock as leverage to acquire competitors.[83] Rising prices, known as inflation, impact the cost of living, the cost of doing business, borrowing money, mortgages, corporate and government bond yields, and every other facet of the economy.[84]

- Hypothesis 2 - confirmed

The increase in banks' credit facilities leads to a better performance has also been proven.82 The increasing credit availability encourages the company to invest, fosters the entrepreneurial climate and contributes to more dynamic economic relationships.

Companies hold their clients' cash on accounts that pay the interest rates that are lower than short-term rates. They benefit from the marginal difference between the generated yield using the invested cash into short-term notes, and the paid out interest to the clients. Still, when rates rise, this spread raises with an additional income that going straight to earnings. Companies are influenced directly by the macroeconomic environment.

Exchange rates also have an impact on Group revenue and Group operating profit. Currency differences arise as a result of the translation of various local currencies into the euro (the reporting currency). This is subject to the following: The greater the volatility of the euro in relation to other currencies, the more significant the impact of currency translation on Linde's revenue and earnings.[85]

Due to its global operations, Linde is exposed to a number of financial market risks. In particular, these include counterparty risk, liquidity risk and risks arising from movements in interest rates, share prices, and exchange rates. These risks are monitored and managed on an ongoing basis. The basic strategies for the management of interest rate risk, currency risk and liquidity risk and the objectives and principles governing Linde's financing are determined by the Treasury Committee, led by the Chief Financial Officer. This committee usually meets once a month and comprises representatives from Corporate & Support Functions Treasury and Accounting&Reporting.[86]

Interest rate risk arises as a result of fluctuations in interest rates caused by the markets. These fluctuations affect both interest expense and the fair value of financial instruments. Interest rate risk is centrally managed. On the basis of sensitivity and scenario analyses, the Treasury Committee determines ranges for the fixed-floating ratio of the financial liabilities. The focus is on the main financing currencies: the euro (EUR) and the US dollar (USD).[87] Group Treasury manages the rates within the agreed ranges and submits reports to the Treasury Committee about the measures implemented. Methods of hedging exposure to the risk include entering into interest rate hedging transactions with banks and using long-term fixed-interest bonds and loans.[88]

As a prove of interest rates influence, the financial income would be analyzed.

in EUR m	2015	2016
Net interest income from defined benefit plans	7	7
Finance income from finance leases in accordance with IFRIC 4/IAS 17	19	15
Income from investments	-	1
Other interest and similar income	16	6
TOTAL	42	29

Table 8. Financial Income[86]

The drop in financial income is largely due to the reduction in other interest and similar income because the interest rates to be applied in the 2016 financial year were lower than in the previous year.

The Linde Group uses interest rate swaps to hedge the exposure to variations in the equitable dimension of financial liabilities and assets as an outcome of interest rate fluctuations. If the hedge is effective, the carrying amount of the hedged item is adjusted for variations in the equitable dimension attributable to the hedged risk.[89,86] The next table shows the variations in basic transactions and hedging instruments within equitable dimension hedging relationships admitted in profit or loss.

The Linde Group hedges its exposure to translation risk by taking out loans in foreign currency and by entering into forwarding exchange contracts and cross-currency interest rate swaps. These hedges generally qualify as hedges of a net investment in a foreign operation (referred to below as net investment hedges) in obedience to IAS 39 Financial Instruments: Recognition and Measurement and Consequently, the effective part of the hedge is transferred to equity. If the foreign operation is subsequently sold or relinquished, the amount admitted in equity is released to the statement of profit or loss. No amounts were recognized in 2016 or 2015 as an outcome of ineffectiveness in net investment hedges.

in EUR m	2015	2016
From hedged transactions	35	21
From hedging instruments	-34	-20
INEFFECTIVENESS	1	1
Cash flow hedges		
Forward exchange transactions	12	-
Interest rate/cross-currency interest rate swaps	-234	-329
Commodities	-22	6

Financial liabilities	240	244
Fair value hedges		
Interest rate swaps	90	12
Net investment hedges		
Forward exchange transactions	-60	-45
Cross-currency interest rate swaps	-99	-112
Financial liabilities in foreign currencies	1.435	1.017

Table 9. Fair Value Hedges[86]

The last but not the least,

- Hypothesis 3 – neither confirmed, nor disproved

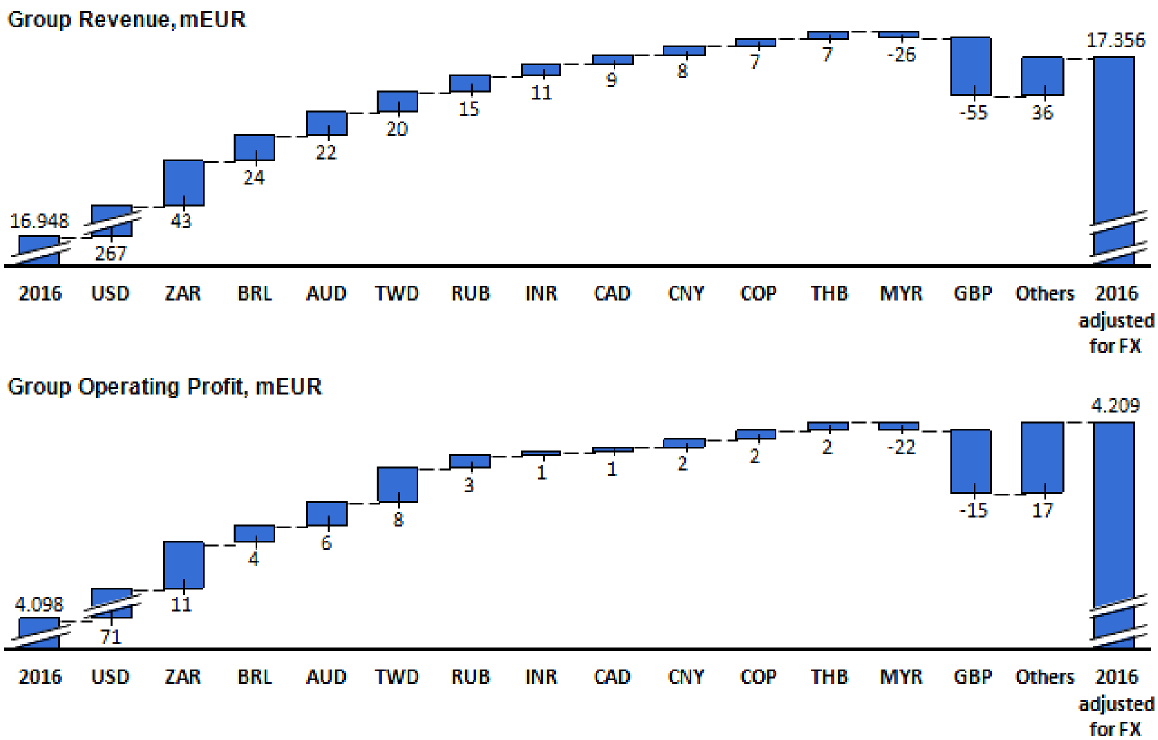
Exposure is oriented as the slope indicator, which appears as the regression outcome of the stock returns on the exchange rate fluctuations.[82] Companies which sell internationally are often the subject to variations of the exchange rate. Companies which have obligations in a foreign currency could be influenced by changes in the exchange rate has not been validated. More data and longer period should be evaluated to receive more clear and truthful output from this Hypothesis. Consequently, Hypothesis 3 have not been confirmed or disproved.

The Linde Group monitors and manages its exchange rate risk, a risk which has an impact on its working processes. The gross exchange rate risk encompasses all the Group's operating activities. This gross exchange rate risk is decreased by around 78% in 2016 (2015: 82%). Thus, The Linde Group is exposed at the balance sheet date to a net exchange rate risk from operating activities involving foreign currency corresponding to 22% in 2016 (2015: 18%) of the original unsecured risk.[86]

The risk of exchange rate fluctuations is controlled for internal management goals on a value-at-risk basis, which refers to other currencies positions rather than the relevant functional currency.

It is also important to differentiate between operational transaction risks (currency risks resulting from business and financing activities between different currency zones) and translation risks (currency risks arising from the currency translation of the financial statements of subsidiaries where those subsidiaries have a functional currency other than the Group reporting currency).[31] The guideline of the Group specifies that individual commercial units must control transaction risks themselves and accept assign hedging transactions with Group Treasury, grounded on predefined minimum hedging rates, provided there are no other reasons not to hedge the exposure in this way.[90]

So the Linde Group is influenced by the risks of exchange rate fluctuations because of its worldwide business spread. Its international directions of commerce in a variety of currency areas and its local business model lead to a low concentration of risk for the Group.



	USD	ZAR	BRL	AUD	TWD	RUB	INR	CAD	CNY	COP	THB	MYR	GBP
Average Rate in 2016	1,107	16,27	3,855	1,489	35,69	74,14	74,37	1,466	7,353	3378	39,05	4,583	0,820
2016 adjusted for FX	1,052	14,15	3,423	1,457	34,13	64,43	71,46	1,413	7,303	3157	37,70	4,717	0,852

Figure 28. Potential currency impact on Group performance in 2017[6,71]

[6] All figures from continuing operations and the data is based on spot rates as of 31 December 2016

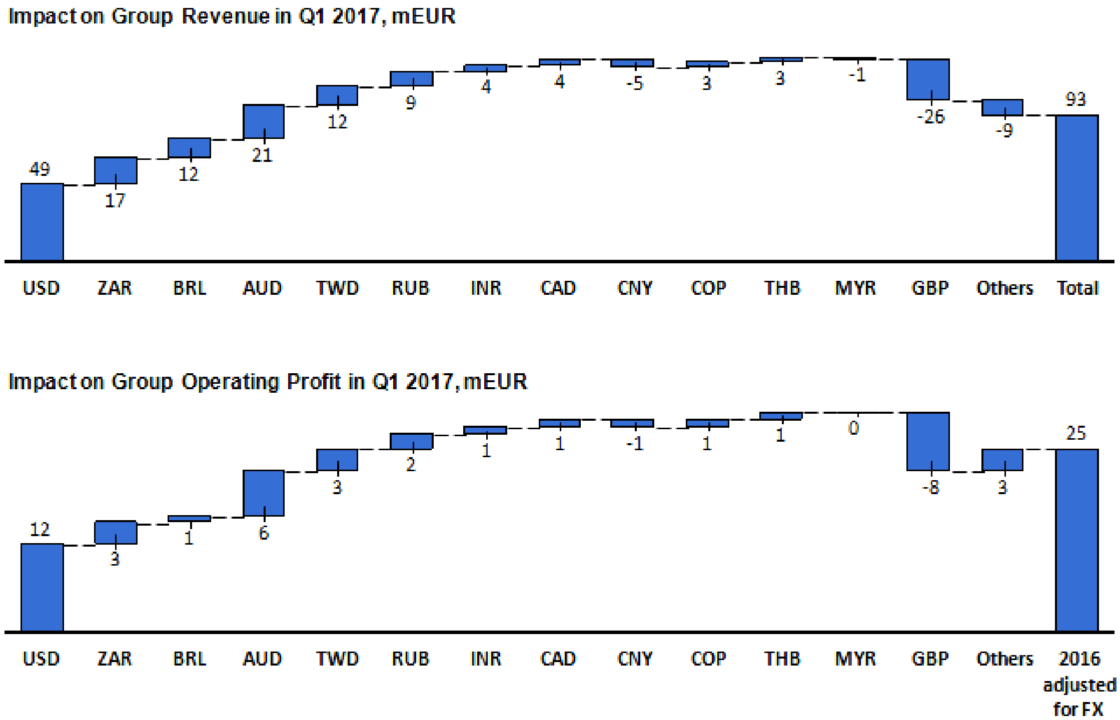


Figure 29. Real currency impact on revenue and operating profit of Group in Q1 2017[7,71]

Exchange rates also have an influence on revenue and operating profit of the Group. Currency differences arise as a result of the translation of various local currencies into the euro (the reporting currency).

For example, in 2017 financial year, Linde AG expects to see the revenue development of somewhere in the range of –3 % to +3 % after exchange rate exposure corrections. The company have mentioned a goal of 9 to 10% for the return on capital employed.[91,71] The Group operating profit, after representation of exchange rate exposure corrections, is supposed to be in 2017 on a level with last year indicator and could rise by up to 7%.

Analysis of regression and statistical indicators as well as financial indicators from 2006 to 2017 made it possible to identify the intensity of macroeconomic influence on Linde AG:

Inflation decrease + stock market index increase → total revenue increase.

[7] All figures from continuing operations

5. Summary

The factors influencing the development of the company are its internal and external environment. For the detailed study of the macroeconomic environment and its influence on the corporate performance of Linde AG, three indicators were chosen – stock market index, inflation and exchange rates. Therefore, there were three hypotheses developed for the deep and comprehensive study of the macroeconomic influence on Linde AG performance.

Hypothesis 1: Inflation decrease and stock market index increase positively influence a company's performance – confirmed by the research.

This research confirmed the positive influence of decreasing inflation and increasing stock market index on the company's performance. Moreover, the conclusions are supported by the examples of considering inflation and stock market development in Linde's activities. In research calculations inflation refers to the worldwide indicators, while exchange rate and stock market refer to German indicators.

Hypothesis 2: The increase in banks' credit facilities leads to a better corporate performance – confirmed by the research.

Bank credit facilities are considered to be one of the leading financial reasons that affect the financial recovery in the economy. They could be used to regulate inflation and to stimulate financial development. The increasing credit availability encourages the company to invest, fosters the entrepreneurial climate and contributes to more dynamic economic relationships.

The companies borrow from banks in order to operate their activities effectively. When borrowing is becoming more expensive the companies may decelerate the borrowing process, as they should pay higher interest rates on their loans. On its turn, the company limits its investments, which slower its growth. For public companies, it may also result in a decline at the stock prices.

Hypothesis 3: Exposure is specified as the slope coefficient that results from regressing stock returns on changes in the exchange rate. Firms with international sales are more likely *to be exposed to fluctuations in the exchange rate. Firms with debt in foreign currency will be affected by changes in exchange rates*. *It was neither confirmed nor disproved by the research.*

The changes in exchange rates affect the investment results, incomes from the international stocks, etc. Those businesses that have foreign affiliates or any of their operations internationally are at a significant influence from the currency fluctuations. The conversion rates changes can abolish profits or grow the company's gains, sometimes they are accounted in millions. The dynamic currency environment may be not only of a threat, but also give companies new opportunities for the development. The currency changes are always subject to risks and the risks may be unpredictable.

The research could not find the evidence of a significant influence of exchange rates on Linde's economic performance. On the other hand, it was noticed that Linde AG is taking exchange rates very seriously into account in its activity. Thus, a conclusion can be made that more data and more mathematical discussion is needed to either support or deny the stated third Hypothesis.

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Appendix

Table 1. Linde AG Balance sheet as of 2016

	31.12.2015	31.12.2016	Change	
	in EUR m	in EUR m	in EUR m	in percent
Assets				
Financial assets	17,499	17,553	54	0.3
Other non-current assets	539	540	1	0.2
Receivables and other assets	1,985	2,110	125	6.3
Securities	400	107	-293	-73.3
Cash and cash equivalents	359	168	-191	-53.2
Other assets	44	130	86	195.5
TOTAL ASSETS	20,826	20,608	-218	-1.0
Equity and liabilities				
Equity	9,845	10,144	299	3.0
Provisions for pensions	274	188	-86	-31.4
Other provisions	796	819	23	2.9
Liabilities	9,911	9,451	-460	-4.6
Übrige Passiva	-	6	6	-
TOTAL EQUITY AND LIABILITIES	20,826	20,608	-218	-1.0

Table 2. Linde AG Profit and loss statement as of 2016

	2015	2016	Change	
	in EUR m	in EUR m	in EUR m	in percent
Revenue	17,345	16,948	-397	-2.3
Cost of sales	11,166	10,847	-319	-2.9
GROSS PROFIT	6,179	6,101	-78	-1.3
Research and development costs, marketing, selling and administration expenses	4,330	4,228	-102	-2.4
Other operating income and expenses	168	189	21	12.5
Share of profit or loss from associates and joint ventures (at equity)	12	13	1	8.3
EBIT	2,029	2,075	46	2.3
Financial result	-397	-324	73	18.4
Income tax expense	396	424	28	7.1
PROFIT FOR THE YEAR	1,236	1,327	91	7.4
attributable to Linde AG shareholders	1,133	1,206	73	6.4
attributable to non-controlling interests	103	121	18	17.5
Restructuring and merger costs (special items)	192	126	-66	-34.4
Amortisation of intangible assets/depreciation of tangible assets	1,866	1,897	31	1.7
OPERATING PROFIT	4,087	4,098	11	0.3
OPERATING MARGIN *in %*	23.6	24.2	-	+60 bp
EARNINGS PER SHARE *in EUR* **– UNDILUTED**	6.10	6.50	0.40	6.6
EARNINGS PER SHARE *in EUR* **– UNDILUTED (BEFORE SPECIAL ITEMS)**	6.82	7.00	0.18	2.6
RETURN ON CAPITAL EMPLOYED (BEFORE SPECIAL ITEMS) *in %*	9.5	9.4	-	-10 bp

Table 3. Financial indicators

		2016	*2015*	*2014*
Share				
Closing price	€	156,10	133,90	154,20
Year high	€	163,55	193,85	157,30
Year low	€	115,85	128,05	139,15
Market capitalisation (at year-end closing price)	*€ million*	28 978	24 857	28 625
No. of shares (at 31 December)	*000s*	185 638	185 638	185 638
Cash dividend per share	€	3,70	3,45	3,15
Group				
Revenue	*€ million*	16 948	17 345	17 047
In Germany	*%*	7,2	7,5	7,4
Outside Germany	*%*	92,8	92,5	92,6
Operating profit[2]	*€ million*	4 098	4 087	3 920
Operating margin	*%*	24,2	23,6	23,0
EBIT	*€ million*	2 075	2 029	1 885
Profit for the year	*€ million*	1 206	1 133	1 162
Capital expenditure (excluding financial assets)	*€ million*	2 004	2 036	1 954
Equity ratio	*%*	44,0	43,7	41,4
Return on capital employed (ROCE)	*%*	9,4	9,5	9,5
Personnel expenses	*€ bn*	3,724	3,829	3,536
Personnel expenses (per employee)	*1,000 €*	62,4	64,1	53,9
Pension costs	*€ million*	248	278	293
Donations	*€ million*	2,7	2,4	2,8

Table 4. The Gases Division performance of the Linde

Gases Division: Revenue and Operating Profit by Segment						
	January to March 2016			*January to March 2017*		
in € million	*Revenue*	*Operating profit*	*Operating margin in %*	*Revenue*	*Operating profit*	*Operating margin in %*
EMEA	1,410	430	30.5	1,478	462	31.3
Asia/ Pacific	969	254	26.2	1,073	268	25.0
Americas	1,284	322	25.1	1,297	323	24.9
Consolidation	-42	-	-	-49	-	-
GASES DIVISION	**3,621**	**1,006**	**27.8**	**3,799**	**1,053**	**27.7**

Revenue on a Comparable Basis by Segment						
in € million	*31.03.2016*	*31.03.2017*	*Exchange rate effect*	*Currency-adjusted revenue trend in %*	*Effect at natural gas prices*	*Revenue trend on a comparable basis in %*
Gases Division	3,621	3,799	101	2.1	44	0.9
EMEA	1,410	1,478	-2	5.0	8	4.4
Asia/ Pacific	969	1,073	44	5.9	10	4.9
Americas	1,284	1,297	59	-3.4	26	-5.3

Table 5. The Engineering Division performance of the Linde

Engineering Division		
	January to March	
in € million	*2016*	*2017*
Revenue	568	648
Order intake	310	457
Order backlog at 31.12./31.03.	4,386	4168
Operating profit	46	53
Operating margin	8.1%	8.2%

Engineering Division: Revenue and Order Intake by Plant Type				
	Revenue		*Order intake*	
in € million	*31.03.2016*	*31.03.2017*	*31.03.2016*	*31.03.2017*
Olefin plants	193	246	38	61
Natural gas plants	114	163	26	132
Air separation plants	78	125	151	185
Hydrogen and synthesis gas plants	141	66	57	33
Other	42	48	38	46
ENGINEERING DIVISION	**568**	**648**	**310**	**457**

Table 6. Linde cash flow statement as of 2016

in EUR m	*2015*	*2016*	*Absolute change*	*Change in percent*
OPERATING PROFIT	4,087	4,098	11	0.3
Change in working capital	59	279	220	-
Income taxes paid	-532	-446	86	16.2
Other changes	-31	-531	-500	-
CASH FLOW FROM OPERATING ACTIVITIES	3,583	3,400	-183	-5.1
Cash outflow for investments in tangible assets, intangible assets and financial assets (excluding securities)	-1,952	-1,836	116	5.9
Payments for investments in consolidated companies	-113	-250	-137	-
Cash inflows from the disposal of assets	186	323	137	73.7
OPERATING FREE CASH FLOW	1,704	1,637	-67	-3.9
Payments for/proceeds from investments in securities	99	291	192	-
Net cash inflows/outflows from the proceeds/repayment of loans and capital market debt	-434	-763	-329	-75.8
Dividend payments to Linde AG shareholders and non-controlling interests	-701	-765	-64	-9.1
Net interest payments for financial debt and interest rate derivatives	-364	-347	17	4.7
Other changes	-24	-21	3	12.5
CHANGE IN CASH AND CASH EQUIVALENTS	280	32	-248	-88.6

Statement of Authorship

I hereby certify this Master thesis presented here has been composed by myself and is the result of my own investigations, unless otherwise acknowledged in the text. All references and all sources of information have been specifically acknowledged. This thesis has not been submitted, either in part or whole, for a degree at this or any other University. This work has not been published.

Mittweida, 27th December 2017

Olena Tisova