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## UPDATE ON 'TARGETS AND IMPACTS OF CHINESE DIRECT INVESTMENTS IN GERMANY'

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*Abstract: The This paper compares findings from two scholarly investigations conducted in 2019 and 2022, exploring the logic and financial repercussions of China's direct investments in Germany. The initial study, undertaken in 2019, aimed to differentiate Chinese investments from other international investments within Germany, examining hypotheses concerning aspects like corporate expansion, financial success, and exposure to risk. Through the application of regression analysis, this research did not uncover significant disparities in these parameters among firms acquired by Chinese entities compared to other international investors. Notably, it observed a tendency among Chinese investors to favour transactions involving assets, frequently associated with companies facing insolvency. In 2022, a subsequent investigation utilized both descriptive and multivariate statistical methods to reassess these elements. Aligning with prior results, traditional financial measures such as corporate growth, profitability, and risk did not substantially affect the probability of acquisitions by Chinese investors.*

*The uniformity of these outcomes in both studies suggests that solely financial indicators do not fully account for the decision-making process in Chinese investments in Germany.*

*Keywords: FDI, China, Acquisitions, Update*

### Summary: 2019 Study

The academic article 'Targets and Impact of Chinese Direct Investment in Germany – An Empirical Analysis by Löchel/Sächtig published in 2019 was dedicated to the ongoing debate regarding the rationality of Chinese direct investment in Germany. The focus of the study was on the question of whether Chinese investments have an economic significance that distinguishes them significantly from other foreign direct investments in Germany. In addition, the study analysed the development of companies with Chinese direct investments in comparison to their previous development.

### Hypothesis Testing

The authors first formulated hypotheses postulating an interaction between direct investment and economic characteristics. These hypotheses were tested using a comparison group to find out whether Chinese investments are economically unique. The hypotheses formulated are as follows:

H1: The growth of a company has a positive influence on the likelihood of being acquired by a Chinese investor.

H2: The profitability of a company has a positive influence on the likelihood of being acquired by a Chinese investor.

H3: Lower business risk has a positive influence on the likelihood that a company is acquired by a Chinese investor.

To test these hypotheses, the authors utilised a regression analysis and used various economic indicators such as the number of employees, gross profit, EBITDA, equity ratio, and total assets as independent variables. The dependent variable was coded binary and represented differences between the two categories "Chinese target" and "other target" of the companies. The study chose a multilevel analysis with random slopes as the statistical method. The three-level model showed the highest explanatory power based on Akaike (AIC) and Bayesian information criterion (BIC) values and confirmed the absence of multicollinearity.

The results of the hypothesis testing showed that none of the formulated hypotheses could be significantly confirmed: No significant differences were found in the growth, profitability, or business risk of companies acquired by Chinese investors compared to other foreign investors.

The study also analysed other independent variables such as the type of deal and the accounting standard. A positive correlation was found between the probability of a company being acquired by a Chinese investor and asset deals. This might be due to the fact that Chinese investors often acquire insolvent companies, which in most cases are handled as asset deals.

### Post-Merger Analysis

The article went on to analyse the development of Chinese-invested companies in Germany following mergers. This involved a comparison of the companies over a period of four years before the takeover and five years after the takeover. The analysis focussed on economic indicators such as growth, profitability, and business risk.

The evaluation of the post-merger analysis shows mixed results. While some economic indicators such as gross profit and number of employees showed positive trends before the takeover and negative trends after the takeover, other indicators such as total assets, equity, and EBITDA showed negative trends before the takeover and positive trends afterwards. Business risk and profitability show a tendency to improve after the takeover.

### Conclusion of previous research

Ultimately, the article concludes that despite the lack of significant differences between Chinese and other foreign investments in Germany in terms of growth, profitability, and business risk, the observed development of Chinese-invested companies after the takeover appears to be positive. However, it should be noted that the period analysed includes the financial and economic crisis of 2008, which may have influenced the results.

Overall, the study provided insights into the rationality of Chinese direct investment in Germany and suggests that Chinese investors may follow similar economic and business strategies as other foreign investors. Furthermore, the study emphasised the positive contribution of Chinese direct investments to Germany's economic development, especially through acquisitions of companies facing insolvency.

## Results of the Second Wave

In 2023, an additional study was conducted taking into account transactions until end of December 2022 and the obtained results were compared with the findings from the previous study conducted in 2018. This analysis considered a variety of variables that could potentially influence acquisitions by Chinese investors.

### Descriptive Statistics

The analysis began with descriptive statistics, examining the distribution of the dependent variable ("acquisition by Chinese investors") over time. It was observed that the distribution of values "0" and "1" in the target variable remained constant over time. This suggests that the dependent variable remained stable across all companies throughout the various periods.

Subsequently, an examination of the distribution of metric independent variables across different years was conducted, revealing differences between the years, particularly in terms of means. These differences could indicate the presence of outliers in the data. To address this issue, various data cleaning methods were applied, including the removal of extreme outliers and the application of the winsorizing method to limit outliers to less extreme values.

Categorical independent variables, such as industry, type of transaction, billing, and deal, were visualised using bar charts. It was observed that some industries were more frequently represented than others, while the categories "billing" and "deal" exhibited largely uniform distributions. It was noted that categorical variables remained constant over time, indicating that the attribute values of the companies did not change significantly.

### Multivariate Statistics

In the next step, a logit model and a mixed model were computed and modelled to analyse the data. The primary objective of this analysis was to explain the binary dependent variable "target", incorporating five metric and four categorical independent variables into the model.

Given that measurements for a specific ID were considered dependent on each other, a multilevel model was employed, with IDs integrated as a second level into the model. Initially, a simple logit model was estimated to provide an initial overview of the data. This model was chosen due to the binary distribution of the dependent variable.

The interpretation of the estimated parameters in the logit model was facilitated by calculating the odds ratio of the coefficients to analyse their effects on the probability of the dependent variable. An odds ratio below 1 suggests a lower likelihood of the value "1" compared to the value "0", while an odds ratio above 1 indicates a higher likelihood of the value "1".

The model's goodness-of-fit was assessed using information criteria such as AIC and BIC, where smaller values suggest a better-fitting model. It was found that models with and without winsorization of the data yielded similar results and comparable information criteria.

The analysis of categorical variables revealed that certain industries and the "deal" variable had a significant impact on the dependent variable, while the metric variables did not exhibit significant effects. Multicollinearity was also explored, with no problematic values identified.

Finally, a mixed model was applied to better account for dependencies in the data, incorporating multiple levels into the model, including ID and industry as additional levels. The results of the mixed model displayed similar patterns to the simple logit model.

*Table 1. Results of the regression analysis*

| | Modell 1 | Modell 2 | Modell 3 | Modell 4 |
|---|---|---|---|---|
| Rohertrag | 0,192 | 0,111 | 0,205 | 0,324 |
| EBITDA | 0,024 | -0,049 | 0,037 | -0,031 |
| Bilanzsumme | -1,190 | -0,999 | -0,435 | -0,127 |
| Mitarbeiter | -1,420 | 3,810 | -1,240 | -2,500 |
| Eigenkapital | -0,052 | -0,278 | 0,064 | 0,086 |
| Abschlussart (1) | 0,717 | 4,130 | 1,630 | 1,100 |
| Rechnungslegungsart (1) | 4,990 | 5,660 | 6,140 | 1,270 |
| Deakart (1) | 17,200*** | 17,200** | 15,000** | 16,600** |
| | | | | |
| Branchen | | | | |
| Bau | 3,570 | -9,880 | 2,460 | 3,970 |
| Chemie | 0,241 | 4,600 | 1,700 | 4,580 |
| Elektronik | -11,700 | -6,090 | -9,580 | -9,760 |
| Energie | -11,700* | -11,200* | 12,700** | -10,400* |
| Healthcare | -12,800*** | -9,520* | -14,100** | -8,520* |
| Infrstruktur | 0,426 | 4,150 | 1,240 | 5,700 |
| Maschinenbau | -14,000*** | -9,330*** | -13,200*** | -10,200*** |
| Metallverarbeitung | -13,700*** | -7,450* | -13,400*** | -8,930** |
| Nachrung | -15,900*** | -13,100 | -15,600 | -10,600 |
| Textil | -14,700*** | -1,850 | -6,150 | -7,160 |
| Verarbeitendes Gewerbe (Holz) | 7,030 | -7,500 | 1,580 | 4,910 |
| | | | | |
| Log Likelihood | -151,000 | -158,000 | -152,000 | -154,000 |
| AIC | 344,000 | 357,000 | 348,000 | 352,000 |
| BIC | 443,000 | 455,000 | 450,000 | 454,000 |
| | | | | |
| Stichprobe | 789 | 789 | 789 | 789 |
| Note | *p<0,1; **p<0,05; *** p<0,01 | | | |

In summary, the analysis revealed that the growth, profitability, and business risk of a company alone did not have significant effects on the likelihood of being acquired by Chinese investors.

**Hypothesis Testing**

H1: The growth of a company has a positive influence on the likelihood of being acquired by a Chinese investor.

The analysis did not reveal significant effects of the metric variables (growth) on the likelihood of being acquired by Chinese investors. Therefore, this hypothesis cannot be confirmed.

H2: The profitability of a company has a positive influence on the likelihood of being acquired by a Chinese investor.

Similar to H1, the metric variables (profitability) did not exhibit significant effects on the

likelihood of being acquired by Chinese investors. Hence, this hypothesis also cannot be confirmed.

H3: Lower business risk has a positive influence on the likelihood that a company is acquired by a Chinese investor.

The analysis did not demonstrate significant effects of the metric variable (business risk) on the likelihood of acquisition. Thus, H3 cannot be confirmed either.

Overall, it can be concluded that the acquisition of companies by Chinese investors in the available data is not significantly influenced by the growth, profitability, or business risk of the companies. Other factors not considered in this analysis appear to play a more significant role.

### Differences and Similarities

Analysing the results from the two waves of the survey in 2018 and 2022 revealed some similarities and differences with regard to the factors that influence the acquisition of companies by Chinese investors.

One important similarity was that none of the hypotheses relating to growth, profitability, and business risk could be significantly confirmed in both survey waves. Neither the growth, profitability, nor business risk of the companies showed significant effects on the likelihood of a takeover by Chinese investors. This suggests that these financial metrics alone are not sufficient to explain Chinese investors' interest in German companies.

Another common finding was that the industry and the type of deal were significant factors influencing the likelihood of a takeover by Chinese investors. Certain sectors, such as electronics, energy, healthcare, mechanical engineering, metal processing, food, and textiles, were more frequently targeted by Chinese investors in both waves of the survey. This suggests that sector affiliation has a decisive influence on Chinese investments and that this effect has remained stable over the years.

However, there were also differences in the specific sectors that were significant in each survey wave. In the first wave of the survey (2018), certain industries such as electronics, energy, healthcare, mechanical engineering, metal processing, food, and textiles were identified as being significantly positively influenced by Chinese investors. In the second wave of the survey (2022), the picture was slightly different, with some of the above-mentioned sectors remaining significant, while new sectors such as automotive and biomedicine (healthcare) saw a noticeable increase in significance. This suggests that the preferences of Chinese investors may have shifted slightly over time.

The type of deal, particularly asset deals, was found to be a significant influencing factor in both waves of the survey. Chinese investors apparently favoured asset deals, which could indicate a possible strategy in which they become active in crisis situations or in companies with special resource interests.

In addition, financial metrics (growth, profitability, business risk) alone were found to be insufficient to explain Chinese investors' decisions. This emphasises the importance of other, non-financial factors such as strategic goals, technology access, or market access in their decisions.

It is important to note that analysing the results also required some methodological considerations, including cleaning the data of outliers, applying multilevel models, and checking for multicollinearity. Overall, the results illustrate that the acquisition of companies by Chinese investors depends on a variety of complex factors that go beyond financial performance.

### Impulses for Future Studies

Identifying significant industries and their changes over time in relation to Chinese investment in German companies opens up a wide range of research opportunities and provides important

insights into the dynamics of the global economy. This research is of great importance as it can help to make informed economic and policy decisions for both Germany and China.

One promising research direction is an in-depth industry analysis. In this context, a more thorough examination of the reasons why certain sectors are more attractive to Chinese investors than others could provide important insights. This requires a deeper analysis of market trends, competitive environments, regulatory changes, and other factors that could influence these preferences.

Another important research direction is to analyse long-term trends in the investment activities of Chinese companies in Germany. Such an analysis could shed light on whether these are temporary shifts or long-lasting changes. Investment cycles and global economic developments could be tracked over the years.

It is also important to analyse the influence of global events on the preferences of Chinese investors. This includes analysing events such as trade wars, political tensions, or pandemics and could provide important insights into the impact of such events on investment decisions.

Qualitative research approaches, such as interviews with Chinese investors or German managers, could provide a deeper understanding of the underlying motives and decision-making processes behind investments and make the results of quantitative analyses easier to interpret.

Comparative studies between Germany and other European countries could show whether the preferences of Chinese investors in Germany are similar or different to their preferences in other European countries. This could reveal differences in investment strategies.

Another line of research is risk analysis, in which the influence of business and market risks on the investment decisions of Chinese companies is analysed. Such an analysis could contribute to the development of models for predicting investments and help to better manage risks.

It is equally important to analyse the impact of political decisions and geopolitical tensions on Chinese investments. This research could help to assess political risks and develop policy strategies.

Finally, research on the integration and management of acquired companies by Chinese investors could provide insights into the long-term impact of such transactions on the companies concerned.

These different lines of research could help to develop a more comprehensive understanding of the dynamics of Chinese investment in Germany. This in turn could serve as a basis for informed economic and political decisions, which are of great importance for both Germany and China.

**REFERENCES**
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## АКТУАЛИЗАЦИЯ НА ЦЕЛИТЕ И ВЪЗДЕЙСТВИЕТО НА ПРЕКИТЕ КИТАЙСКИ ИНВЕСТИЦИИ В ГЕРМАНИЯ

*Резюме: В статията се сравняват резултатите от две научни изследвания, проведени през 2019 г. и 2022 г., в които се изследват логиката и финансовите последици от преките инвестиции на Китай в Германия. Първоначалното проучване, проведено през 2019 г., имаше за цел да разграничи китайските инвестиции от други международни инвестиции в Германия, като разгледа хипотези, отнасящи се до аспекти като корпоративна експанзия, финансов успех и излагане на риск. Чрез прилагането на регресионен анализ това изследване не разкри значителни различия в тези параметри сред фирмите, придобити от китайски субекти, в сравнение с други международни инвеститори. По-специално при китайските инвеститори се наблюдава тенденция да предпочитат транзакции, включващи активи, често свързани с дружества, изправени пред несъстоятелност. През 2022 г. в последващо*

*проучване бяха използвани както описателни, така и многомерни статистически методи за повторна оценка на тези елементи. В съответствие с предишните резултати традиционните финансови показатели, като например корпоративен растеж, рентабилност и риск, не повлияха съществено върху вероятността за придобиване от страна на китайските инвеститори.*

*Еднаквостта на тези резултати и в двете проучвания предполага, че единствено финансовите показатели не отчитат напълно процеса на вземане на решения при китайските инвестиции в Германия.*

***Ключови думи:*** *ПЧИ, Китай, придобивания, актуализация*

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