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Foreign Direct Investment, Corporate Finance, and the Life Cycle of Investment

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Abstract

This article discusses the effect of foreign direct investment on the corporate sector in the Czech Republic. The analysis uses subaggregated corporate data from a unique Deutsche Bundesbank database containing an almost complete sample of German enterprises that invested in the Czech Republic between 1996 and 2004. Attention was given to two issues: the role of intra-group financing in foreign-owned corporations and the life cycle of direct investments.

1. Introduction

The inflow of foreign direct investment (FDI) into the Czech Republic has been high in recent years. On average, it reached around 6.5 % of GDP in 1995–2006. Although part of the inflow has been due to the privatisation of state-owned enterprises, especially in the 1990s, a relatively large proportion of this investment has come in the form of acquisitions of private corporations or greenfield investments, particularly in recent years.

In this article, we analyze in detail two FDI-related phenomena, namely the sources of financing in companies founded through FDI, and the lifecycle of a direct investment. The analysis uses subaggregated corporate data on German direct investments in non-financial corporations in the Czech Republic between 1996 and 2004 from the MiDi database administered by Deutsche Bundesbank for the purposes of calculating Germany's financial account of balance of payments and its international investment position.

The available theoretical and empirical research has mainly discussed and quantified the positive effects of FDI on the performance of the domestic economy, including indirect effects on domestic companies, especially in the framework of supplier-customer relations ("spillovers"). The available evidence suggests strong direct positive effects on investment activity, employment, export performance and output growth (Jones, Wren, 2006). The existence of indirect effects of FDI in the new EU member states, including the Czech Republic, is suggested by a number of studies as well as by the available anecdotal evidence (Javorcik, 2004), (Torlak, 2004), (Geršl et al., 2007). From the macroeconomic perspective, FDI is known to be the least volatile form of capital flows (Taylor, Sarno, 1997).

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However, foreign direct investment can also introduce certain risks into the economy. The strengthened export orientation due to FDI increases the dependence of the domestic economy on the external environment and possibly also on global developments in those sectors where the investors operate, which may lead to higher volatility in the economy's performance (Bergin et al., 2006). In addition, transfers of profit from foreign-owned corporations may put pressure on the current account and exchange rate of the host economy (Geršl, 2007). The tendency of foreign companies to obtain funding for their operations within their group rather than from local banks may reduce the demand of large foreign-owned companies for loans on the local market. This slows the development of the domestic financial sector. Banks can respond to this by shifting to riskier small and medium-sized domestic enterprises, which often act as foreign companies' suppliers. This may increase credit risk within the loan portfolios of local banks. Moreover, a strong dependence of the economy on the performance of foreign companies founded as part of the relocation of production to lower-cost countries raises concerns regarding the effect of a potential outflow of these investments to countries with even lower wage and other costs. The available evidence suggests that a foreign investment can go through a lifecycle, at the final stage of which might be the liquidation (or further relocation) of the FDI.¹ Thus, a detailed analysis of performance and financing of FDI-based corporations, including their lifecycle positions, is needed for a balanced discussion of the effects of FDI on local economies.

This article partly relates to analysis conducted by Brada and Tomšík (2003) and Mandel and Tomšík (2006), who analyze the external balance of an economy from a life cycle point of view. They introduce a FDI financial lifecycle model (Brada, Tomšík, 2003, pp. 5-6) that explains profit development and its distribution into reinvested earnings and dividends over time. While in early stages of an FDI project the profits are negative or small, in later stages they increase but are reinvested. In the last (mature) stage the profits are repatriated to the foreign owner via dividends. Their empirical results confirm the model prediction, as they show that the older the FDI, the higher the repatriation of profits (while the newer the FDI, the higher the reinvested earnings in the income balance of the current account).

Our analysis differs from their work in four aspects: first, our research is based on corporate (albeit subaggregated) data from one country (Germany), while their analysis uses macroeconomic data on the balance of payments items. Second, our subaggregated corporate data allows us to conduct the analysis by "vintage" (i.e. the first year) of FDI inflows, information Brada and Tomšík (2003) were lacking in their analysis. Third, we have a slightly different focus: while Brada and Tomšík (2003) focus on the effects of FDI lifecycle on the volume of reinvested earnings in the current account balance (i.e. a macroeconomic variable), we focus more on the development of FDI projects on the micro-level and also include in the analysis variables other than profit, such as the use of intra-group financing in FDI-based companies. Fourth, in the case of profits, we explore a lifecycle in profitability and not in the distribution of profits into reinvested earnings and dividends.

¹ However, in this article we do not assess the likelihood and possible effects of liquidation of FDI on the host economy.

The analysis of intra-group financing is also conducted within a lifecycle model that is related to several stylized facts from both the corporate finance literature (Rajan, Zingales, 1995), (Bauer, 2004) and the anecdotal evidence.

This article is structured as follows: Section 2 describes the characteristics of German foreign direct investment. Section 3 discusses the role of intra-group financing and summarises the most important findings of the empirical analysis. Section 4 analyses the lifecycle of a foreign direct investment, including a panel regression. Section 5 concludes by summarising the results.

2. Foreign Direct Investment from Germany: Evidence from Project-level Data

Germany is one of the biggest investors in the Czech Republic. At the end of 2005 Germany's share in the stock of FDI was around 20 % (making it the second largest investor behind the Netherlands with 29 %), although a number of German corporations had invested in the Czech Republic indirectly via third parties registered, for example, in the Netherlands. In this article we focus only on non-financial corporations (i.e. excluding investment in banks, insurance companies and other financial intermediaries, where German enterprises are also active). Germany's share in the stock of FDI in the non-financial sector was roughly 24 % at the end of 2005, again behind the Netherlands (with around 32 %).²

The Deutsche Bundesbank's MiDi database covers all FDI of German companies in the Czech Republic according to a standard definition (a share in the company's capital of 10 % or more), including indirect holdings.³ However, only foreign direct investments in companies with total assets exceeding CZK 3 billion are recorded.⁴ The MiDi database is a unique database containing corporate information on the performance, assets and liabilities of the subsidiaries of German corporations abroad, including information on the financial relations between companies linked by participating interests.⁵ Although using only a sub-sample of FDI (with a German investor) reduces the information content of the results of the analysis for the whole sector of foreign companies operating in the Czech Republic, the relevance of Germany in the FDI stock allows us to some extent to apply the results to the economy in general.

² Data for 2006 were not available at the time this article was prepared.

³ See (Lipponer, 2006) for a description of the Deutsche Bundesbank MiDi (Microdatabase Direct Investment) database. The MiDi database has the advantage that it also includes companies indirectly owned by German companies, e.g. through holding companies or other entities founded, for example, for tax reasons in third countries such as the Netherlands. For indirect FDI holdings to be recorded, the German owner must have a majority participating interest in the intermediary company. If the investment is held through two intermediaries, it will be recorded in the database only if the first (majority-owned) intermediary owns 100 % of the second intermediary. The database also contains data on foreign direct investment in Germany.

⁴ This threshold has applied since 2001 but was changed frequently prior to that year. For example, between 1999 and 2001 all investments had to be reported wherever the total assets of the foreign company exceeded DM 1 million (for majority-owned companies) or DM 10 million (for investments representing more than 10 % but less than 50 % of capital). For this reason it is not possible simply to observe the evolution of aggregate data over time.

⁵ Individual data are protected and may not be published. Researchers and experts working with this database in Deutsche Bundesbank may – with the prior consent of Deutsche Bundesbank – publish only aggregate data and analyse results in a way preventing the calculation of individual data.

TABLE 1 Relevance of Companies with a German Foreign Direct Investor in the Czech Corporate Sector
(corporations from MiDi in % of corporations with 100 employees or more from CZSO)

	Assets	Turnover	Employment
Mining and quarrying	4.5	3.3	2.2
Manufacturing	24.4	24.5	18.4
Electricity, gas and water supply	29.1	24.9	22.0
Construction	6.6	6.6	5.5
Trade and repair	29.6	28.9	24.8
Transport and communications	7.9	5.2	4.0
Services*	92.6	32.0	4.8
Non-financial corporations sector. total	23.4	21.9	13.8

Note: * The high share of German companies in assets in the services sector is due to the inclusion of only large corporations (100 employees or more) from the CZSO database, whereas a large number of smaller companies are probably active in this sector.

Source: CZSO; Deutsche Bundesbank

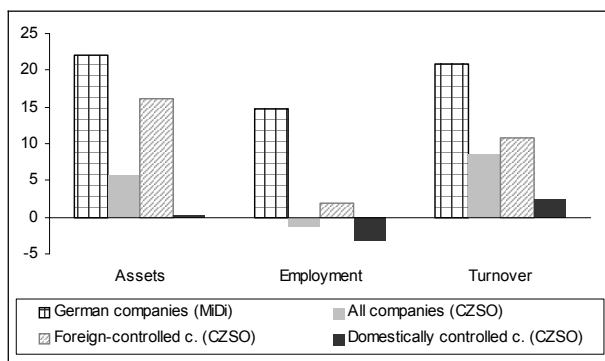
As at the end of 2004 the MiDi database included 718 Czech non-financial corporations with a German direct investor, around 50 % of which were active in manufacturing, 25 % in trade and roughly 20 % in transport, communications and services.⁶ Table 1 shows the relevance of companies with a direct investor from Germany compared to the aggregate data for the Czech corporate sector.⁷ Companies with a German investor accounted for around 25 % of assets in the Czech non-financial sector at the end of 2004, their shares in total turnover and employment being roughly 20 % and less than 15 % respectively. The relevance of German investment differs depending on the industry; German enterprises have particularly high shares in manufacturing, electricity, gas and water supply, trade and some services. The inflow of German FDI into the individual sectors was motivated both by efforts to gain market share (services, energy, trade) as well as by efforts to benefit from the low wage costs in the Czech Republic (manufacturing).

Figure 1 shows the average increase in the indicators of companies with a German investor between 2000 and 2004 by comparison with developments in Czech companies with 100 employees or more in the following categories: all companies, foreign-owned companies and domestic companies (including public enterprises). The averages of size and performance for German-owned companies generally increased after 2000 at a higher rate than those for other company categories. This may have been due to organic growth and an improving financial and economic situation of the existing enterprises with a German investor, but also to the exit of inferior companies and the entry of new, larger and better performing companies. This trend can also be explained in part by the privatisation of some large Czech companies to German corporations (e.g. Transgas) during this period.⁸

⁶ 2004 is the last year for which data are available; data for 2005 were available in the MiDi database only in the second half of 2007.

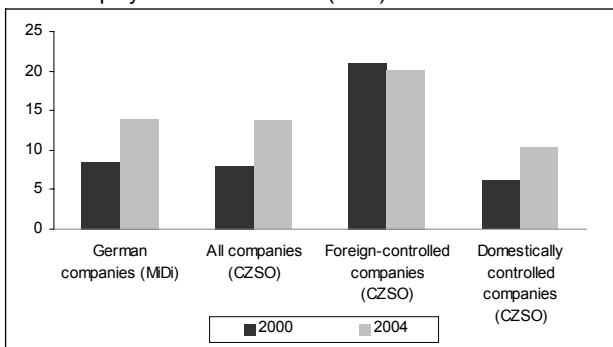
⁷ The data for the Czech corporate sector are published by the CZSO and only include companies with 100 employees or more. Thus, Table 1 slightly overestimates the relevance of German companies. For example, this is visible in the services sector, where many smaller enterprises are likely to operate. On the other hand, the reporting threshold for MiDi (total assets exceeding EUR 3 million) corrects this distortion somewhat, as large companies are likely to be recorded in the MiDi database as well.

FIGURE 1 Annual Growth in Company Performance Indicators 2000–2004 (average annual growth in %)



Source: CZSO; Deutsche Bundesbank

FIGURE 2 Return on Equity in 2000 and 2004 (in %)



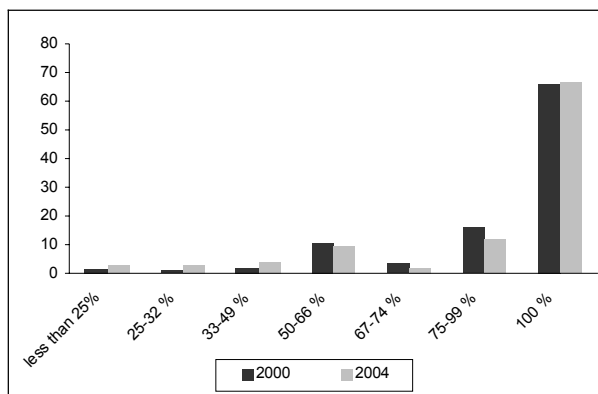
Source: CZSO; Deutsche Bundesbank

Figure 2 shows that companies with a German owner raised their profitability to a similar extent as larger companies in the Czech Republic in general, but still lag behind the average profitability of foreign-owned companies. The growth of companies with a German investor and the improvement in their profitability indicate that these enterprises are still in the growth phase of their lifecycle (see also Section 4 of this article).

For a host economy of FDI, the relevance of the foreign direct investment project for the parent company itself might be an important indicator of future development of the investment project. If the foreign investor controls the subsidiary (i.e. its share in the subsidiary's equity is higher than 50 %), the project could be considered as a strategic investment with prospects for further development in comparison with projects where the foreign investor holds only a minority share. In addition, the degree of control might influence the impact of foreign ownership on

⁸ The increase in the average company size may also have been due to a change in the asset threshold for FDI reporting in the MiDi database, which more than doubled in 2002.

FIGURE 3 Distribution of the German Investor's Share in the Equity of the Czech Subsidiary (in % of all FDI projects; x axis – share in equity, y axis – frequency)



Source: Deutsche Bundesbank

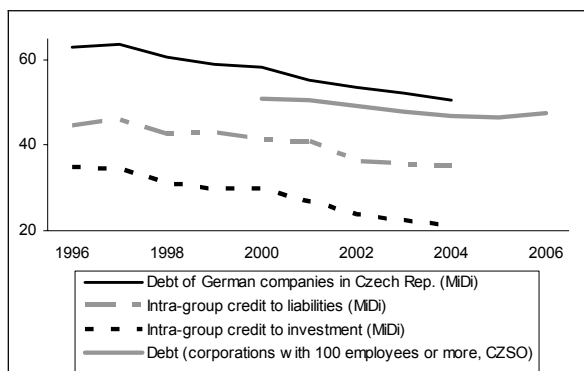
the performance and financing of the subsidiary. *Figure 3* shows the distribution of the German investor's share in the equity of the Czech subsidiary. Almost 70 % of Czech companies with a German investor are fully controlled by the parent company (the share equals 100 %), another 20 % are controlled through a majority share. *Figure 3* also shows that while the share of fully controlled subsidiaries did not change between 2000 and 2004, the distribution of other types of control has moved a bit towards minority shares. This could reflect a higher frequency of joint ventures and projects with minority participation of foreign (German) investors in the past few years related to an improved institutional environment and protection of minority shareholders.

3. Intra-group Financing and Its Determinants

Foreign-owned companies generally have the advantage of the possibility to use the parent company's financial resources (or intra-group credit) for development. Given that bank financing is for prudential reasons provided to companies with at least some history, subsidiary companies in early stages of development usually rely on intra-group financing. Thus, similarly to Brada and Tomšík (2003), we could introduce a three-stage model of the lifecycle in terms of financing. In the early stage of an FDI project, the new affiliate does not have any history and has low (or negative) profits, but needs to invest. For this stage, intra-group financing is the main source of financing.⁹ In the second stage, after the local affiliate builds some history, records positive profits and has some fixed assets to be put up as collateral, bank loans complement the intra-group credit. Higher efficiency and profitability, as well as the support provided by a foreign owner, put foreign-owned companies at an advantage in seeking external financing from banks (in terms of both the amount of

⁹ However, some foreign companies approach local banks to finance local affiliates, providing a explicit guarantee for the local loan. This is indirectly confirmed by the aggregate data on cross-border risk transfer, see (Geršl, 2007).

FIGURE 4 Total Debt and Intra-group Financing
(debt as the ratio of liabilities to total liabilities in %)



Source: CZSO; Deutsche Bundesbank

credit and its cost), as such companies rank among the least risky debtors. In the final stage, the remaining intra-group financing is replaced with banks loans, as the local affiliate is already able to show a positive credit history towards local banks and does not need explicit financial help from the owner. The foreign owner can thus redistribute its available financial resources towards other projects in the start-up stage.

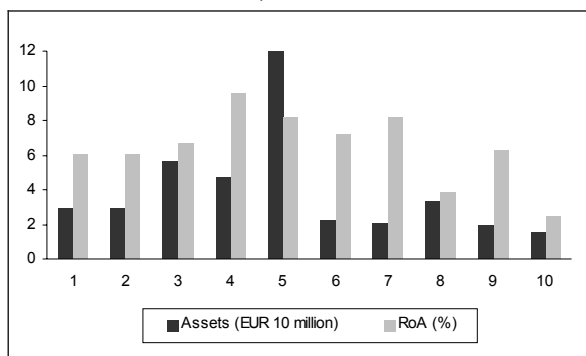
Figure 4 illustrates that the average debt ratio of companies with German investors was higher than that of all companies with 100 employees or more in the Czech Republic. Intra-group loans accounted for a large share of the debt (around 40 % of the total in 2004), with debt and the share of intra-group liabilities in debt both falling over time.

The degree of intra-group financing can depend on numerous factors. Some of the determinants can be connected with the company's characteristics and do not necessarily change over the life of the investment (financing strategy, influence of the parent company), while others are related to the lifecycle of the investment and therefore the optimum degree of financing by the parent company may change over time according to the above-described model. Factors on the external financing supply side, e.g. client interest rates and competition on the banking market, certainly also play a role.

Figure 5 shows that companies with a higher share of intra-group financing are, on average, smaller (have lower assets) and less profitable (as measured by return on assets), even though the influence of profitability is not completely non-linear. Smaller companies may rely more on financing from their parent company, as their size can work to their disadvantage on the loan market (due to a lack of fixed assets as potential collateral). On the other hand, Figure 5 may capture companies at different stages of the investment lifecycle. Companies in the initial stage, i.e. smaller and less profitable ones, use credit from the parent company, whereas companies in the later stage are larger, generate profit and tend to obtain financing for their operation from local banks.

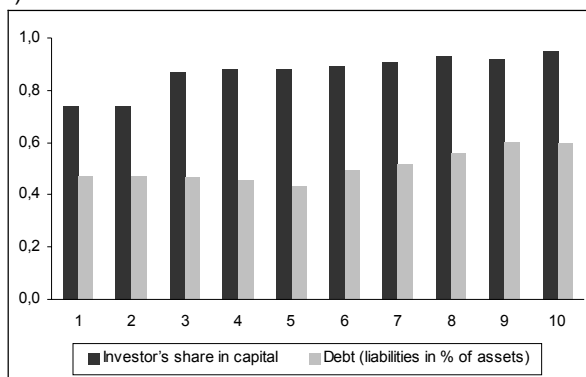
Figure 6 shows two other possible determinants of the degree of intra-group financing, namely the investor's share in the company's capital and the company's total debt. On average, companies in which the investor has a larger share of capital

FIGURE 5 Determinants of Degree of Intra-group Financing
(average values in deciles of distribution of degree of intra-group financing, 2004; RoA = return on assets)



Source: Deutsche Bundesbank

FIGURE 6 Determinants of Degree of Intra-group Financing II
(average values in deciles of distribution of degree of intra-group financing, 2004)



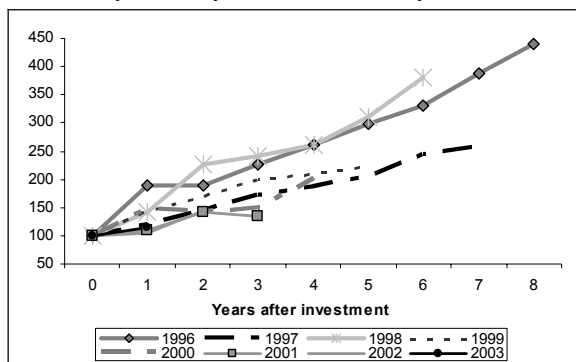
Source: Deutsche Bundesbank

use intra-group financing to a greater extent. This confirms the hypothesis that funds from the parent company are used as a financing instrument mainly where the parent company has a high degree of control of its investment. The company's total debt is another important determinant: companies with higher debt use funds from the parent company to a greater extent. Again, this may be related to the investment lifecycle, as a company in the initial stages of its development has higher debt and secures funds for its development from the foreign direct investor rather than from local banks. The lifecycle of an investment is discussed in detail in the following part of this article.

4. The Lifecycle of a Foreign Direct Investment

The evolution of the financial indicators of FDI for foreign-owned companies described in Sections 2 and 3 was analysed by comparing the averages for the companies existing in the individual years. The changes in profitability or financing may

FIGURE 7 Evolution of Assets after Investment
(broken down by the first year of investment ; year zero of investment = 100)



Note: Series 2001 and 2002 overlap for years 1 and 2, series 1997 and 2003 for year 1.

Source: Deutsche Bundesbank

thus have been due to the entry or exit of investors and therefore do not capture the typical evolution of an average foreign direct investment. Nor is the comparison of the profitability and other financial ratios for German investments with ratios for corporations under domestic control entirely conclusive, as the higher profitability of German enterprises may be due to the fact that foreign investors acquired more profitable companies (“cherry picking”).

In this section, the financial ratios are calculated over time for the same sample of companies.¹⁰ Companies for which records are available for the whole time span of the investment were selected from the MiDi database. Companies with a complicated ownership structure (i.e. those where the subsidiary has more than one owner or one foreign company owns more than one Czech company) were excluded.¹¹ Companies were sorted by the year the German owner made the investment in the Czech Republic (i.e. what we get is a kind of “vintage” breakdown, for example projects established in 1997 or 1998, etc.).¹² This breakdown enables us to assess the evolution of the characteristics of an investment over its lifecycle. The simple descriptive analysis of the role of the lifecycle for the development of the financial indicators is then supplemented by econometric analysis in Section 5.

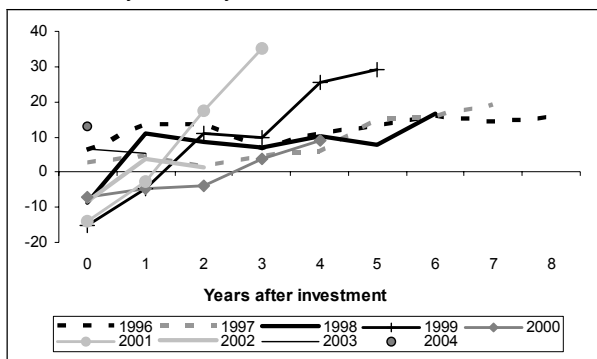
Following the commencement of an investment, companies with a German owner typically record further growth in assets (see *Figure 7*). Six to nine years following the commencement of a foreign investment, assets had risen roughly two to four times. The increase in assets occurs with various intensities for investments from

¹⁰ The variables were first summed up over the whole sample of companies and then the financial ratios were calculated. Thus, it does not represent the average. Use of the average would cause problems of outliers which could distort the average value.

¹¹ Especially in the case of companies where one parent company owns more than one subsidiary, individual data may be affected by potential transfers of production and profit between subsidiaries.

¹² The first year of the firm’s existence in the database is regarded as the year when the foreign owner made the investment. Data for companies entering in 1996 are an exception, as they also include all German companies that invested before 1996 (1996 is the first year of the database). The numbers of projects aggregated in individual vintages are as follows: vintage 1996 (86 projects), 1997 (17), 1998 (15), 1999 (18), 2000 (18), 2001 (19), 2002 (13), 2003 (15) and 2004 (11 projects).

FIGURE 8 Evolution of Profitability (RoE) after Foreign Investment
(broken down by the first year of investment; RoE = return on equity, in %)



Source: Deutsche Bundesbank

all years. The additional investment in assets is generally distributed quite evenly over time. Current assets usually dominate the structure of the asset growth, followed by tangible and intangible fixed assets, whose rate of growth is also above average. Growth in financial assets is the lowest.

So far, the data on asset growth do not indicate any turning point in the FDI lifecycle, as assets are continuing to grow even for relatively old investments (eight years and older). Thus a significant outflow of assets from foreign-owned companies and FDI in general probably cannot be expected in the short to medium term.¹³

The evolution of return on equity (RoE) in the individual groups of companies according to the year the investment was made (see *Figure 8*) suggests that the profitability of a foreign direct investment usually goes through a cycle. In the case of acquisitions of domestic companies by a German investor, this would confirm the hypothesis that the entry of a foreign owner has led to a rise in the profitability of the subsidiaries in the Czech Republic.¹⁴ Many investments of this type were designed as restructuring investments where investors picked loss-making companies with potential for growth. In the case of greenfield investments, the evolution of RoE reflects high start-up costs, connected with higher depreciation of fixed assets and still low turnover due to the gradual launching of production. *Figure 8* also shows that the increase in profitability was sharper in companies which had recorded relatively high losses at the beginning of the investment (investments in 1999 and 2001).¹⁵

¹³ This conclusion applies if a relatively long time remains until the end of the period under review. It is also conditional on the sector structure of FDI. It can be assumed that investment motivated primarily by lower wages of employees with a lower standard of human capital can move quite quickly (see also the discussion in Section 2 and *Table 1*). More detailed evidence on the sector structure of investment in manufacturing indicates that German FDI in the Czech Republic has tended to go into facilities with a higher share of value added.

¹⁴ Unfortunately, the MiDi database does not indicate whether the investment was made by acquiring an existing Czech company or in the form of a greenfield investment. Anecdotal evidence suggests that both types of FDI were made in the past.

¹⁵ The high increase in RoE in these companies is to some extent due to their low initial equity, which is the denominator in the RoE ratio. An improvement in the absolute level of profit is thus reflected in a rise in RoE, which is much more significant owing to high leverage.

The comparison also reveals that profitability decreases in some companies after the second or third year. This may be due to additional development of the company and ensuing higher investment costs. Such a decrease occurs more often in companies with higher initial profitability. However, this slight decline in profitability could be explained also by accumulation of the profits in previous years. If the parent company decides in the early stages of the investment not to distribute profit, this would increase the equity of the subsidiary. Given the fact that the positive effects of the foreign presence on profitability are often one-off, this increase of equity leads to a decrease of profitability.

Figure 8 also shows that the potential for further growth in profitability is somewhat exhausted at a longer time horizon after the commencement of the investment (six to eight years), even though profitability remains relatively high. Overall, it can be expected that the impulse to corporate profitability from foreign direct investment will continue into the future, but it will be somewhat weaker than in the past.

In the case of investments taking the form of the acquisition of a Czech company by a German investor, the changes in profitability resulting from the entry of the foreign partner can be analysed by breaking down RoE into three basic components.¹⁶ The first component is the change in return on sales, which indicates the company's ability to generate profit from a given volume of sales. Thus the role of the foreign investor consists in introducing new technology, streamlining production and improving overall labor productivity. Another component is the effect of debt. If debt rises, leverage is strengthened, which leads to an increase in RoE given an unchanged return on assets. The foreign owner can thus contribute to an increase in RoE by providing funds, by providing an implicit or explicit guarantee for a loan to the subsidiary or by generally enhancing the creditworthiness of the subsidiary in the eyes of creditors. The third channel for increasing profitability is a reduction in the assets turnover ratio, which leads to more efficient use of the company's assets to generate sales. The foreign owner can contribute to an increase in profitability by penetrating new markets and thereby boosting sales, or by more efficient use of existing assets (e.g. modern inventory management methods, sale of unusable assets, etc.).

As shown in *Table 2*, growth in RoE has mostly been driven by increases in return on sales. The influence of debt has been relatively low (perhaps with the exception of investments made in 1996). In some years, however, the positive effect of a decrease in the assets turnover ratio was fairly significant (1999 and 2000 vintages). This was probably linked chiefly with an increase in the companies' sales. The rise in the assets turnover ratio for the 1996 and 1998 vintages, which made a negative contribution to overall profitability, can be explained by additional investment of these companies, which had yet to generate sufficient sales.

In addition to growth in assets and profitability over the investment lifecycle, the structure of balance-sheet liabilities of the subsidiaries of German investors in

¹⁶ The following relationship holds:

$$RoE = \frac{profit}{equity} = \frac{profit}{sales} \cdot \frac{sales}{assets} \cdot \frac{assets}{equity} = Return\ on\ Sales \cdot \frac{360}{assets\ turnover} \cdot \frac{1}{1 - debt}$$

The change in RoE can be thus approximated by the change in return on sales, the change in the inverse of the assets turnover ratio and the percentage change in the inverse of the ratio of equity to assets. This approximation is not entirely accurate, with the "residual" in *Table 2* reflecting the error of this estimate.

TABLE 2 Contributions of Individual Factors to the Change in RoE over Three Years after Investment
(in percentage points)

Vintage	Total change in RoE	Contributions in percentage points			
		Return on sales	Financial leverage	Assets turnover ratio	Residual - combined effect
1996	0.1	1.1	1.3	-1.5	-0.7
1997	1.6	2.6	-0.6	0.1	-0.4
1998	15.6	16.3	-0.1	-1.9	1.3
1999	25.0	41.5	-11.3	67.6	-72.8
2000	10.9	8.4	0.6	3.7	-1.8
2001	49.1	22.5	3.5	0.9	22.4

Source: Deutsche Bundesbank

the Czech Republic was also analysed. In most cases, the share of the foreign company in the equity of the subsidiary¹⁷ showed an upward tendency within three years of the investment as foreign companies expanded their influence over their subsidiaries (see *Figure 9*).¹⁸ Five to seven years following the commencement of the investment, the German owners' share in equity in some companies had declined slightly, perhaps reflecting the start of an outflow of profits to Germany. Another explanation relates to the lifecycle model. In the early stages after investment the stocks of the subsidiary might be undervalued. The investor could thus eventually buy them due to "speculative" reasons (as a sort of "portfolio" investment), believing in the positive effect of its own actions. This "speculative" part of the investment could then be sold after restructuring of the subsidiary.

In most cases, the total indebtedness of the subsidiary declined over the time span of the German investments. However, loans from the parent company (which are also included in the FDI statistics) also appear within the subsidiaries' external funds. As shown in *Figure 10*, the share of loans from the parent company in total external funds increased in many companies. Where the investment was made in the form of an acquisition, loans from the foreign parent company may have crowded out bank loans (see also Section 3 of this article).¹⁹ In the case of greenfield investment, *Figure 10* partly confirms the prediction of the lifecycle model introduced in Section 3, as for a number of vintages of FDI from Germany the share of intra-group credit first increased and later declined (with the notable exception of the 1996 and 1997 vintages).

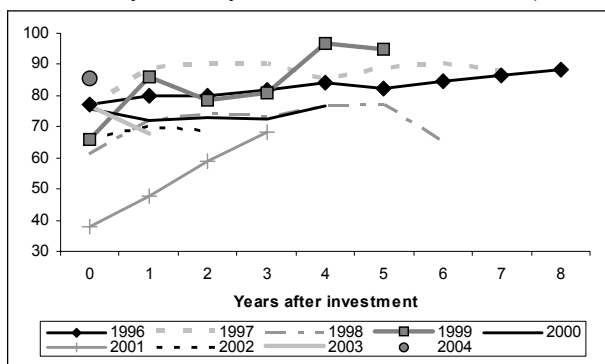
One of the factors that might have contributed to a decrease in the use of intra-group credit could also be macroeconomic stability in the Czech Republic and very

¹⁷ I.e. the share of the parent company in capital plus its shares in retained earnings, profit for the current financial year and capital funds.

¹⁸ This growth in the investor's share was partly voluntary, but may also have been due partly to mandatory purchase offers for listed companies.

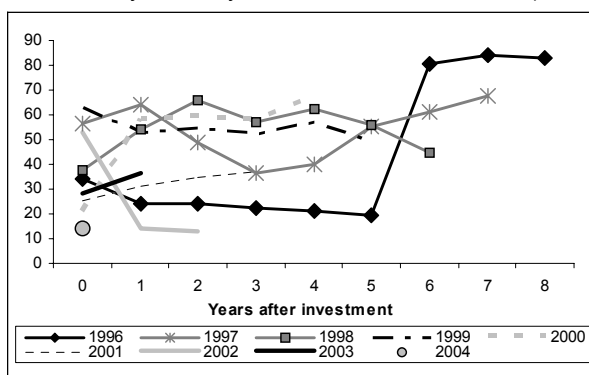
¹⁹ However, it is difficult to determine whether the higher share of loans from the parent company is due to the complicated access of the subsidiaries to loans ("credit crunch") or whether loans from the parent company crowd out bank loans in a situation where banks would be willing to lend. It can be assumed that the former reason prevailed in the initial stages of foreign investments, when FDI contributed significantly to the removal of market imperfections and offered a valuable alternative to bank financing. This motivation is probably somewhat weaker now.

FIGURE 9 The Parent Company's Share in the Equity of the Subsidiary (broken down by the first year of investment; share in %)



Source: Deutsche Bundesbank

FIGURE 10 Share of Debt to the Parent Company in Total Debt (broken down by the first year of investment; share in %)



Source: Deutsche Bundesbank

low interest rates, which are currently even lower than in the euro area. This negative interest rate spread motivates the subsidiaries of foreign companies to draw loans from local banks (with a guarantee provided by the foreign company) to a greater extent than would otherwise be the case according to the lifecycle model.

5. Econometric Testing of the Lifecycle Model

In this section, we estimate three equations in which we related a financial ratio (growth in assets, return on equity and the share of intra-group credit in liabilities) of an FDI vintage to a number of explanatory variables. These variables include (i) duration (number of years of the investment vintage) and the squared duration to capture the non-linearity of the lifecycle, (ii) the investment vintage characteristics related to the direct investment (the parent company's share in the equity of the local affiliate, the share of total direct investment including intra-group credit in total assets, the share of intra-group credit in the direct investment), (iii) characteristics related to the local affiliates (debt over total liabilities, assets turnover ratio, return on

assets) and (iv) macroeconomic variables (GDP growth, inflation, three-month money market spread between CZK and EUR/DM).

The data constitute an unbalanced panel of nine vintages, with the 1996 vintage lasting for nine years, the 1997 vintage lasting for eight years, etc., totalling 45 observations.²⁰ To avoid possible endogeneity, the three independent variables are not used as explanatory variables in the other two regressions. Moreover, to eliminate the possibility that the development of the vintage only reflects the development of the whole economy, the dependent variables total assets and return on equity (as well as the explanatory variables debt and assets turnover ratio) are expressed in relative terms to the total corporate sector's average development.²¹ The regressions are estimated using a fixed-effect panel estimator.²² Given the relatively low number of observations, the regression results must be taken with caution.

Table 3 shows that in the case of return on equity, the lifecycle effect seems to exist, as the squared duration is significant. Thus, the RoE might first increase to decline in later stages (after approximately six years). Similarly, the lifecycle of the investment seems to influence the share of intra-group credit in total liabilities. Here the share of the investor in the liabilities declines and stabilises after four years. As far as the index of assets is concerned, the quadratic term is not significant. This confirms the conclusion from graphical analysis indicating that the lifecycle of the investment has not yet reached any turning point.

The higher increase of assets in FDI-based companies when compared to the economy's average can also be explained by higher leverage, while other variables do not seem to have any effect.

The relative return on equity is positively influenced by the share of direct investment in total liabilities (i.e. total financial resources from the parent company), relative leverage and inflation, and negatively by the parent company's share in equity, the share of intra-group credit in total investment and the assets turnover ratio. Greater financial resources and higher leverage enable the local affiliate to multiply the ability to generate profit, while a lower assets turnover ratio reflects the efficient use of assets to generate sales. The negative effect of the share of intra-group credit in total investment (that is in effect used as a proxy for the relevance of intra-group credit to avoid endogeneity) can be explained by the lifecycle model in addition to the effect captured by the variable duration, as the number of years is relatively small for some of the vintages. Companies with a higher degree of intra-group financing are still in the early stage of the lifecycle with negative or low profitability and a high need for financing their investments.

²⁰ The data underlying the aggregate variables related to FDI vintages are individual project-level data that would be ideal to analyze in a panel data framework. However, due to confidentiality reasons, for the purpose of this article we could work only with aggregates. There is another ongoing research project of the authors that will be based on micro-level data and will provide a welcomed deepening of the analysis.

²¹ Thus, in the case of assets, an index of increase was built both for a vintage and for an average corporation in the Czech economy over the time span of the vintage, using the Czech Statistical Office data, and the resulting relative index was calculated as a ratio of the index of the FDI vintage to the index of the Czech corporate sector. In the case of RoE, debt and assets turnover ratio, the relative variable was calculated by subtracting the average Czech corporate value in the given year from the FDI vintage value.

²² Hausmann indicated that a fixed-effect model is appropriate.

TABLE 3 Regression Results

	Index of assets (relative)	Return on equity (relative)	Intra-group credit (in liabilities)
Duration	24.33*** (-8.64)	16.74*** (-2.47)	-18.95*** (-5.71)
Duration squared	0.806 (-1.09)	-1.416*** (-0.31)	2.419*** (-0.51)
Share of parent company	-69.86 (-147)	-101.1** (-44.1)	184.8*** (-59.2)
Direct investment (in % of total liabilities)	11.35 (-44.7)	141.2*** (-24.9)	
Intra-group credit (in direct investment)		-127.8*** (-27.5)	
Debt (relative)	1.758** (-0.83)	1.454*** (-0.41)	
Debt			1.057** (-0.48)
Assets turnover ratio (relative)	0.0154 (-0.076)	-0.0801*** (-0.022)	
Return on assets			178.4 (-114)
CPI	5.903 (-3.79)	3.128*** (-1.08)	-1.554 (-2)
GDP	-1.285 (-4.15)	-1.046 (-1.19)	-3.668* (-2.03)
3M interest rate spread	-3.52 (-3.2)	-0.824 (-0.91)	0.0623 (-1.85)
Constant	0.989 (-144)	-52.95 (-41.3)	-155.4** (-61.2)
Observations	45	45	45
Number of id	9	9	9
R-squared	0,92	0,88	0,63

Note: Standard errors in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1; estimated using the fixed-effect estimator as an unbalanced panel.

In addition to the non-linear effect of duration of the investment, intra-group credit is positively associated with the parent company's share in the local affiliates. This is in line with expectations, since only if the foreign owner can fully control the investment, it will provide financing for its development. The results also reveal that the degree of intra-group financing is higher in companies with higher leverage. This would suggest that parent companies supply intra-group loans only if the local subsidiary needs a relatively high degree of financing. Finally, the negative effect of GDP growth suggests that intra-group loans may serve as a substitute for loans from local banks in times of economic recession. In years in which GDP growth decelerated and local banks were thus less keen on lending to the corporate sector, the foreign-owned companies in the early stages of the lifecycle might have turned to their owners for the needed financing. Interestingly, the interest rate spread does not have any effect. However, this could be due to the time coverage only until 2004, as the period of the negative interest rate spread has been more prevalent in the subsequent three years.

6. Conclusions

The results of the analysis confirm the hypothesis that where FDI took the form of an acquisition of a Czech company, the entry of the foreign owner resulted in an increase in the profitability of the domestic company, primarily by increasing its ability to generate profit on a given volume of sales. Some companies also benefited from a decline in the assets turnover ratio, probably reflecting growth in orders thanks to the foreign investor.

Foreign-owned companies generally do not face a lack of funds to finance further development and growth in assets. Intra-group financing, i.e. loans provided by the parent company to its Czech subsidiary, played an important role in the financing of corporate growth. The quantile analysis as well as econometric estimations confirmed that the use of intra-group credit changes through the lifecycle of the FDI. However, other determinants related both to the direct investment and macroeconomic environment have their effect as well.

Although there are some indications that the lifecycle of German investment in the Czech Republic might have entered its later stages, for example due to the significant non-linearity in development of the return on equity, these effects are not as yet sufficiently conclusive. Nevertheless, the profitability of the Czech subsidiaries of German companies remains relatively high. The risk of liquidation of foreign direct investments thus seems relatively low.

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