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THE EFFECT OF FOREIGN DIRECT INVESTMENT INFLOW ON DOMESTIC FIRM MANUFACTURING INDUSTRY IN ESTONIA

Bachelor Thesis

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I have written this Bachelor Thesis independently. Any ideas or data taken from other authors or other sources have been fully referenced.

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Introduction

Several transitioning economies experienced significant economic growth at the end of the 20th century by increasing Foreign Direct Investment (FDI). One such country, and the focus of this thesis, is Estonia, the host country attracting FDI in the past decade, a small Baltic nation that regained full independence in 1991. After regaining full independence in 1991, Estonia transformed from a centrally planned economy to a market-oriented system (Mongardini, 2001). Its accession to the European Union in 2004 further strengthened investor confidence by providing greater economic stability and access to the single market, including the free movement of goods, services, capital, and labor, facilitating cross-border investments (Rannu, 2009).

Over the past three decades, Estonia has strategically leveraged FDI to integrate into global markets, foster innovation, enhance productivity, and advance technological development. A significant portion of these investments has been directed toward the manufacturing industry. Foreign capital inflows have supported technological advancement, process automation, and skill development within domestic manufacturing firms, strengthening Estonia's role in global production networks. While the country has gained international recognition for its startup ecosystem, manufacturing remains a critical industry benefiting from FDI spillovers, including knowledge transfers, supplier linkages, and labor mobility effects. (Invest in Estonia, 2023, Valdmann & Kallaste, 2018) These indicators reflect Estonia's growing competitiveness and ability to attract foreign investment into knowledge-intensive industries. FDI continues to play an essential role in sustaining Estonia's economic growth, with net FDI inflows nearly tripling from 4.3% of GDP in 2013 to 12.6% in 2023 (World Bank, 2023).

Nowadays, the advantages and disadvantages of the FDI inflow spillover effect on domestic firms for host countries remain debatable. On the one hand, FDI provides capital and generates spillover effects, influencing domestic firms through various channels. Prior research by Blomström and Kokko (1998) highlights that domestic firms benefit from spillover effects when multinational enterprises (MNEs) introduce advanced managerial practices and production techniques. These practices can spread to domestic firms indirectly through imitation and labor mobility, potentially contributing to domestic firm performance and competitiveness improvements.

Similarly, Javorcik (2004) finds that host countries benefit from interaction with foreign affiliates, such as supply chain relationships through backward linkages; local suppliers may adopt better technologies and managerial practices, leading to productivity enhancements and increased competitiveness in the domestic market.

On the other hand, despite this positive spillover effect, FDI can also create challenges for domestic firms through the crowding-out effect. The dominance of foreign firms in domestic markets may lead to resource reallocation, where local firms struggle to compete for skilled labor, financing, and market share (Markusen, 1995). With their superior financial resources and access to global supply chains, foreign firms may limit domestic firms' ability to expand, potentially reducing domestic investment (Desai, Foley & Hines, 2004). As a result, FDI may not always support domestic capital formation. Moreover, the benefits of technology transfer and productivity spillovers are not automatic but depend on the absorptive capacity of domestic firms, as well as the extent of collaboration between foreign and local enterprises (Javorcik, 2004; Cohen & Levinthal, 1990). In some cases, FDI may establish its own supply networks, bypassing domestic firms and limiting potential spillover effects.

Previous research has primarily focused on the broad economic effects of FDI, often combining analyses of horizontal spillover (within-industry) and vertical spillover (across-industry) effects, especially in large or developing countries. However, there remains a lack of focused research examining horizontal FDI spillovers at the industry level in small, transition economies such as Estonia.

The thesis aims to examine how FDI inflows affect domestic firms within the same industry in Estonia, with a focus on horizontal spillovers through different mechanisms, and the author analyzes using industry-level data from 2008 to 2020 in Estonia's manufacturing industry to assess the relationship between FDI and domestic firm performance outcomes. The author intends to offer valuable study opportunities to those interested in FDI in transition countries.

To achieve this aim, the following research tasks have been identified:

- Discuss the financial components and characteristics of foreign direct investment inflow, as well as the concept of the mechanism of the FDI spillover effect.
- Provide an overview of previous empirical studies examining the effect of FDI inflow spillover on domestic firms.
- Collect secondary data, focusing on variables relevant to measuring FDI spillovers and domestic firm performance.
- Compute the variables from raw data.

- Employ a panel regression approach to determine the effect of FDI inflow on domestic firms.
- Present and discuss the results of the empirical research
- Comparing the findings with previous studies of the FDI effect on domestic firms
- Conclude the key empirical findings, limitations, and implications of FDI on domestic firms

The thesis structure is divided into two main chapters: a theoretical chapter and an empirical chapter. The theoretical chapter begins with Chapter 1.1, which defines the financial components and characteristics of FDI inflow. Chapter 1.2 introduces the concept of FDI spillover mechanisms, and Chapter 1.3 reviews previous empirical studies, highlighting both the positive and negative impacts of FDI on domestic firms. The second chapter focuses on the empirical analysis of how FDI inflows affect domestic firms in Estonia's manufacturing industry. Chapter 2.1 presents the data collection and methodology, while Chapter 2.2 discusses the empirical results. Finally, Chapter 2.3 compares the results with the theoretical insights presented earlier.

Keywords: Foreign Direct Investment (FDI), Horizontal spillover, Transition country

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1. Theoretical background of foreign direct investment spillover effect

1.1. Financial component and characteristics of foreign direct investment inflow

To examine the effect of foreign direct investment (FDI) inflow on domestic firms, in this section, the key financial components and characteristics of foreign direct investment (FDI) inflows will be examined based on existing academic literature. It is important to note that in this study, the terms “FDI financial components” and “FDI characteristics” are not used interchangeably. According to OECD (2008) and UNCTAD (2007), “financial components” specifically refer to equity capital, reinvested earnings, and intra-company loans, while “FDI characteristics” encompass broader features such as entry modes and sectoral distribution. Understanding these distinctions is crucial for determining how FDI influences domestic capital allocation, technological transfer, and market pressure and affects domestic firms' financial access, market structure, resource availability, and investment aspects.

FDI is an investment made by a firm or individual in one country into business interests in another. Typically, FDI occurs when an investor establishes foreign business operations or acquires foreign assets, including ownership or controlling interest in a foreign company. Moreover, A key distinguishing feature of FDI, compared to other forms of investment, is the element of control, where the investor holds significant influence over the management of the enterprise, often defined as owning at least 10% or more of voting stock. Unlike portfolio investments, FDI implies active involvement in management and operations**, frequently** leading to long-term relationships between foreign investors and host economies. (OECD 2008; UNCTAD, 2007)

FDI inflows comprise three main elements: equity capital, reinvested earnings, and intra-company loans (OECD 200; UNCTAD, 2007). These components collectively influence the domestic firm by facilitating capital inflows, stabilizing financial structures, and ensuring operational flexibility for MNEs. By synthesizing existing studies and incorporating the Estonian context to evaluate both the potential benefits and disadvantages, the author of this thesis critically evaluates each component individually in the following paragraphs.

The first component is equity capital, which refers to purchasing shares in a domestic enterprise, granting foreign investors ownership and control (UNCTAD, 2007). This form of investment plays a dual role in shaping the domestic business environment. From a domestic firm’s perspective, Estrin and Meyers (2001) discuss that equity capital can be a valuable source of long-term financing, enabling expansion, modernization, or entry into new markets. In many cases, foreign investors provide financial resources and contribute non-financial assets such as advanced technology, managerial expertise, and access to global networks. These inputs can lead to operational improvements, and equity partnerships may open opportunities for domestic firms to participate in international value chains. However, I argue that the growing dominance of foreign firms in capital markets may create barriers for domestic enterprises. As Levine (2002) suggests, domestic firms operating in the same industry are affected when foreign investors capture a large share of available equity capital. From the thesis author's perspective, this financial imbalance affects immediate access to credit and influences how domestic firms allocate capital. Faced with increased competition and restricted financing, domestic investors may choose to scale down their investments, avoiding sectors dominated by foreign ownership. This adjustment in domestic capital allocation reflects a strategic response but may also weaken long-term innovation and competitiveness within the local economy.

The second component, reinvested earnings, refers to the share of profits retained by foreign affiliates that are not distributed as dividends to the parent company (UNCTAD, 2007; OECD, 2008). The author of this thesis incorporates the study in Estonia's context by Masso, Meriküll, and Vahter (2011), which highlights that the corporate income tax system exempts retained earnings from corporate income tax. As a result, foreign firms build up liquid assets and reduce reliance on external debt, enabling self-financed expansion. Comparably, Levine's (2002) findings highlight domestic firms' challenges in getting financing, and a financial imbalance becomes clear. While foreign firms benefit from tax policies that encourage reinvestment, domestic firms, which rely more on traditional bank loans, may find it harder to compete due to limited access to capital and may face competitive disadvantages in accessing investment capital. Consequently, domestic firms may adjust their domestic investment behavior by reducing capital expenditure, postponing expansion, or reallocating funds more cautiously toward less competitive markets. This response reflects a shift in domestic capital allocation, where firms invest more cautiously in environments dominated by foreign enterprises.

Intra-company loans, the third key financial component of FDI, refer to capital transfers between foreign parent companies and their subsidiaries (OECD, 2008; UNCTAD, 2007). According to Mwaita (2022), these loans help foreign firms grow by providing stable financing and expanding operational projects, such as providing a flexible and cost-effective route for expansion. Such growth can also benefit domestic firms, for instance, by boosting demand for local suppliers and services, creating new employment, or encouraging knowledge exchanges. However, Desai, Foley, and Hines (2004) argue that this financial independence can put domestic firms at a disadvantage, as banks may prefer lending to foreign subsidiaries, making it harder for local firms to access credit. The author of this thesis identifies this as a financial imbalance**,** where domestic firms struggle to secure investment, limiting their growth. This suggests that while these loans assist foreign companies in their development and can bring benefits such as increased work for local suppliers and the creation of new jobs, they can also negatively impact local businesses. This occurs because banks may prefer to lend money to foreign companies rather than to local ones, making it more difficult for local businesses to secure the funding they need for expansion.

Moreover, since FDI inflows affect domestic firms in multiple ways, their impact cannot be understood from a single perspective. To assess these effects more systematically, this thesis categorizes the impact of FDI into five key aspects: financial access, technological access, competitive pressure, resource availability, and investment. The author also categorizes the impact into benefits and challenges (See Table 1).

Table 1

Benefits and challenges of FDI on domestic firms

Aspect	Benefits for domestic firms	Challenges for domestic firms
Financial Access	• Foreign equity investment brings new technologies. • Reinvested earnings support growth. • Intra-company loans offer stable financing.	• Foreign dominance may crowd out domestic firms. • Higher borrowing costs • Reduced credit access for domestic firms
Technological Access	• Equity introduces new technologies. • Reinvested earnings fund upgrades.	• Limited technology spillover • Domestic firms with weak technological skills struggle to adopt foreign innovations
Competitive Pressure	• Encourages domestic firms to innovate and improve quality.	• Foreign firms decrease prices of product and service, and push up wages • Small domestic firms struggle to compete
Resource Availability	• FDI links domestic firms to global suppliers • Increases access to materials and inputs	• Foreign firms dominate inputs, making it harder for domestic firms to secure resources
Investment	• Stimulates domestic firms to invest in expanding operations • Increases domestic supplier investment to serve foreign firms	• Investment flows often favour foreign-led projects. • Domestic firms may experience uneven benefit distribution due to investment

Sources: Compiled by author based on Desai, Foley & Hines (2004), Javorcik (2004), Levine (2002), Estrin & Meyer (2001), Mwaita (2022), OECD (2008), and UNCTAD (2007)

In the following paragraph, the thesis author proceeds to explain the modes of entry through which FDI is introduced. By gathering insights on the two primary modes of FDI entry: 1) Greenfield investment and 2) Mergers and acquisitions (M&A), the author aims to analyze their respective impacts on domestic firms. To provide a structured analysis, this section is divided into two aspects: first, the potential benefits of each mode for domestic firms, followed by an examination of the challenges they may introduce. This approach ensures a balanced discussion, highlighting domestic firm benefits and challenges associated with foreign entry.

Greenfield investment occurs when foreign firms establish new production facilities or business operations in the host country. This type of investment stimulates economic activity by creating jobs, fostering competition, and introducing new technologies (Estrin & Meyer, 2001). It also expands the industrial base by generating demand for local suppliers**,** which can enhance domestic firm productivity if linkages are established (Javorcik, 2004). However, greenfield investment does not always translate into benefits for domestic firms, as it also introduces intense competition that may put them at a disadvantage. This perspective is drawn from Blomström and Kokko (2001) and Estrin and Meyer (2001), who highlight different but complementary challenges associated with Greenfield investment. Blomström and Kokko (2001) argue that foreign firms, with superior financial resources and advanced technology, create unequal competition, making it harder for domestic firms to survive in the same market.

Meanwhile, Estrin and Meyer (2001) emphasize the structural barriers Greenfield investments introduce, such as long setup times, regulatory challenges, and substantial capital requirements. While these barriers may delay foreign entry, once foreign firms establish themselves, their access to capital and economies of scale can reinforce their dominance, further limiting opportunities for domestic firms. As a result, the author of this thesis contends that while greenfield investment may stimulate economic activity, its benefits for domestic firms are not guaranteed and depend on their ability to compete with foreign entrants.

The second mode, mergers and acquisitions (M&A), involves acquiring or merging with existing businesses in the host country. This mode offers faster market access and enables foreign investors to leverage established supply chains, customer bases, and local expertise. M&A can enhance the efficiency and competitiveness of acquired firms, bringing capital and managerial expertise. (Dunning, 1993). However, the author of this thesis argues that M&A can challenge domestic firms by increasing competition and limiting their market share. Since M&A focuses on restructuring rather than expansion. Additionally, from the perspective of Meyer (2004), M&A's impact on domestic firms is more indirect than that of Greenfield's investment, as foreign takeovers restructure existing businesses rather than create new market expansion. This can limit growth opportunities for independent domestic firms, reducing their ability to compete and innovate within the industries.

To provide a better overview of the modes of entry, the author of this thesis has developed a figure illustrating the two primary approaches to FDI inflows, Greenfield Investments and Mergers and acquisitions (M&A), along with their key characteristics (See Figure 1).

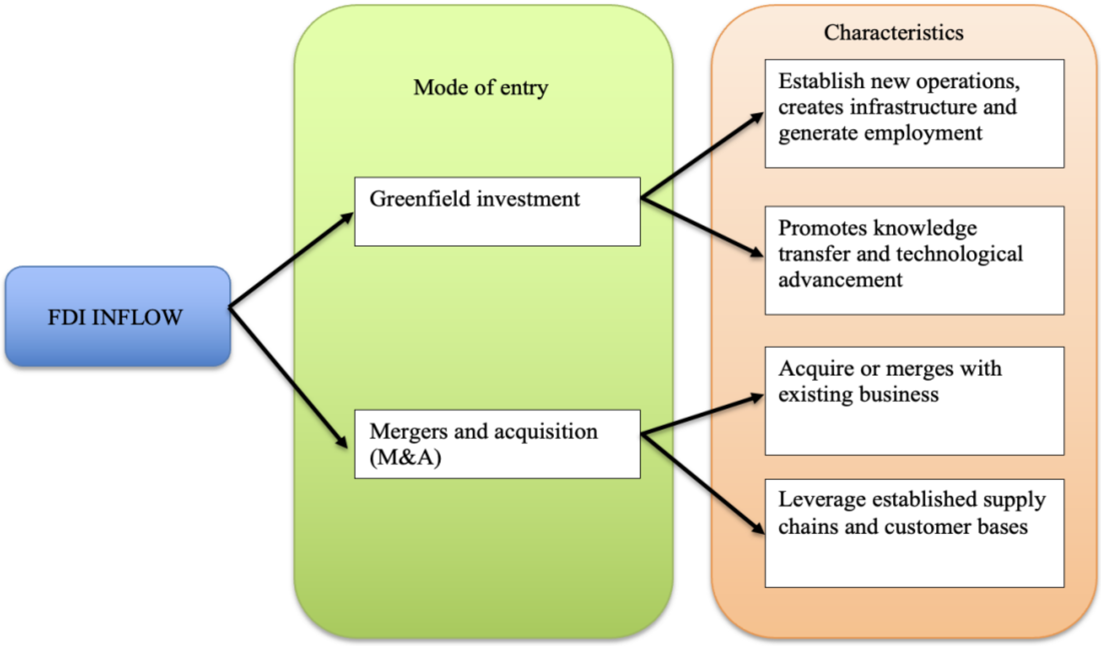

Figure 1. The mode of entry of FDI inflow and characteristics
Compiled by author based on Blomström & Kokko (2001), Dunning (1993), Estrin & Meyer (2001), Javorcik (2004), Meyer (2004)

Another notable feature of FDI inflow is its uneven regional distribution across different regions. Masso and Vahter (2006) find that the total factor production outside Northern Estonia, like Tallinn, Estonia's capital, is significantly lower than in Northern Estonia. This regional disparity suggests that FDI is heavily concentrated in urban centers, while rural areas and traditional industries receive significantly less investment. The author of this thesis argues that this concentration is due to better infrastructure, skilled labor, and stronger market access in urban areas, making them more attractive to foreign investors. As a result, domestic firms in rural areas may lag behind, limiting opportunities for local firm to grow. Similarly, Goosse, Maidla, Pastak, and Raagma (2020) introduce another perspective by acknowledging the existence of greenfield investments in rural areas, albeit limited and primarily focused on resource-based industries. While this indicates that there is a potential for growth, it also suggests that the types of FDI being attracted do not necessarily promote diversification or innovation. Instead, they may perpetuate existing economic structures rather than foster comprehensive development. The author finds the data from the European Commission's (2023) Country Report in Estonia to align with the study. The data indicate that in 2020, the GDP per capita in Põhja-Eesti (Northern Estonia) was 120.6% of the EU average, while regions like Lääne-Eesti and Lõuna-Eesti were at 48% and around 60%, respectively. This disparity suggests a concentration of economic activity and investment in the northern region, particularly around Tallinn, the capital city. The author argues that the implications of this regional imbalance are profound. While urban firms may reap the benefits of increased investment, rural businesses may face heightened challenges. This lack of investment can result in a productivity gap that widens over time, reinforcing economic divides and limiting the ability of rural firms to integrate into global value chains. Access to foreign technology, expertise, and markets becomes restricted, leaving these businesses at a competitive disadvantage.

To conclude this subchapter, having examined the characteristics of FDI inflows in this section, this thesis highlights the complex nature of FDI and its implications for domestic firms. While FDI brings financial resources, managerial expertise, and advanced technology, its impact depends on multiple factors, including financial accessibility, entry modes, and regional distribution. From a financial perspective, foreign firms benefit from capital inflows through equity capital, reinvested earnings, and intra-company loans. However, as Levine (2002) and Desai, Foley & Hines (2004) argue, this financial advantage can limit domestic firms' access to credit, making it harder for them to secure investment. Moreover, examining the modes of entry, Greenfield investments stimulate job creation and technological transfers but also introduce competitive pressures that may disadvantage domestic firms (Blomström & Kokko, 2001). In contrast, mergers and acquisitions (M&A) provide immediate financial and managerial benefits to acquired firms but may reduce competition and limit opportunities for independent domestic firms to expand (Meyer, 2004). These findings suggest that while foreign investment creates opportunities, it also presents challenges that can reshape industry dynamics. Lastly, the regional distribution of FDI further complicates its effects. The concentration of investment in urban areas, particularly Northern Estonia, enhances productivity and spillovers for firms in these regions but may widen the development gap between urban and rural areas. Given these complexities, it is important for the author to address this in Chapter 1.2. The author will further analyze FDI spillover effects, including the mechanisms and conditions through which FDI spillovers affect domestic firms.

1.2. The concept of the mechanism of foreign direct investment spillover effect

In this subchapter, the author of the thesis will explain how FDI affects domestic performance through various spillover mechanisms. By analyzing transmission mechanisms FDI is often associated with spillover effects, which refer to the indirect impacts that the presence and activities of MNEs have on domestic firms and the host economy. These effects are most likely to occur in host countries, where foreign firms can influence domestic firms operating within the same industry and firms in related or supporting industries (Blomström & Kokko, 2002; UNCTAD, 2001). However, these spillovers vary significantly across countries and industries, depending largely on the level of local capabilities, competition, and absorptive capacity within the host economy (Girma&Görg, 2002; Shujiro & Youngmin, 2022; Amin, Haq & Hussain, 2022)

FDI spillovers can be broadly classified into 1) horizontal and 2) vertical spillovers. On the one hand, horizontal spillovers take place when domestic firms operating in the same industry benefit from the presence of foreign firms, either by imitating their technology and business practices or competing directly with them. On the other hand, vertical spillovers arise from supply chain relationships, where foreign firms source inputs from domestic suppliers (backward linkages) or sell intermediate goods or advanced technologies to domestic firms (forward linkages), enabling domestic firms to upgrade their processes or products. (Brussevich & Tan, 2019)

To provide a clearer understanding, this thesis includes a figure illustrating the definition of the FDI spillover effect, visually distinguishing between horizontal and vertical spillovers (See Figure 2). This visual representation helps clarify how foreign investment influences domestic firms within the same industry (horizontal spillovers) and across different industries through supply chains (vertical spillovers)

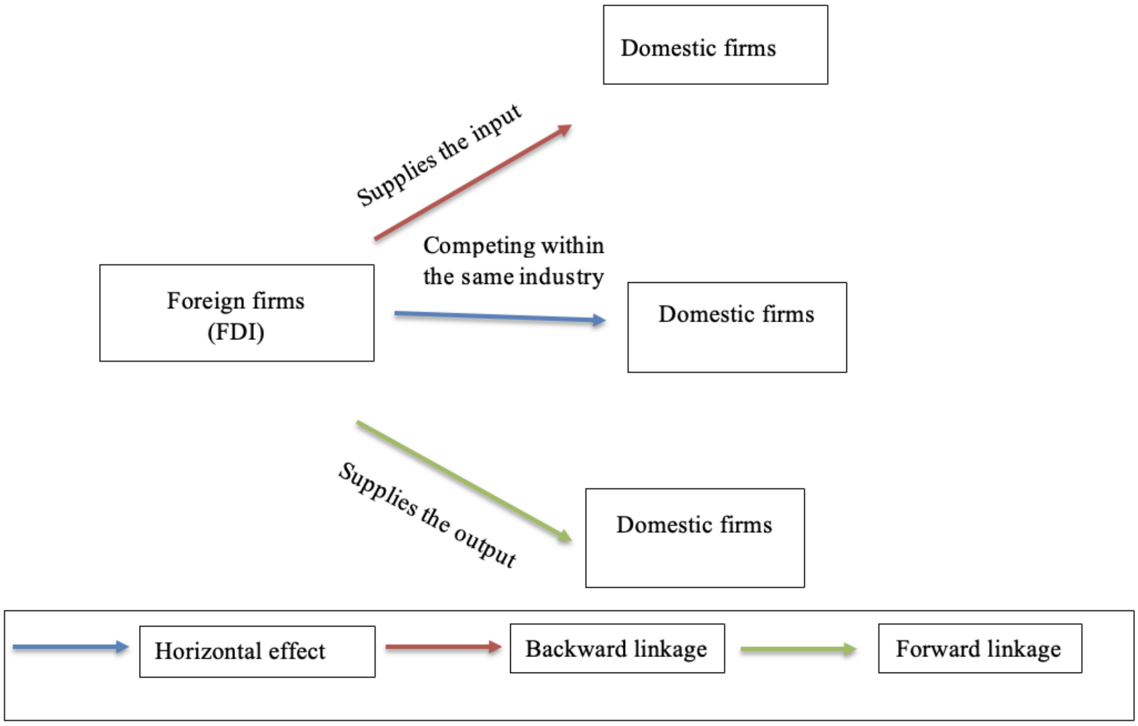

*Figure 2.*The concept of horizontal and vertical FDI inflow spillover

Compiled by author

In this thesis, the analysis centers exclusively on horizontal spillovers among firms operating within the same industry. While vertical spillovers such as those involving suppliers (backward linkages) or distributors and customers (forward linkages) are also recognized as necessary, they fall outside the scope of this study. By narrowing the focus to horizontal spillovers, we can more closely examine how MNEs influence domestic firms through mechanisms by the author of a thesis, including 1) labor mobility, 2) competition, 3) technology transfer, and 4) the demonstration effect. This approach provides a clearer view of how MNEs affect local firms' performance and strategic behavior within the same sector, thereby isolating the direct within-industry impacts of FDI.

Firstly, labor mobility spillovers represent a key intra-industry mechanism through which FDI can influence domestic firms' productivity and investment behavior. This channel operates when workers trained or employed by MNEs transfer to domestic firms within the same industry, bringing with them technical knowledge, managerial practices, and operational expertise acquired in the foreign firm environment (Blomström & Kokko 1998; Castilo et al., 2020; Görg & Strobl, 2005; Meyer, 2004; Pesola, 2011). MNEs often provide superior training, exposure to international standards, and hands-on experience with advanced production technologies and managerial processes, which are typically less accessible in domestic firms (Gershenberg, 1987, as cited in Görg & Strobl, 2005).

The labor mobility channel has been empirically confirmed in several contexts. The most direct process is hiring former MNE employees or former MNE workers to start their own firms. Görg and Strobl (2005) found that domestic firms managed by entrepreneurs with prior work experience in MNEs demonstrated significantly higher productivity levels than those without such experience. Similarly, studies by Castillo et al. (2020) and Pesola (2011) indicate that hiring former MNE employees enhances domestic firm productivity, as these workers transfer valuable technical skills and managerial practices, and find that MNEs' domestic firms offer higher wages for these employees, reflecting the perceived value of their expertise. This suggests that these entrepreneurs transfer valuable knowledge and skills acquired from MNEs, effectively enhancing the performance of domestic firms.

Another labor mobility channel process is to operate through regional knowledge transfer within geographically concentrated industrial clusters, when MNEs and domestic firms coexist nearby. In these clusters, workers frequently move between companies, which helps spread both informal knowledge and formal skills. This creates a local environment that supports shared learning and improvement processes. Local companies often invest together in employee training, upgrading production, and innovation. They take advantage of the talented workers trained by multinational companies and the informal learning opportunities that arise from working together. (Almeida & Kogut, 1999). Domestic firms in these clusters often invest in worker training, process upgrades, and innovation because they benefit from the skilled workers trained by MNEs and the informal knowledge shared between firms. (Gerschenberg, 1987 as cited in Görg & Strobl, 2005 ; Jaffe, Trajtenberg & Henderson, 1993)

Moreover, the author would like to discuss the competition effect, one of the FDI intra-industry spillovers that occurs when MNEs enter a domestic market, introducing new technology, efficient production processes, and advanced management techniques. As these firms operate in the same industry as domestic firms, they create market pressure that forces local companies to adjust and improve their performance. To remain competitive, domestic firms must increase efficiency, adopt better production methods, and enhance product quality.

One way this effect takes place is through performance benchmarking. MNEs often set higher industry standards, introducing better technology, cost-effective production, and more substantial management structures. Domestic firms exposed to these improvements try to match or adapt to these standards to sustain their market position. (Blomström & Kokko, 2001; Porter, 1990) This encourages local firms to rethink their business strategies, streamline operations, and upgrade technology. MNEs also influence how firms allocate resources, making them focus more on productivity-enhancing investments.

Another effect of this can be processed through resource reallocation. Resource reallocation influenced by MNEs significantly affects how domestic firms allocate their resources. This phenomenon encourages these firms to focus on investments that enhance productivity. Such reallocation may involve several key strategies, such as adopting cutting-edge technologies to improve efficiency, streamlining operational processes to reduce costs and enhance output quality, and investing in workforce development through training programs to upskill employees. By adopting these strategies, domestic companies aim to preserve their competitive advantage in an increasingly global market. On the other hand, some domestic firms may shift resources toward less productive activities. For instance, moving capital into low-risk sectors with limited innovation potential, focusing on short-term cost-cutting instead of long-term development, or reducing investment in R&D and employee development. These defensive strategies may help firms survive in the short run, but can hinder competitiveness over time. (Dunning 1993; Markus, 1995)

Furthermore, domestic firms may stimulate innovation by increasing investments in research and development and optimizing production processes to maintain market relevance and heightened competition. (Cohen& Levinthal, 1990; Klette& Johansen, 1998). Klette and Johansen (1998) suggest that firms facing significant productivity gaps compared to industry leaders are more likely to increase their R&D efforts to bridge these gaps. This aligns with the notion that domestic firms may stimulate innovation by investing more in R&D, refining product designs, and optimizing production processes to maintain market relevance amidst heightened competition. From the perspective of this thesis, competition effects are particularly relevant in sectors where domestic firms and foreign firms directly compete for similar customers, particularly in manufacturing, where product quality, cost efficiency, and delivery reliability are essential competitive factors.

Having explored the mobility and competition channels of FDI spillovers, we now turn to another important channel, which is the technology transfer, referring to the process through which FDI brings new technologies, production methods, and organizational practices into the host economy. MNEs install state-of-the-art machinery in local production facilities, modernizing operations and establishing new industry benchmarks (Blomstrom & Kokko, 2001). The second step entails implementing standardized production processes that streamline operations and enhance quality control, allowing domestic firms to observe and learn from these methods (Cohen & Levinthal, 1990). Finally, MNEs integrate local suppliers into their supply chains, requiring these partners to meet higher technological standards and promoting the broader diffusion of advanced production techniques throughout the industry (Javorcik, 2004). Moreover, Amin, Haq & Hussain (2022), demonstrated that technological spillovers from FDI positively affect total factor productivity (TFP) of domestic companies, reinforcing the argument that technology transfer plays a crucial role in improving domestic investment.

In the author’s view, through technology, this multi-step process not only directly upgrades production facilities but also allows domestic firms to observe, imitate, adopt, or integrate these innovations into their production systems. This aligns with the demonstration effect. The demonstration effect is another channel of the FDI spillover channel that operates when domestic firms observe and learn from the superior practices and performance of MNEs, particularly in production techniques, quality management, product innovation, and market strategies (Blomström & Kokko, 2001). MNEs, through their visible presence and performance leadership, become reference points for domestic firms, especially those operating in the same industry. By showcasing more efficient ways to produce goods, manage supply chains, or market products, MNEs indirectly influence the strategic decisions of domestic firms, including their willingness to invest in similar technologies or organizational improvements. This demonstration effect is particularly strong in industries with lower technological barriers, where domestic firms can relatively easily observe, understand, and adapt MNE practices without requiring radical technological transformation. When domestic firms witness MNEs achieving superior performance through the adoption of advanced technology or better managerial methods, they become more confident in investing in similar upgrades. (Javorcik, 2004) In this sense, the demonstration effect facilitates learning and reduces the perceived investment risk, accelerating domestic investment in upgrading technology, processes, and organizational capabilities.

To illustrate how FDI affects local businesses in the same industry, the author presents a conceptual framework figure below highlighting four main channels: labor mobility, competition, technology transfer, and the demonstration effect. These channels lead to various interconnected outcomes, such as improved technological capabilities, increased investment, higher levels of innovation, and enhanced productivity. By mapping these processes and outcomes, the figure clarifies how MNEs influence the operations, strategic planning, and performance of local firms, ultimately contributing to increased competitiveness in the host country (See Figure 3).

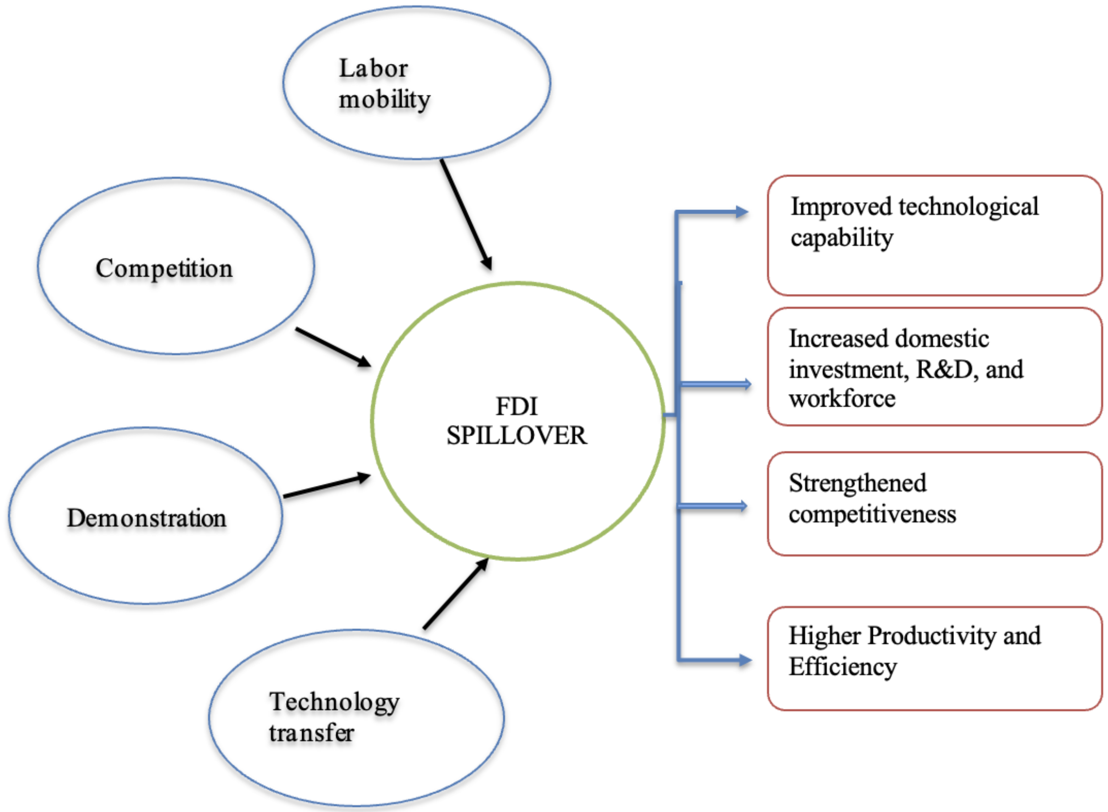

Figure 3. Conceptual framework of FDI horizontal spillover channels
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Having outlined the conceptual framework of FDI spillover channels, the specific conditions that determine whether FDI spillovers occur. While FDI can potentially drive technology adoption, innovation, and productivity improvements since these effects on domestic firms are not automatic. Various external and internal factors, including competitive pressures from MNEs, the absorptive capacity of domestic firms, the quality of institutional frameworks, and firm-specific characteristics such as size and technological intensity, play crucial roles in determining the magnitude and direction of FDI spillovers. The following discussion examines these key determinants, drawing on empirical evidence and theoretical insights to explain how they collectively enable the positive impacts of FDI on domestic industries.

The competitive pressures, which are external factors from MNEs, are also significant. Aitken and Harrison (1999) find that foreign investment did not lead to positive spillovers for domestic firms; in many cases, domestic firms experienced negative productivity impacts due to intensified competition from foreign firms. Similarly, Sinani and

Meyer (2004) note that foreign competition motivates domestic firms to optimize resource utilization and enhance the efficiency of existing technologies. This competitive landscape encourages these firms to seek new technologies and innovative solutions to maintain their market position.

Moreover, another external factor is institutional quality, and policy frameworks determine whether these spillovers materialize. The elements are shaped by national or regional authorities rather than individual firms, they are considered external conditions beyond the direct control of domestic enterprises. Lall (1992) and Park (2017) confirm that the nature of technology spillovers depends on national innovation systems, institutional quality, and industrial policies. Countries with stronger educational systems and policies to link foreign firms with domestic suppliers benefit more from technology-driven productivity gains and increased domestic investment.

The internal factors are equally important. The extent to which domestic firms actually benefit from FDI spillovers also depends heavily on absorptive capacity, which means their ability to recognize, assimilate, and apply new knowledge. This concept applies to technology transfer, including managerial practices and production methods. Factors such as existing technological expertise, R&D investments, and workforce skill levels significantly shape how effectively domestic firms can leverage foreign knowledge. (Blomström & Kokko, 2001; Cohen & Levinthal, 1990; Girma & Görg, 2002; Shujiro & Youngmin, 2022) Consequently, environments where domestic firms already possess robust capabilities are more conducive to positive spillovers. This aligns with Blomström and Kokko (2001), who emphasize that these spillovers are more likely in environments where domestic firms have developed strong technological capabilities, allowing them to effectively understand and adapt foreign technologies to local conditions

However, firm size and technological intensity also affect how domestic enterprises experience FDI spillovers. This perspective aligns with Esquivias et al. (2022) and Bournakis, Papaioannou, and Papanastassiou (2022), who argue that high-tech firms are generally better equipped to absorb advanced technologies. In contrast, low-tech firms with predominantly unskilled labor often face difficulties. This disparity can leave low-tech firms at a disadvantage, further hindering their efficiency. Importantly, these studies also note that horizontal technology spillovers occurring among firms within the same industry tend to be relatively weak, which compounds the challenges for firms that lack robust technological capabilities. Since this study focuses exclusively on horizontal spillovers, it emphasizes how firm size and technological intensity critically influence the impact of FDI on domestic firms operating within the same sector.

Taken together, the evidence suggests that FDI can offer substantial advantages to domestic firms ranging from technology adoption to innovation and productivity improvements, but these outcomes are not automatic. Competitive pressures, institutional frameworks, and domestic firms' absorptive capacity collectively determine the scope and magnitude of FDI spillover effects. Therefore, the author of the thesis illustrates the key conditions that influence FDI spillover effects (See Figure 4).

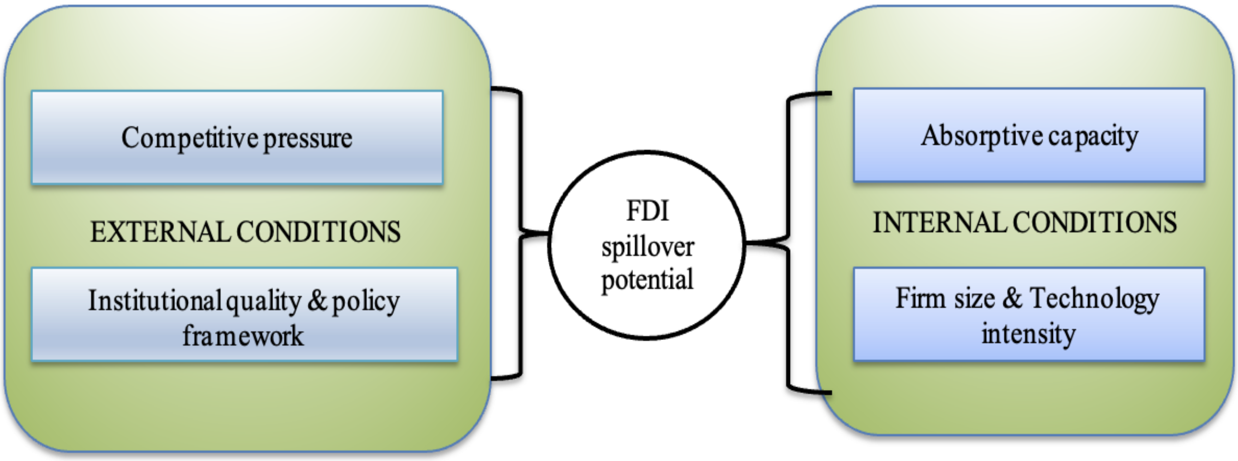

Figure 4. The conditions of FDI potential spillover
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In summary, FDI spillovers play a crucial role in shaping the performance of domestic firms, particularly through horizontal spillovers within the same industry. These spillovers occur through four key mechanisms: labor mobility, competition, technology transfer, and the demonstration effect. However, their impact is not automatic and depends on various external and internal conditions, including the absorptive capacity of domestic firms, competitive pressures from MNEs, and the institutional framework of the host country.

Understanding these conditions is essential, as it highlights the factors that enable domestic firms to benefit from FDI rather than being displaced by it. By identifying the determinants that influence spillover effects, policymakers and business leaders can develop strategies to maximize the benefits of foreign investment while mitigating potential challenges and fostering sustainable growth and innovation in the manufacturing industry.

1.3. Review of empirical analysis on foreign direct investment inflow effect on domestic firms

In this subchapter, the author provides a review of empirical analysis on FDI inflow effect on domestic firms. Given the significance of horizontal spillover effects, numerous studies have attempted to quantify and explain how FDI affects domestic firms operating within the same industry. However, most empirical research tends to analyze horizontal (within-industry) and vertical (between-industry) spillovers, making it challenging to isolate the effects specific to domestic firms competing directly with MNEs. Recognizing this gap, this thesis reviews empirical studies examining horizontal spillovers in transition economies. As many studies do not explicitly differentiate between horizontal and vertical spillovers, the results in the table are reported as they appear in the original studies. If a study specifically mentions vertical spillovers, this is indicated in parentheses. In addition, only a few existing studies focus on Estonia. Therefore, the author decided to review the other reviews of empirical analysis of other small open economy countries that are similar to Estonia.

The existing research reveals three main findings 1) positive spillovers, 2) no significant effects, and 3) negative or crowding-out effects. The author of this thesis argues that these variations are largely shaped by differences in host country institutions, industry structures, and the absorptive capacity of domestic firms.

Empirical evidence suggests that positive productivity spillovers occur primarily when domestic firms possess both the capability and opportunity to absorb foreign knowledge. For instance, In Estonia, Vahter (2010) demonstrated that foreign presence contributed to productivity gains, largely through improvements in innovation and internal processes. Similarly, Sinani and Meyer (2004) found that labour mobility and knowledge transfer facilitated spillovers, although their shorter time frame highlights the conditional nature of these effects. Compared with Estonia, with evidence from Hungary. Halpern and Muraközy (2007) reported more consistent positive impacts, which the author of the thesis interprets as a result of Hungary's comparatively stronger institutional framework, more favourable FDI policies, and a more competitive industrial environment. Taken together, these studies support the key argument of this thesis that FDI alone does not ensure domestic firm upgrading. Instead, the extent of spillover benefits depends on the interaction between foreign firm presence and country-specific factors such as institutional quality, market competition, and domestic firms' technological readiness to learn and adapt.

In contrast, several studies report mixed or insignificant effects, further highlighting the conditional nature of FDI spillovers. For example, Vahter (2005) found positive effects in Slovenia but no impact in Estonia, highlighting the importance of institutional and sectoral differences. Consistent with this, Masso and Vahter (2007) also reported no significant effects in Estonia, likely reflecting sectoral differences and absorptive capacity.

Similarly, Javorcik (2004) found no evidence of horizontal spillovers in Lithuania but observed positive vertical effects through backward linkages in supply chains, suggesting that alternative channels of knowledge transfer may exist. In addition, Damijan, Knell, Majcen and Rojec (2003) identified highly mixed results across ten Central and Eastern European countries, which reinforces the argument that the impact of FDI is highly dependent on country-specific factors. Complementing these findings, Kinoshita (2001) demonstrated that only R&D-intensive domestic firms in the Czech Republic benefited from FDI, emphasising the critical role of firm-level absorptive capacity in determining whether spillovers occur.

However, negative effects have also been observed under specific conditions, reinforcing the argument that the impact of FDI depends heavily on domestic circumstances. Konings (2003) reported that domestic firms in Bulgaria and Romania experienced productivity declines following foreign entry, which the author of this thesis interprets as a consequence of weaker domestic competitiveness and limited technological capabilities. By contrast, no significant effects were found in Poland, further emphasising that country-specific factors such as institutional quality and market structure play a decisive role in shaping whether domestic firms can withstand competitive pressures from FDI.

Finally, recent studies have extended the analysis to domestic firms' investment. Jude (2018) identified a two-stage effect across ten CEE countries. In the short term, FDI can negatively affect domestic investment, as domestic firms initially reduce their spending in response to heightened competition and uncertainty. However, in the longer term, domestic firms often adapt by upgrading their capabilities and re-investing, particularly when FDI takes the form of greenfield investment rather than acquisitions, particularly where FDI was greenfield. Moreover, Gökçeli Gökçeli, Fidrmuc and Ghosh (2022) showed that FDI from developed countries was associated with increased domestic investment across OECD countries, while FDI from developing countries had no significant impact. The author of this thesis interprets these findings as additional evidence that FDI's effects depend strongly on local conditions, with positive effects more likely under stable and well-regulated environments. Moreover, the author makes a summary of the empirical findings discussed (See Table 2).

Table 2

The review of empirical analysis on FDI inflow effect on domestic firms from previous studies

Author(s)	Country and year	Methodology	Focus	Result
Vahter (2005)	Estonia and Slovenia 1994-2001	Cobb-Douglas production function	FDI→Productivity	+(Slovenia), N.S. (Estonia)
Vahter (2010)	Estonia 1995-2004	Instrumental Variables (IV) approach	FDI→Productivity	+
Masso and Vahter (2007)	Estonia 1996-2002	Cobb-Douglas production function, Two-step estimation	FDI→Productivity	N.S.
Javorcik (2004)	Lithuania 1992-2000	Olley-Pakes	FDI→Productivity	N.S. (horizontal), +(vertical)
Sinani and Meyer 2004	Estonia 1994-1999	Heckman two stage procedure	FDI→Productivity	+
Halpern and Muraközy 2007	Hungary 1996-2003	TFP estimation, System GMM	FDI→Productivity	+
Damijan, Knell, Majcen and Rojec . 2003	10 CEE countries 1994-1998	System GMM approach	FDI→Productivity	-(Slovenia), +(Romania), N.S. (other countries)
Kinoshita (2001)	Czech republic 1993-1997	TFP estimation	FDI→Productivity	+(Only R&D firms)
Konings (2003)	Bulgaria, Poland, Romania 1992-97	Generalized Method of Moments (GMM) + Fixed Effects Model	FDI→Productivity	-(Bulgaria and Romania), N.S. (Poland)
Gökçeli, Fidrmuc and Ghosh (2022)	OECD countries 1990	Breusch-Pagan Lagrange multiplier test, the Hausman test	FDI→Investment	+ (Developed countries), N.S. (Developing countries)
Jude (2018)	10 CEE countries	Panel regression analysis	FDI→Investment	-(Short term), + (Long term)

Notes. "+"- positive effect, "-" - negative effect, "N.S." No significant effect
Source: Compiled by author

To summarize, the existing empirical research provides valuable but often mixed insights into the effects of FDI inflows on domestic firms. While positive productivity and investment spillovers have been observed under favourable institutional and market conditions, many studies report insignificant or even negative effects, particularly where domestic firms lack the capacity to absorb foreign knowledge. These findings support the central argument of this thesis that FDI spillovers are highly context-dependent and shaped by the interaction of institutional quality and firm-level capabilities. This highlights the need for further empirical analysis in small open economies such as Estonia, where the existing evidence remains limited and inconclusive.

2. The effect of foreign direct investment inflow spillover on domestic firms in Estonia–empirical analysis

2.1. Data and methodology

To examine the effect of FDI inflows on domestic firms in Estonia (EE), this study utilizes an industry-level panel dataset spanning 12 years from 2008 to 2020. This study employs panel data rather than cross-sectional data, as it tracks the same industries over multiple years. The author includes 286 observations. The analysis relies on secondary data sources from Statistikaamet (n.d.), incorporating economic indicators relevant to domestic firm labour productivity and investment activity within domestic firms.

The author lists the empirical steps below.

1. Data collection and sample selection
2. Calculate the dependent and independent variables from the collected data
3. Data transformation and preparation
4. Econometric model specification (models were specified based on prior studies and included variables to capture the FDI effect)
5. Descriptive analysis and density estimate graphs
6. Employ regression analysis
7. Estimation and interpretation of results
8. Discussion of the results and comparison with the previous studies

The author applies a quantitative research approach and uses regression-based econometric methods to conduct the analysis. Prior to the regression analysis, all relevant variables were constructed in Stata by applying economic ratios and transformation formulas to the collected data. A detailed description of the variables and formulas is provided (See Appendix A).

Although the empirical analysis uses industry-level panel data, this thesis treats it as a proxy for examining the average performance of domestic firms within each manufacturing sector. It allows for the investigation of aggregate firm responses to foreign direct investment inflows, while acknowledging that firm-level heterogeneity within industries cannot be fully reflected. Therefore, in the empirical analysis of this thesis, "Estonian firms" refer to Estonian-owned enterprises within the manufacturing industry, while "foreign firms (FDI)" denote foreign-owned enterprises within the same industry.

The analysis covers 22 manufacturing industries in Estonia, listed below.

1. Manufacture of basic metals
2. Manufacture of basic pharmaceutical products
3. Manufacture of beverages
4. Manufacture of chemicals and chemical products
5. Manufacture of coke and refined petroleum products
6. Manufacture of computer, electronic, and optical products
7. Manufacture of electrical equipment
8. Manufacture of fabricated metal products
9. Manufacture of food products
10. Manufacture of furniture
11. Manufacture of leather and related products
12. Manufacture of machinery and equipment
13. Manufacture of motor vehicles, trailers, and semi-trailers
14. Manufacture of other non-metallic mineral products
15. Manufacture of other transport equipment
16. Manufacture of paper and paper products
17. Manufacture of rubber and plastic products
18. Manufacture of textiles
19. Manufacture of tobacco products
20. Manufacture of wearing apparel
21. Manufacture of wood and wood products
22. Other manufacturing

Drawing on prior empirical literature, this thesis argues that understanding the effect of FDI on domestic firms in Estonia's manufacturing industry requires a multi-dimensional approach. Therefore, the analysis examines the impact of FDI inflows on domestic firms using four regression models: 1) labour productivity based on value added, 2) labour productivity based on turnover, 3) capital intensity, and 4) investment ratio. While much of the existing research (Vahter, 2005; Vahter, 2010; Sinani & Meyer, 2004; Halpern & Muraközy, 2007) has focused on productivity as the primary outcome of FDI spillovers, recent studies (Gökçeli, Fidrmuc & Ghosh, 2022; Jude, 2018) suggest that FDI may also influence domestic firms' investment behaviour. This thesis further extends the analysis by including capital intensity as an additional dependent variable to capture changes in firms' resource allocation, providing a broader perspective on potential structural effects of FDI inflows. By combining multiple outcome variables that reflect both efficiency and resource use, this study offers a more comprehensive view of horizontal FDI spillovers in Estonia's manufacturing sector.

Moreover, to enhance the robustness of the FDI spillover analysis, each of the four econometric models is estimated twice. The first specification is a baseline model without fixed effects, which does not control for unobserved heterogeneity across industries or years, while the second specification includes both industry fixed effects and year. This approach accounts for structural differences between manufacturing industries (e.g., technology levels) and macroeconomic trends over time (e.g., economic cycles). While both specifications are presented in the empirical results, the final conclusions in this thesis are based primarily on the fixed effects models, as they provide more reliable and consistent estimates by controlling for unobserved time-invariant factors and macroeconomic trends over time.

The following section presents the model formulas and hypotheses used in the empirical analysis. Each model targets a different aspect of domestic firm performance. Although they follow a similar econometric structure, the dependent variables and some independent variables differ according to the focus of each model.

Model 1: examines the effect of FDI on domestic firms' labour productivity turnover per employee in the manufacturing industry in Estonia.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \alpha_i + \lambda_t + \varepsilon_{it}$$

Where:

- Y: Log Labour productivity turnover per employee, Estonia
- X_1: Log average firm, Estonia
- X_2: Capital intensity, FDI
- X_3: Export ratio, FDI
- X_4: Technology investment ratio, FDI
- X_5: Horizontal employee spillover

- α_i: Industry
- λ_t: Time (Year)
- ε_{it}: Error terms

Hypothesis

H0: FDI inflows have no significant effect on domestic firms' labor productivity (turnover per employee) in the manufacturing industry in Estonia.

H1: FDI inflows have a significant effect on domestic firms' labor productivity (turnover per employee) in the manufacturing industry in Estonia.

Model 2: examines the effect of FDI on domestic firms' labour productivity value added per employee in the manufacturing industry in Estonia

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \alpha_i + \lambda_t + \varepsilon_{it}$$

Where:

- Y : Log Labour productivity value added per employee, Estonia
- X_1: Log average firm, Estonia
- X_2: Capital intensity, FDI
- X_3: Export ratio, FDI
- X_4: Technology investment ratio, FDI
- X_5: Horizontal employee spillover
- α_i: Industry
- λ_t: Time (Year)
- ε_{it}: Error terms

Hypothesis

H0: FDI inflows have no significant effect on domestic firms' labor productivity (value added per employee) in the manufacturing industry.

H1: FDI inflows have a significant effect on domestic firms' labor productivity (value added per employee) in the manufacturing industry in Estonia.

Model 3: examines the effect of FDI on domestic firms' investment behavior in Estonia's manufacturing industry

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \alpha_i + \lambda_t + \varepsilon_{it}$$

Where:

- Y: Investment ratio, Estonia
- X_1: Net profit margin, FDI
- X_2: Asset to turnover ratio, FDI

- X_3: Debt-to-equity ratio, FDI
- X_4: Horizontal spillover (based on turnover)
- α_i: Industry
- λ_t: Time (Year)
- ε_{it}: Error terms

Hypothesis

H0: FDI inflows have no significant effect on domestic firms' investment ratio in the manufacturing industry in Estonia.

H1: FDI inflows have a significant effect on domestic firms' investment ratio in the manufacturing industry in Estonia.

Model 4: examines the effect of FDI on domestic capital intensity in Estonia's manufacturing industry.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + + \beta_6 X_6 + \alpha_i + \lambda_t + \varepsilon_{it}$$

Where:

- Y: Log capital intensity, Estonia
- X_1: Export ratio, FDI
- X_2: Technology investment ratio, FDI
- X_3: Log firm size, FDI
- X_4: Return on asset, FDI
- X_5: Debt-to-equity, FDI
- X_6: Horizontal spillover (based on turnover)
- α_i: Industry
- λ_t: Time (Year)
- ε_{it}: Error terms

Hypothesis

H0: FDI inflows have no significant effect on domestic firms' capital intensity in the manufacturing industry in Estonia.

H1: FDI inflows have a significant effect on domestic firms' capital intensity in the manufacturing industry in Estonia.

In this thesis, all hypotheses are tested at the 5% significance level ($p < 0.05$), meaning that the null hypothesis (H0) is rejected when the p-value is less than 0.05, indicating a statistically significant effect.

Additionally, this thesis focuses exclusively on horizontal FDI spillovers, which capture the influence of foreign-owned firms on domestic firms operating within the same industry. These spillover effects are measured using two key proxies: (1) horizontal employee share**,** defined as the proportion of total industry employment held by foreign firms, and (2) horizontal turnover share, defined as the proportion of industry turnover generated by foreign firms. Furthermore, horizontal spillover indicators are constructed as industry-level proportions, ranging from 0 to 1. For instance, a value of 0.55 indicates that 55% of the industry's employment and turnover is attributed to foreign enterprises. Since a 1-unit increase in these variables would imply an unrealistic jump from 0% to 100%, this thesis interprets the regression coefficients based on a 0.10 unit increase, which corresponds to a more realistic and economically meaningful 10% change in FDI, such as from 50% to 60%. The author presents the result of the empirical analysis in the following subchapter.

2.2. The result of empirical analysis

In this subchapter, the author presents the results of the analysis**.** To begin with, descriptive statistics are provided to offer an overview of the variables used in the analysis, including both foreign firms (FDI) and Estonian firms. The descriptive statistics reveal clear structural differences between foreign firms and Estonian firms in the manufacturing industry in Estonia (See Appendix B). Following this, percentage differences are calculated to compare the performance of FDI and Estonian industries more explicitly (See Appendix C).

Descriptive analysis, labour productivity based on value added and turnover per employee of foreign firms is substantially higher than that of Estonian firms. On average, the labour productivity of foreign firms based on value added is €273,402 per employee, compared to €23,047 per employee of Estonian firms. Therefore, the labour productivity based on value added of foreign firms is 1,086.3% higher. A similar pattern appears in labour productivity based on turnover, where foreign firms average €1,318,714 per employee, while Estonian firms report only €99,421, indicating a 1226.4% higher value in foreign firms.

Furthermore, capital intensity also reflects this disparity, with foreign firms averaging €550,004 per employee compared to €49,539 per employee of Estonian firms, resulting in a 1010.24% difference. The foreign firm's investment ratio is higher at 13.3%, compared to 11.9% of Estonian firms, which reflects a difference of 11.8%. In terms of firm size, foreign firms employ an average of 134 employees, nearly double the 70 employees average in Estonian firms, reflecting a 91.4% difference. The export ratio is notably stronger in foreign firms, where 75.9% of turnover comes from exports, compared to 56.7% in Estonian firms, reflecting that foreign firms have a 33.8% higher export ratio.

Additionally, profitability is greater in foreign firms, with a net profit margin of 11.0% in foreign firms compared to 6.0% in Estonian firms, which is 83.8% higher in foreign firms. However, the technology investment ratio equals for both groups at 7.1%. Conversely, Estonian firms show a slightly higher asset turnover ratio at 1.4%, compared to 1.3% in foreign firms, showing a 7.14% difference in favour of Estonian firms. The debt-to-equity ratio is also higher for Estonian firms at 88.2%, compared to 81.0% in foreign firms, indicating a greater reliance on debt financing.

Importantly, regarding FDI spillover indicators, the author finds that the spillover indicators show the dominant role of foreign firms in the Estonian manufacturing industry. Foreign firms account for 91% of total industry turnover (horizontal turnover spillover) and 55.2% of total employment within the industry (horizontal employee spillover). This dominance of foreign firms over domestic firms highlights a strong potential for generating productivity and knowledge spillovers to domestic firms.

The descriptive analysis reveals a consistent dominance of foreign firms over Estonian firms across most performance indicators. Foreign firms exhibit substantially higher labour productivity, capital intensity, investment ratios, profitability, and export orientation. The much higher capital intensity reflects their greater resource allocation toward physical assets, technology, and equipment for each employee, critical drivers of productivity advantages. Likewise, the higher investment ratio indicates a stronger tendency among foreign firms to reinvest profits and expand operations, potentially contributing to long-term competitive strength. Notably, the only areas where Estonian firms slightly outperform are asset turnover and debt-to-equity ratios, suggesting more efficient use of assets and a higher reliance on debt financing, respectively. These descriptive findings indicate foreign firms' significant scale, technological, and market advantages, which may provide opportunities for knowledge and productivity spillovers to Estonian enterprises. The following sections proceed to test these potential relationships through regression analysis.

Labour productivity turnover per employee. Foreign firms consistently outperformed Estonian firms in turnover-based labour productivity throughout 2008–2020. While the average turnover per employee in Estonian firms increased from €65,495 in 2008 to €125,491 in 2020, foreign firms report significantly higher figures, rising from €895,533 to €1,481,029 over the same period. The percentage difference remains above 1000% yearly, indicating a persistent and substantial productivity gap. Although both groups show improvements over time, the relative advantage of foreign firms remains strong and stable, suggesting structural differences in efficiency or technology use (See table 3).

Table 3

The average labour productivity turnover per employee of Estonian firms and foreign firms (FDI) from 2008 to 2020

Year	Labour productivity turnover per employee, Estonia (€)	Labour productivity turnover per employee, FDI (€)	Difference (%)
2008	65,495	895,533	+1267.33
2009	64,310	856,627	+1232.03
2010	71,900	1,243,951	+1630.11
2011	85,334	1,415,712	+1559.02
2012	99,015	1,373,705	+1287.37
2013	102,237	1,404,720	+1273.98
2014	108,249	1,366,103	+1162.00
2015	100,053	1,362,173	+1261.45
2016	103,215	1,372,919	+1230.15
2017	114,466	1,418,684	+1139.39
2018	129,295	1,486,979	+1050.07
2019	123,671	1,486,554	+1102.02
2020	125,491	1,480,290	+1079.06

Notes. "+" in the Difference (%) indicates the percentage by which foreign firms outperform Estonian firms; "–" indicates the percentage by which Estonian firms outperform foreign firms.

Source: author's calculation

Moreover, the density plot illustrates apparent differences in labour productivity turnover per employee distribution between Estonian and foreign firms. Estonian firms exhibit a distribution concentrated in the lower range of productivity values, spanning approximately from 3.0 to 6.0, with a peak around 4.5. In contrast, foreign firms show a distribution shifted to the right, ranging roughly from around 5.5 to 8.0, peaking around 7.0. This finding indicates that foreign firms consistently achieve higher turnover-based labour productivity per employee than Estonian firms. The distinct separation between the two curves suggests a substantial productivity gap, with minimal overlap, emphasizing the performance advantage held by foreign firms in the Estonian manufacturing industry (see

Figure 5). This pattern may reflect underlying technological, management practices, and capital resources differences between foreign and domestic firms.

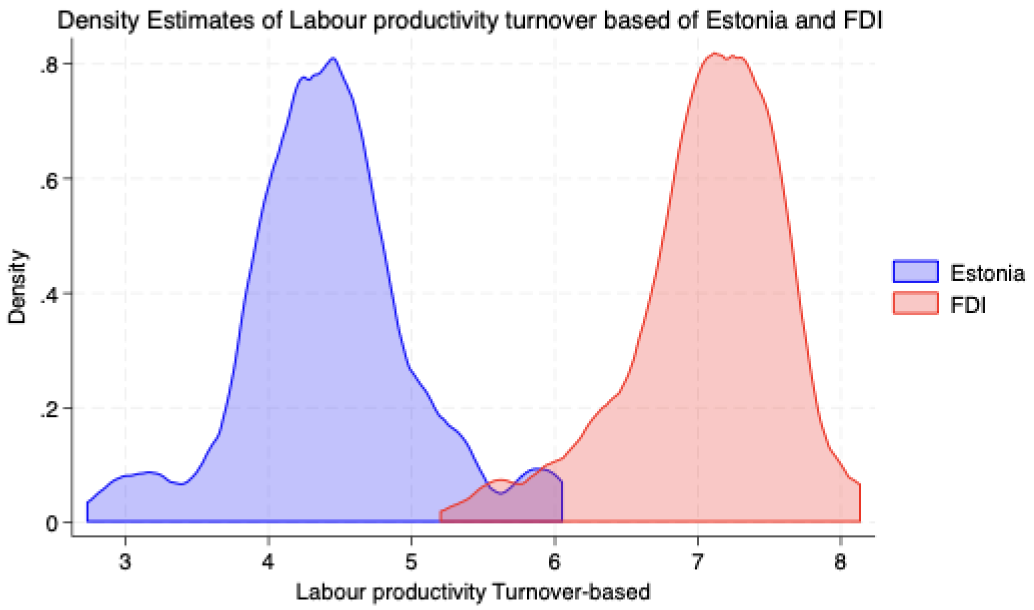

Figure 5. Density Estimates of labour productivity turnover per employee of Estonia and foreign firms (FDI)

Source: author's calculation

The following interpretation refers to the regression model using labour productivity measured as turnover per employee (see Table 4). In this regression analysis, there are 205 observations. Therefore, 81 observations were dropped due to missing data in some variables. The regression results show that horizontal spillovers from foreign firms, measured by the share of foreign employment in the same industry, significantly and positively affect domestic labour productivity turnover per employee. Without fixed effects, a 10% increase in the share of foreign employment is associated with a 9.84% increase in domestic labour productivity. The estimated effect remains positive and statistically significant when including industry and year fixed effects, though a more minor about a 5.59% increase in productivity. This reduction in effect size suggests that unobserved industry characteristics and macroeconomic trends explain some of the relationship between foreign employment share and domestic productivity. However, the persistence of a positive and statistically significant effect even after controlling for these factors indicates that genuine horizontal productivity spillovers from foreign firms to domestic firms likely exist.

Among the other control variables, the FDI technology investment ratio is positively significant only in the baseline model, indicating that initial technological presence may be influential but loses significance once structural factors are controlled for. Firm size, capital intensity, and export orientation of foreign firms show no significant impact in either model.

Including the explanatory power of the model improves considerably when fixed effects are included: the R-squared increases from 0.280 to 0.956. This means that when accounting for differences between industries and across years, the model explains 95.6% of the productivity variation, confirming that structural and time-related factors matter.

The results highlight employment spillovers as a key channel for FDI-driven improvements in turnover-based labour productivity in Estonian industries. The positive link between foreign employment share and domestic firms' turnover per employee suggests knowledge sharing, demonstration effects, and skill diffusion that enhance efficiency in the manufacturing sector.

Table 4

Regression results for labour productivity turnover per employee

Variable	Labour productivity turnover per employee (Without fixed effects)	Labour productivity turnover per employee (With fixed effects)
Horizontal spillover Employee	0.984*** (0.208)	0.559** (0.226)
Log average firm size estonia	0.206 (0.163)	0.117 (0.100)
Capital intensity FDI	0.000 (0.000)	0.000 (0.000)
Export ratio FDI	-0.439 (0.283)	-0.546* (0.322)
Techology investment ratio FDI	2.840*** (1.028)	0.287 (0.402)
Constant	3.071*** (0.759)	4.119*** (0.484)
Industry Fixed Effects	No	Yes
Year Fixed Effects	No	Yes
R-squared	0.280	0.956
Number of Observations	205	205

Notes: Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

Source: author's calculation

Labour productivity value added per employee. Foreign firms consistently outperform Estonian firms in value-added-based labour productivity throughout the 2008 to 2020 period. While the average value added per employee in Estonian firms increased from

€15,195 in 2008 to €33,329 in 2020, foreign firms reported significantly higher levels, rising from €214,368 to €328,276 over the same period. The percentage difference remains above 880% every year and exceeds 1,300% in several years, indicating a substantial and persistent productivity gap. Although both groups demonstrate growth in value added per employee, the advantage held by foreign firms remains consistent and wide. This pattern reflects more profound structural differences, such as greater capital availability, efficiency, or technology usage in foreign firms (See Table 5).

Table 5

The average labour productivity value added per employee of Estonian firms and foreign firms (FDI) from 2008 to 2020

Year	Labour productivity value added per employee, Estonia (€)	Labour productivity value added per employee, FDI (€)	Difference (%)
2008	15,195	214,368	+1310.78
2009	14,129	184,500	+1205.28
2010	17,894	249,529	+1294.48
2011	18,706	268,882	+1337.41
2012	24,147	250,947	+ 939.25
2013	23,189	267,842	+1055.04
2014	24,000	268,579	+1019.08
2015	21,044	269,368	+1180.02
2016	24,633	288,278	+1070.29
2017	24,853	307,556	+1137.50
2018	29,553	345,167	+1067.59
2019	30,525	306,647	+ 904.58
2020	33,329	328,278	+884.96

Notes. "+" in the Difference (%) indicates the percentage by which foreign firms outperform Estonian firms; "−" indicates the percentage by which Estonian firms outperform foreign firms.

Source: author's calculation

According to the density graph of labour productivity value added per employee, the log labor productivity density distribution (value added per employee) reveals a clear distinction between Estonian and FDI industries. The Estonian industries are concentrated between approximately 2.8 and 4.5, indicating lower productivity levels. In contrast, the red curve for FDI industries is shifted to the right, spanning values roughly from 4.5 to 6.2, with a peak density around 5.5. This rightward shift suggests that FDI industries consistently achieve higher labour productivity per employee than Estonian industries. The limited overlap between the two curves reinforces the presence of a substantial productivity gap, in line with the descriptive statistics and supporting the argument that FDI firms operate at a structurally more productive level, potentially due to better technology, capital intensity, or managerial practices (See Figure 6).

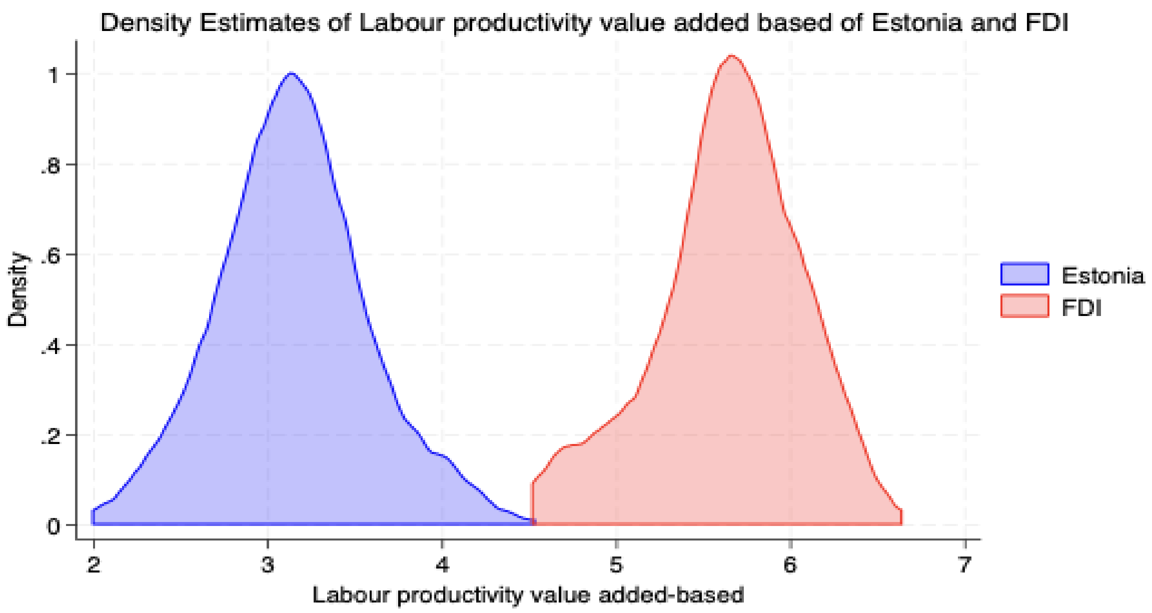

Figure 6. Density Estimates of labour productivity value added per employee of Estonia and FDI

Source: author's calculation

The following interpretation refers to the regression model using labour productivity measured as value added per employee (see Table 6). This model explores how foreign firm presence (measured by employment) affects value-added labor productivity in Estonian firms. The regression analysis is conducted on a sample of 205 industry-year observations, with 81 observations excluded due to missing values in some of the variables.

The results indicate that horizontal spillovers from foreign firms, measured by the share of foreign employment in the same industry, have a statistically significant and positive association with labour productivity based on value added per employee in baseline model without fixed effects, a 10 % increase in the foreign employment share is associated with an approximately 1.70% increase in Estonia's labour productivity. However, when industry and year fixed effects are included, the coefficient remains positive. Still, it is no longer statistically significant, suggesting that structural and time-specific factors can partially explain the spillover effect.

Considering the other control variables, technology investment by foreign firms shows a strong positive association with productivity in the model without fixed effects. Nevertheless, this relationship also becomes statistically insignificant once fixed effects are added. On the contrary, the firm size of Estonian firms is statistically significant in the fixed effects model. This suggests that larger domestic industries measured by the number of employees tend to exhibit higher labour productivity based on value added, even after controlling for spillover. While not the central focus of this analysis, firm size is one of several contributing factors to productivity differences, potentially due to better management, greater resources, or more efficient operations in larger firms.

The rest of the variables, such as capital intensity and export ratio, do not have statistically significant effects in either model. Additionally, the explanatory power of the model increases substantially when fixed effects are included: the R-squared rises from 0.163 to 0.815, meaning that 81.5% of the variation in productivity is explained when accounting for industry and year characteristics.

Consequently, these findings indicate limited evidence of horizontal spillovers in value-added productivity after controlling for structural differences, but this finding supports the importance of firm characteristics, particularly size, significantly influencing productivity.

Table 6

Regression results for labour productivity value added per employee of Estonian firms

Variable	Labour productivity value added per employee, Estonia (Without fixed effects)	Labour productivity value added per employee, Estonia (With fixed effects)
Horizontal Employee	16.977*** (3.979)	13.708* (8.253)
Log average firm size Estonia	2.872 (3.107)	11.579*** (3.650)
Capital Intensity FDI	0.001 (0.002)	-0.004 (0.003)
Export Ratio FDI	-0.851 (5.396)	-13.901 (11.743)
Techology investment ratio FDI	50.824*** (19.629)	8.687 (14.666)
Constant	-0.044 (14.484)	-24.734 (17.668)
Industry Fixed Effects	No	Yes
Year Fixed Effects	No	Yes
R-squared	0.163	0.815
Number of Observations	205	205

Notes: Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1
Source: Author's calculation

Investment ratio, defined as the ratio of gross investment to fixed assets, shows fluctuations over time for both groups (See Table 7). In the early years, particularly 2008 to 2012, foreign firms consistently reported higher investment ratios than Estonian firms. For instance, in 2008, the investment ratio for foreign firms was 15.6% compared to 13.2% for Estonian firms, marking an 18.18% higher rate. The gap peaked in 2009, when foreign firms invested 81.03% more relative to fixed assets than domestic firms.

However, the trend is not uniform. In certain years, such as 2013 and 2018, Estonian firms reported higher investment ratios than foreign firms. Specifically, the investment ratio in Estonian firms exceeded that of foreign firms by 14.10% in 2013 and 15.10 % in 2018. Throughout the observed period, the data suggest that foreign firms engage in more capital-intensive activity, potentially due to better access to finance. In comparison, Estonian firms tend to follow a steadier and more risk-averse investment approach, although they occasionally outperform foreign firms in terms of investment. Therefore, this pattern reflects variation over time rather than a consistent trend.

Table 7

The average investment ratio of Estonian and foreign firms from 2008 to 2020

Year	Investment ratio Estonia (%)	Investment ratio FDI (%)	Difference (%)
2008	13.20	15.60	+18.18
2009	5.80	10.50	+81.03
2010	9.80	11.00	+12.24
2011	11.10	15.80	+42.34
2012	12.50	13.40	+7.20
2013	14.10	12.10	-14.18
2014	11.30	14.30	+26.55
2015	11.70	13.40	+14.53
2016	12.20	14.00	+14.75
2017	13.30	14.90	+12.03
2018	15.10	13.20	-12.58
2019	12.40	14.50	+16.94
2020	10.80	10.00	-7.41

Notes. “+” in the Difference (%) indicates the percentage by which foreign firms outperform Estonian firms; “–” indicates the percentage by which Estonian firms outperform foreign firms.

Source: author’s calculation

According to the density estimate of investment ratio of Estonia and foreign firms (FDI) (See Figure 7), the author finds that the distribution for Estonian firms is more concentrated, with a peak around 0.10, suggesting that investment levels are typically close to 10% of fixed assets. In contrast, the distribution for foreign firms is broader and has a longer right tail. While some foreign firms invest at similar levels to their domestic counterparts, a notable share invests much more, with ratios above 30%, and some even reach 60%. This explains the longer right-hand tail observed in the distribution of foreign firms.

Overall, foreign firms tend to display greater variation and, in some cases, higher investment intensity. This could reflect differences in financial access or a preference for more capital-intensive strategies. Meanwhile, Estonian firms generally invest at more consistent and lower levels, possibly due to limited funding or more cautious planning.

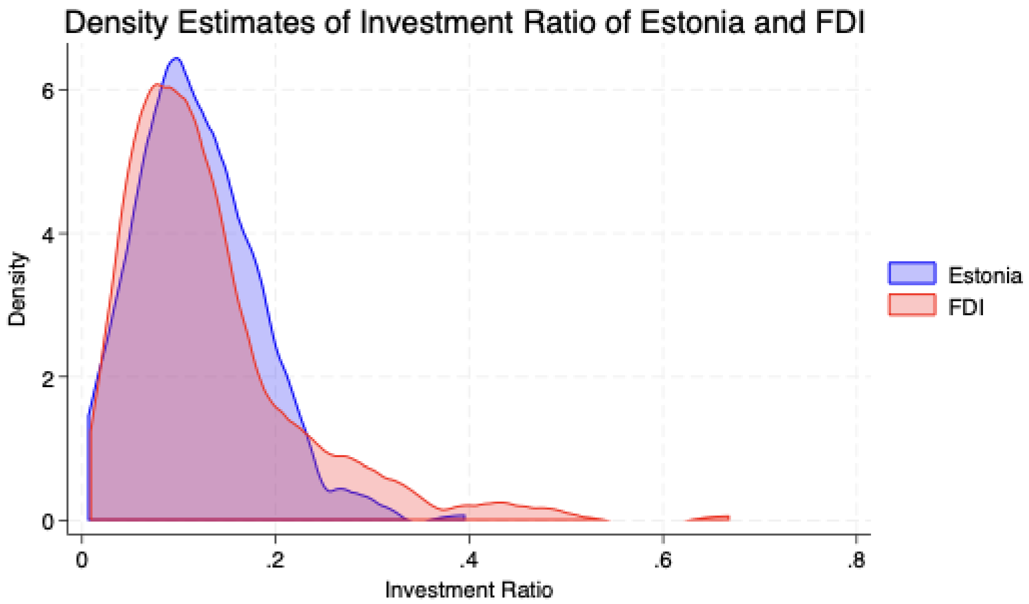

Figure 7. Density Estimates of Investment Ratio of Estonia and FDI
Source: author's calculation

The regression results for Model 3 are presented (See Table 8) and are interpreted as follows. In this regression model, the sample consists of 205 industry-year observations, with 81 excluded due to missing data. The regression results of the investment ratio of Estonian firms provide mixed evidence on the presence of horizontal FDI turnover spillover effects on Estonian firms' investment behavior. In the model without fixed effects, the coefficient for horizontal turnover is negative and statistically significant, a 10% increase in the foreign turnover share is associated with an estimated 0.028 decrease in the investment ratio, which is equivalent to a 2.8 % decline, suggesting that a greater presence of foreign firms within the same industry is associated with lower investment ratios among domestic firms. This indicates a potential negative effect, where foreign competition discourages domestic investment.

However, when industry and year fixed effects are included, the coefficient becomes considerably smaller and loses statistical significance. This attenuation suggests that the initial negative association may have been driven by unobserved heterogeneity across industries or macroeconomic trends over time, rather than reflecting a genuine crowding-out spillover effect from foreign firms. The absence of statistically significant effects for other foreign firm characteristics, such as net profit margin and debt-to-equity ratio, further reinforces the lack of robust evidence for FDI-induced reductions in domestic investment. Overall, the initially observed negative spillover effect does not withstand the inclusion of controls for industry and year-specific factors. This is further supported by the increase in explanatory power: the R-squared improves from 0.072 in the baseline model to 0.346 with fixed effects, underscoring the substantial role that structural industry characteristics and time dynamics play in shaping domestic investment behavior.

Table 8

Regression results of the investment ratio of Estonian firms

Variable	Investment ratio Estonia (Without Fixed Effects)	Investment ratio Estonia (With Fixed Effects)
Horizontal Turnover	-0.282*** (0.081)	-0.019 (0.259)
Net Profit Margin FDI	0.000 (0.000)	0.000 (0.000)
Asset Turnover Ratio	0.128 (0.188)	0.021 (0.183)
Debt to Equity FDI	-0.011 (0.007)	-0.020 (0.013)
Constant	0.387*** (0.077)	0.116 (0.250)
Industry Fixed Effects	No	Yes
Year Fixed Effects	No	Yes
R-squared	0.072	0.346
Number of Observations	205	205

Notes: Standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Source: Author's calculation

Capital intensity, defined as the ratio of fixed assets to the number of employees, reflects how much capital is used per worker in production. The average capital intensity of Estonian and foreign firms from 2008 to 2020 (See Table 9). The results reveal a substantial and persistent gap between the two groups. Foreign firms consistently report much higher capital intensity levels than Estonian firms. For instance, in 2008, the average capital intensity in foreign firms was €396,225 per employee compared to only €29,569 in domestic firms, indicating a difference of over 1,200%. This disparity continued throughout the period, peaking in 2010 when foreign firms had more than nearly 10 times the capital per worker of their domestic counterparts. Although domestic firms showed some increase in capital intensity over time, the gap remained large. These descriptive findings suggest that foreign firms in Estonia operate with significantly more capital per employee, possibly due to greater access to funding, more advanced production technologies, or a preference for capital-intensive processes.

Table 9

The average of capital intensity of Estonian and foreign firms from 2008 to 2020

Year	Capital intensity Estonia (€)	Capital intensity FDI (€)	Difference (%)
2008	29,569	396,225	+1240.00
2009	41,171	505,377	+1127.51
2010	53,321	568,695	+966.55
2011	47,012	534,906	+1037.81
2012	61,058	508,289	+732.47
2013	62,621	527,658	+742.62
2014	63,417	531,656	+738.35
2015	47,881	531,213	+1009.44
2016	44,330	586,933	+1224.01
2017	45,859	617,964	+1247.53
2018	49,377	643,788	+1203.82
2019	44,188	570,624	+1191.36
2020	53,517	650,992	+1116.42

Notes. “+” in the Difference (%) indicates the percentage by which foreign firms outperform Estonian firms

Source: Author’s calculation

The author shows the density graph of the log of capital intensity of Estonian and Foreign firms (FDI) below (See Figure 8). The graph reveals a clear distinction between the two distributions. Estonian firms have capital intensity values that are tightly clustered between approximately 2 and 5, with a strong peak around 3.5 to 4.5. In contrast show a broader distribution, centered at higher capital intensity levels, mainly between 5 and 7. This indicates that foreign firms tend to use significantly more capital per employee compared to domestic ones. While there is some overlap between the two distributions, the peak and the spread suggest that foreign firms operate with more capital-intensive production processes, potentially due to greater access to financial resources, advanced technology, or scale advantages. These visual findings are consistent with the descriptive statistics and reinforce the idea that structural differences in capital usage exist between foreign and domestic firms.

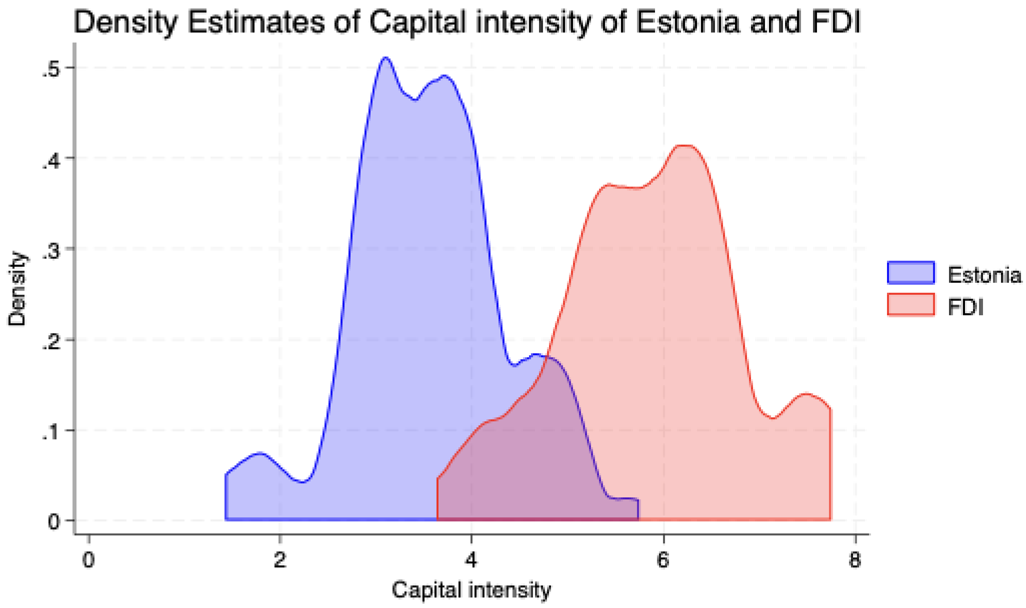

Figure 8. Density Estimates of capital intensity value added per employee of Estonia and FDI
Source: author's calculation

The following interpretation refers to the regression model using the log of capital intensity as the dependent variable (see Table 10). The number of observations in this model is 205. The results provide consistent evidence that horizontal spillovers from foreign firms, measured by the share of foreign turnover in the same industry, are positively associated with domestic capital intensity. In the model without fixed effects, a 10-percentage-point increase in foreign turnover is associated with an approximately 49% increase in capital intensity. This relationship becomes even stronger in the fixed effects model, where the same increase is linked to an 82% rise in capital intensity. These findings suggest that Estonian firms operating in sectors with a greater foreign presence tend to adopt more capital-intensive production methods over time, likely due to learning, technology transfer, or competitive pressures.

While the main focus is on spillovers, a few control variables also show statistically significant effects. In particular, the log of foreign firm size and their return on assets are both negatively associated with domestic capital intensity in the fixed effects model. This may indicate that in industries where foreign firms are larger or more profitable, domestic firms invest relatively less in capital per worker, potentially due to competitive disadvantages or resource constraints. Other control variables, such as export intensity, technology intensity, and debt-to-equity ratio of foreign firms, are not statistically significant after accounting for industry and year effects.

The explanatory power of the model improves substantially when fixed effects are included. The R-squared increases from 46% in the model without fixed effects to 93.3% in the fixed effects model, indicating that a large share of the variation in capital intensity is explained by differences across industries and years. Overall, the results offer robust support for the presence of horizontal FDI spillover effects on capital intensity in Estonian firms, even after accounting for sectoral and temporal heterogeneity.

Table 10

Regression results for capital intensity of Estonian firms

Variable	Capital intensity (Without fixed effect)	Capital intensity (With fixed effect)
Export ratio FDI	-2.954*** (0.310)	0.141 (0.671)
Techology investment ratio FDI	-3.263** (1.308)	0.325 (0.765)
Firm size FDI	-0.278** (0.128)	-1.232*** (0.170)
Return on asset FDI	-3.414*** (1.156)	-1.864*** (0.551)
Debt to equity FDI	-0.308*** (0.094)	0.012 (0.069)
Horizontal turnover	4.941*** (1.011)	8.210*** (1.408)
Constant	5.521*** (0.957)	2.745** (1.329)
Industry	No	Yes
Year	No	Yes
Observations	210	210
R-squared	0.460	0.933

Notes: Standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Source: author's calculation

Throughout the analysis, the thesis has examined how FDI spillovers affect domestic firms in Estonia's manufacturing industry, focusing on labor productivity (measured by both turnover and value added per employee), investment behavior, and capital intensity.

The author illustrates the table for this overview, which helps consolidate the empirical evidence and clarify under which conditions FDI influences domestic firm performance in Estonia's manufacturing industry. The results indicate significant spillover effects on capital intensity and turnover-based labour productivity, but no statistically significant effects on investment ratio or value-added productivity once structural differences are accounted for (See Table 11).

Table 11

Summary of regression results on horizontal FDI spillover effects across four models

Model	Dependent Variable	Spillover Variable	Result without fixed effect	Result with fixed effect
1	Labour Productivity Estonia (Turnover)	Horizontal Employee	+	+
2	Labour Productivity Estonia (Value Added)	Horizontal Employee	+	N.S.
3	Investment Ratio Estonia	Horizontal Turnover	-	N.S.
4	Capital Intensity Estonia	Horizontal Turnover	+	+

Notes + Positive effect, - negative effect, N.S. no significant effect

Source: Author's calculation

The regression results based on fixed effects reveal varying FDI spillover effects across different performance indicators in Estonia's manufacturing industry. Notably, a significant and consistent spillover is found for labour productivity measured by turnover per employee, indicating that domestic firms within the industry with greater foreign employment presence tend to generate more sales per worker. This suggests improved market efficiency or managerial practices diffused from foreign firms. However, when labour productivity is measured by value added per employee, the spillover effect becomes statistically insignificant after controlling for industry and year-specific factors. This implies that while FDI may boost output relative to turnover, it does not enhance the value added per employee. It is a stricter measure of productivity, accounting for input costs and added economic value. The results highlight that FDI spillovers may improve operational efficiency without necessarily increasing the underlying value creation of domestic firms.

In addition, capital intensity shows a strong and positive spillover effect, suggesting that domestic firms respond to foreign firm presence by increasing capital per worker, potentially due to demonstration effects, technology diffusion, or competitive pressure aimed at maintaining productivity levels. In contrast, the results for domestic investment show that foreign firm presence may have a short-term negative effect. In the model without fixed effects, domestic firms appear to reduce investment when foreign firms enter, possibly due to increased competition or limited access to financing. However, when industry and year differences are controlled, this negative effect disappears and becomes statistically insignificant. This suggests that the initial result was likely influenced by structural differences between industries, rather than a real long-term negative effect of domestic investment by foreign firms.

To summarize, the results show that FDI spillovers are not consistent across all outcomes. The findings suggest that both external and internal factors, such as the scale of foreign firm presence and internal characteristics of domestic firms, including size, resources, and absorptive capacity, jointly influence performance. While FDI spillovers can promote improvements in operational efficiency and capital deepening, these positive effects are more potent in industries where domestic firms are better equipped to absorb and respond to external competitive pressures. The variation in significance across the models further supports the view that the effects of FDI depend highly on structural industry conditions and firm-specific capabilities.

2.3. Comparison and discussion of results

This subchapter evaluates the empirical findings in relation to the theoretical expectations presented earlier in Chapter 1. The purpose is to assess whether the observed results support or contradict the predicted effects of FDI spillovers on domestic firm performance in Estonia’s manufacturing industry.

First, the results provide strong evidence for positive horizontal spillovers on domestic firms’ labour productivity, particularly when measured by turnover per employee. The significant and robust relationship between foreign presence (measured by the share of foreign employment) and domestic productivity aligns with prior studies (Halpern & Muraközy, 2007; Sinani & Meyer, 2004) that suggest foreign firms promote knowledge transfer and operational improvements through labour mobility and demonstration effects. This supports the idea that domestic industries in Estonia have been able to learn and adapt practices from foreign-owned firms. Moreover, the results for value-added productivity showed positive spillovers in the baseline model. Still, they became insignificant after controlling for industry and year fixed effects, suggesting that structural factors such as industry characteristics and firm size may explain the observed productivity gap. Notably, the firm size control variable revealed that larger domestic firms in Estonia are better positioned to absorb foreign knowledge, supporting the notion that absorptive capacity increases with firm size (Blomström & Kokko, 2001).

Second, the analysis of domestic investment behaviour provides additional insights. The descriptive results showed that foreign firms maintain higher investment ratios than domestic firms. However, the regression results reveal that the initial significant negative association between foreign presence and domestic investment ratio disappears once structural differences across industries and years are controlled. This suggests that the observed negative correlation in the baseline model may have been driven by unobserved heterogeneity between industries rather than reflecting a consistent negative effect of FDI on domestic investment. These findings are consistent with the conditional nature of FDI spillovers suggested by Jude (2018) and Gökçeli, Fidrmuc and Ghosh (2022), where external market conditions and domestic absorptive capacity jointly influence the degree of spillover effects.

Third, capital intensity showed the strongest and most consistent positive spillover effect. The results indicate that industries with greater foreign presence tend to have significantly higher levels of capital intensity, suggesting that domestic firms invest more in physical assets per employee in response to foreign competition and technological learning. This outcome is consistent with the theoretical expectation of technology transfer and capital deepening (Cohen & Levinthal, 1990; Amin, Haq & Hussain, 2022). Domestic firms upgrade their production processes and adopt more capital-intensive production methods, possibly to remain competitive in industries with high foreign dominance.

To conclude, the results of this study demonstrate that FDI spillovers in Estonia's manufacturing industry are highly contingent on structural and industry-specific factors. Positive effects on productivity and capital deepening were observed, particularly where domestic firms possessed the absorptive capacity to leverage foreign knowledge and respond to competitive pressures. However, the absence of consistent effects on domestic investment and labor productivity value added per employee reinforces the view that FDI spillovers are conditional and do not automatically translate into widespread domestic firm upgrading across all performance dimensions (Blomström & Kokko, 2001; Cohen & Levinthal, 1990;

Girma & Görg, 2002; Shujiro & Youngmin, 2022). These findings align with prior research and confirm that the extent of spillover effects is powerfully shaped by country-specific conditions such as institutional quality (Lall, 1992; Park, 2017), firm size (Esquivias et al., 2022; Bournakis, Papaioannou, & Papanastassiou, 2022), absorptive capacity, and industry competitiveness (Aitken & Harrison, 1999; Meyer, 2004).

Conclusion

Foreign direct investment (FDI) plays a crucial role in developing and modernizing domestic industries, particularly in transition economies such as Estonia. This thesis analyzes how FDI inflow affects domestic firms in Estonia's manufacturing industry, focusing specifically on labor productivity, capital intensity, and investment. The empirical approach, based on industry-level panel data from 2008 to 2020 and the empirical analysis combined descriptive analysis with econometric regression models using both baseline and fixed effects specifications to controls for structural differences across manufacturing industries and macroeconomic fluctuations over the sample period, providing a more accurate estimation of the effects of foreign presence on domestic firm outcomes. The results revealed nuanced outcomes regarding the effect of FDI inflows on domestic firms in Estonia's manufacturing industry, contributing to a deeper understanding of economic interactions within the Estonian economy.

The result provides clear evidence that FDI spillovers are not uniform across performance indicators. A significant and consistent positive spillover was found for labour productivity when measured by turnover per employee, suggesting that domestic firms operating in industries with higher foreign presence benefit from improved market efficiency, managerial practices, or organisational learning. However, the effect on value-added productivity was statistically insignificant after controlling for industry and year effects, indicating that while FDI may contribute to operational improvements, it does not necessarily increase the value creation per employee when input costs are taken into account.

In terms of domestic investment behaviour, it also produced important insights. The descriptive analysis showed that foreign firms maintain higher investment ratios than domestic firms. However, the regression analysis revealed that the initial negative association between foreign presence and domestic investment ratios disappeared after controlling for structural differences across industries and periods. This suggests that the observed negative correlation in the baseline model was likely driven by unobserved heterogeneity rather than an actual causal negative effect of FDI on domestic firm investment. These findings support the conditional nature of FDI spillovers, where external market conditions and the absorptive capacity of domestic firms jointly influence the degree of spillover effects. Meanwhile, the most robust positive spillover was observed in capital intensity, where domestic firms in industries with higher foreign presence exhibited higher levels of capital per employee, suggesting they responded to foreign competition by upgrading equipment, adopting new technologies, or increasing asset investments to maintain competitiveness. This outcome is consistent with theoretical predictions regarding technology diffusion and demonstration effects.

The thesis also illustrates that the transmission channels through which FDI affects domestic firms' technology spillovers, managerial practices, and access to capital are not automatically activated, but depend heavily on industry characteristics and absorptive capacities. This highlights the importance of targeted government and institutional policies to support learning and innovation among domestic firms in Estonia, particularly in industries where FDI is most concentrated. Moreover, the thesis examines FDI spillover patterns and their effects on domestic firms over time. It emphasizes the importance of considering macroeconomic influences, such as the structure of foreign capital inflows, and microeconomic conditions within domestic industries when assessing the broader impact of FDI.

Despite its valuable contributions, this thesis has several limitations. First, due to data constraints, the analysis is restricted to horizontal spillovers, focusing only on the influence of foreign firms on domestic firms within the same industry. Vertical spillovers were not analyzed, referring to effects transmitted through supply chains or customer-supplier linkages. This exclusion may restrict a comprehensive understanding of the overall effects of FDI on domestic industries. Moreover, although year fixed effects were included to control for general time trends, certain extraordinary macroeconomic events or shocks (such as the global financial crisis or sudden policy changes) during the 2008–2020 period may have influenced foreign and domestic firm behavior in ways that are not fully accounted for by the model's variables.

The author suggests that future studies could analyse how FDI affects domestic firms differently depending on their innovation capacity or workforce skill level, including vertical spillover. Additionally, comparative research between Estonia and other Baltic or Central European countries could yield insights into the role of national policies and institutional quality in shaping FDI outcomes.

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Appendix A

Variable formula

Variable name	Description	Calculation formula
Labour productivity (Value Added)	Labour productivity basd on value added per employee	$\frac{Value\ added}{Number\ of\ Employees}$
Labour productivity (Turnover)	Labour productivity based on turnover per employee	$\frac{Turnover}{Number\ of\ Employees}$
Log Labour productivity (Value Added)	Natural logarithm of value added per employee	$\ln\left(\frac{Value\ added}{Number\ of\ employees}\right)$
Log Labour productivity (Turnover)	Natural logarithm of turnover per employee	$\ln\left(\frac{Turnover}{Number\ of\ Employees}\right)$
Investment ratio	Ratio of gross investment to fixed assets	$\frac{Gross\ investment}{Fixed\ assets}$
Firm size	Average number of employees per enterprise	$\frac{Number\ of\ employees}{Number\ of\ enterprises}$
Capital intensity FDI	Capital stock per employee	$\frac{Fixed\ assets}{Employees}$
Log of capital intensity	Natural logarithm of capital intensity	$\ln\left(\frac{Fixed\ assets}{Employees}\right)$
Export ratio	Share of exports in total turnover	$\frac{Export}{Turnover}$
Technology investment ratio	Investment in tangible goods relative to turnover	$\frac{Goods\ investment}{Turnover}$
Horizontal spillover (Employee)	Employee of foreign firms within the same industry by total turnover of both firms	$\frac{Employee\ of\ foreign\ owned\ firms}{Total\ employees\ of\ both\ firms}$
Net profit margin	Indicates profitability relative to their total revenue.	$\frac{Net\ profit}{Revenue}$

Asset turnover ratio	Revenue earned per one unit of asset	$\frac{Revenue}{Asset}$
Debt-to-equity ratio	Indicates financial leverage by comparing borrowed funds to equity.	$\frac{Loan}{Equity}$
Horizontal spillover (Turnover)	Turnover of foreign firms within the same industry by total turnover of both firms	$\frac{Turnover\ of\ foreign\ \ firms}{Total\ of\ turnover\ of\ both\ firms}$

Notes. The variables for foreign firms (FDI) and Estonian firms are constructed using the same formulas.

Source: Compiled by author

Appendix B

Descriptive analysis of performance indicator

Variable	Obs	Mean	Std. Dev.	Min	Max
Labour productivity value added base Estonia (€)	231	23,047	13,830	0	93,200
Labour productivity value added FDI (€)	234	273,402	148,295	0	766,000
Labour productivity turnover Estonia (€)	209	99,421	71,885	15,268	427,018
Labour productivity turnover FDI (€)	210	1,318,714	621,790	180,822	3,429,924
Capital intensity Estonia (€)	209	49,539	48,230	4,156	312,171
Capital intensity FDI (€)	210	550,004	558,380	37,746	2,323,941
Investment ratio Estonia	209	0.119	0.063	0.006	0.396
Investment ratio FDI	210	0.133	0.097	0.008	0.669
Firm size Estonia	209	69.992	60.149	30.75	533
Firm size FDI	210	133.992	73.39	51	479.6
Export ratio Estonia	209	0.567	0.198	0.115	0.874
Export ratio FDI	210	0.759	0.211	0.163	0.988
Tech ratio Estonia	209	0.071	0.086	0.002	0.411
Tech ratio FDI	210	0.071	0.05	0.002	0.216
Net profit margin Estonia	209	5.976	9.263	-40.986	63.985
Net profit margin FDI	210	10.987	22.495	-42.055	214.34
Asset turnover ratio Estonia	209	.014	.012	0.002	0.09
Asset turnover ratio FDI	210	0.013	0.023	0.001	0.293
Debt to equity Estonia	209	0.882	0.459	0.106	2.517
Debt to equity FDI	210	0.81	0.614	0.155	4.048
Horizontal turnover	214	0.911	0.137	0	1
Horizontal employee	214	0.552	0.216	0	1

Notes. Investment ratio, export ratio, tech investment ratio, net profit margin, asset turnover ratio, debt-to-equity ratio, horizontal turnover, and horizontal employee are expressed as proportions (0 to 1 scale)

Source: author's calculation

Appendix C

Average values of performance indicators

Variable	Estonia	FDI	% Difference
Labour Productivity value added per employee (€)	23,047	273,402	+1086.28%
Labour Productivity turnover per employee (€)	99,421	1,318,714	+1226.39%
Capital Intensity (€)	49,539	550,004	+1010.24%
Investment Ratio	0.119	0.133	+11.76%
Firm Size (Number of employees)	69.99	133.99	+91.44%
Export Ratio	0.567	0.759	+33.86%
Tech Investment Ratio	0.071	0.071	0.00%
Net Profit Margin	5.98	10.99	+83.8%
Asset Turnover Ratio	0.014	0.013	–7.14%
Debt-to-Equity Ratio	0.882	0.810	–8.16%
Horizontal Turnover	-	0.911	-
Horizontal Employee	-	0.552	-

Notes. 1) "+" in the Difference (%) indicates the percentage by which foreign firms outperform Estonian firms; "–" indicates the percentage by which Estonian firms outperform foreign firms. 2) Investment ratio, export ratio, tech investment ratio, net profit margin, asset turnover ratio, debt-to-equity ratio, horizontal turnover, and horizontal employee are expressed as proportions (0 to 1 scale)

Source: author's calculation

Resümee

See lõputöö analüüsib, kuidas välismaiste otseinvesteeringute (FDI) sissevool põhjustab horisontaalseid ülekandemõjusid Eesti töötleva tööstuse ettevõtetele. Välismaises otseinvesteeringud on olnud oluline majandusliku ümberkujundamise tegur Eestis pärast üleminekut tsentraalselt planeeritud majanduselt turupõhisele majandusele. Kuigi Eestil on õnnestunud edukalt ligi meelitada märkimisväärseid välismaiseid otseinvesteeringuid, eriti töötlevasse tööstusse, jääb endiselt empiiriliselt lahtiseks küsimus, kui palju kohalikud ettevõtted nendest investeeringutest tegelikult kasu saavad.

Lõputöö on ajendatud kestvatest aruteludest akadeemilises kirjanduses, mis käsitlevad välismaiste otseinvesteeringute ülekandemõjude kahetist olemust välismaised ettevõtted võivad teadmiste ülekande ja konkurentsi kaudu tõsta tootlikkust, kuid samas tõrjuda välja kohalikke investeeringuid. See uuring keskendub ainult horisontaalsetele ülekandemõjudele, mis toimuvad sama tööstusharu välismaiste ja kodumaiste ettevõtete vahel selliste kanalite kaudu nagu tööjõu liikuvus, tehnoloogia levik, konkurents ja demonstratsiooniefekt.

Teoreetiline raamistik sünteesib varasemaid uuringuid välismaiste otseinvesteeringute ülekande mõjude kohta ning kirjeldab mehhanisme, mille kaudu välismaised ettevõtted võivad mõjutada kohalikke ettevõtteid. Empiiriline analüüs tugineb Statistikaameti tööstusharude tasandi paneelandmetele, mis hõlmavad 22 töötleva tööstuse haru aastatel 2008–2020. Analüüsiks kasutatakse nelja regressioonimudelit, et hinnata seoseid välismaiste otseinvesteeringute olemasolu ja kohalike ettevõtete tulemuslikkuse vahel: tööjõu tootlikkus (põhinedes müügitulul ja lisandväärtusel), kapitalimahukus ning investeeringute suhe. Tulemuste usaldusväärsuse tagamiseks kasutatakse nii algmudelit kui ka fikseeritud efektidega spetsifikatsioone.

Tulemused toovad esile mitmetahulisi järeldusi. Horisontaalsed töötajate ülekandemõjud avaldavad statistiliselt olulist ja positiivset mõju tööjõu tootlikkusele (eriti müügitulupõhistes mudelites), mis viitab sellele, et teadmiste ülekandmine välismaistelt töötajatelt kohalikele tõstab tööjõu efektiivsust. Samas on mõju lisandväärtusel põhinevale tootlikkusele ebaühtlane ning muutub statistiliselt ebaoluliseks, kui arvestada tööstusharude struktuurseid erinevusi. Investeerimiskäitumise seos horisontaalsete välismaiste otseinvesteeringute ülekandemõjudega on nõrk või negatiivne negatiivsed mõjud ilmnevad mudelites, kus ei kasutata fikseeritud efekte, kuid need kaovad, kui arvesse võetakse tööstusharude ja aastate fikseeritud efekte. See osutab, et sisemised ettevõtte spetsiifilised tingimused ja finantsnäitajad mängivad olulisemat rolli kohalike investeeringute määramisel kui välismaiste otseinvesteeringute ülekandemõjud.

Hoolimata töö tulemustest on selles lõputöös mitmeid piiranguid. Andmete kättesaadavuse tõttu keskendub uurimus üksnes horisontaalsetele ülekandemõjudele ega käsitle vertikaalseid ülekandemõjusid tarneahelate kaudu. Lisaks, kuigi fikseeritud efektidega mudelid aitavad kontrollida varjatud heterogeensust, võib neist olla välja jäetud muutujad, mis võivad tulemusi kallutada.

Tulevased uuringud võivad kasu saada vertikaalsete seoste uurimisest või riikidevaheliste võrdluste läbiviimisest, et süvendada arusaamist välismaiste otseinvesteeringute mõjust väikestes üleminekuriikides ning analüüsida, kuidas majanduspoliitilised muutused mõjutavad välismaiste otseinvesteeringute mõju kohalike ettevõtete tootlikkusele.