LOCATION, PROFITABILITY, AND INTERNATIONAL TRADE LIBERALIZATION IN EUROPEAN TEXTILE-CLOTHING FIRMS[1]

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Abstract:

In the European traditional manufacturing sector (TMS), there is a vigorous debate concerning the real impact of international trade liberalization on firm profitability. Based on firm-level data from five European countries, we analyze how location, productive subsector, and firm characteristics are associated with the profitability of the European textile-clothing industry in the pre- and post-trade liberalization period. Our results reveal that the externalities derived from geographical proximity were diluted after international trade liberalization. Moreover, larger companies and those that focus on high-added-value products, as represented by Northern European firms, show a stronger association with profitability. Accordingly, this observation calls into question the future of some TMS activities in a globalized world. Therefore, manufacturing strategies and industrial policies should be location- and context-specific.

Keywords: liberalization, location, manufacturing strategies, European firms, textile-clothing industry.

JEL codes: F23, L67, R11, R12

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1. INTRODUCTION[3]

Among economists, trade liberalization is controversial because critics claim that the policy costs jobs as a result of imports, whereas proponents assert that it increases efficiency and fosters economic growth (Conway, 2009). Trade liberalization involves the reduction of barriers to the free exchange of goods between nations (tariffs, licensing rules, and quotas). Its effects are highly relevant for a nation's industries because firms are forced to compete in the same market, with foreign competitors who enjoy cost-production advantages in their countries of origin (Burfisher et al., 2001; Flach and Unger, 2022), while other countries and sectors benefit from a reduction in tariffs and non-tariff barriers (Mukherjee and Chanda, 2016; Tan and An, 2019). At the company level, trade liberalization facilitates and pushes the international exchange of intermediate and final products (imports and exports) with important effects on productivity and manufacturing strategy (De Loecker, 2011). Examples of trade liberalization are the General Agreement on Tariffs and Trade (GATT) and the North American Free Trade Agreement (NAFTA). An explanation of the removal of the quota process in the textile industry can be found in Tan and An (2019).

In the traditional manufacturing sector (TMS) (e.g., textiles, furniture, toys, and luggage), trade liberalization, combined with declining spatial transaction costs, has created a critical, volatile, and uncertain environment that is threatening the survival of European firms (Autio et al., 2021). In some cases, the potential strategic responses to this crisis have included perseverance, retrenchment, and exit, while alternatives involving strategic changes and innovation have also been implemented (Wenzel et al., 2020). In the latter case, firms have had to modify their characteristics and competitive strategies to adapt to the changing environment (Sammarra and Belussi, 2006; Belussi and De Propris, 2013). This has led to high economic and non-economic costs that have called into question the future of some industries, such as the textile industry, and the regions[4] in which they are located (Jones and Hayes, 2004; Pickles and Smith, 2011; Fromhold-Eisebith et al., 2021).

[3] The authors want to acknowledge the constructive comments and feedback from the University of Alicante colleagues, Laura Rienda, Lorena Ruiz, and Pedro Seva-Larrosa.

[4] In line with Enright (2003), the term "region" is used to refer to subnational regions—regions within nations—rather than supranational regions, which encompass multiple nations.

The study of how market liberalization changes a territory's role in the performance of manufacturing firms is not new, nor is the debate about how this issue can be faced (Dicken, 2003; Buckley and Ghauri, 2004; Abecassis-Moedas, 2007). In the case of the textile-clothing industry, this discussion was raised because it is not randomly spatially distributed but geographically agglomerated, such that the main effect of liberalization has been increased competition—for both inputs and outputs (Puig and Marques, 2010). Consequently, liberalization has influenced the type of strategies that firms adopt (e.g., to make or buy), the behavior of markets and their agents, competition-cooperation relationships, and the regional industrial ecosystem in which firm activity occurs. This has brought about a need to redefine competitors, particularly emerging economies like China.

However, in the field of economics, further research is needed to examine the relationship between trade liberalization and firm performance. Most literature evaluates how trade reforms at the national level affect development outcomes and the different mechanisms through which this impact occurs, such as resource allocation, economies of scale and scope, importation of inputs and intermediate goods, knowledge transfer, enhanced domestic competition, or productivity improvements (Kandelwal, 2010). Nevertheless, at a country level, the European textile-clothing industry is not homogeneous with regard to where it produces (location), what it produces (manufacturing strategy[5]), or who produces (business characteristics) (European Commission, 2019). Overall, the effects of those changes are expected to vary at the firm level. In recent years, studies on trade reforms have shifted their focus toward microeconomic analyses at the firm level (Mukherjee and Chanda, 2017). In this context, the first objective of this research was to examine the profitability of textile-clothing firms before and after international trade liberalization while attending to the territory and location mode.

[5] Since the pioneering work of Skinner (1969), the manufacturing strategy has been defined and conceptualized from various perspectives (Dangayach and Deshmukh, 2001). Authors such as Kotha and Orne (1989) developed a conceptual framework that allows linking the traditional production function with the competitive strategy at the company level. This redefinition, termed "generic manufacturing strategy," is based on the model of competitive strategies incorporating Industry-wide Differentiation Strategy to Industry-wide Cost Leadership Strategy. That conceptual synthesis is convenient for this work since it allows us to advance—from the point of view of the end product—in the study of the interdependencies between strategy and structure in the textile industry.

Different strands of the literature have analyzed the importance of location mode (isolated versus agglomerated) on firm performance (Beugelsdijk et al., 2010; Claver-Cortés et al., 2019). Economic geography research has mainly focused on examining network models based on firms from the same sector operating in specialized regions, such as local production systems, innovation milieus, industrial areas, and industrial districts/clusters. Some research has been carried out to examine the varying profitability of these agglomerated firms compared to those located in diversified regions, as well as the overall effect of positive and negative externalities on firm performance. However, there is still a need to engage in greater debate on these issues. (Menghinello et al., 2010; Martin and Sunley, 2011; McCann and Folta, 2008). This situation has led to fears of decline and a lack of viable industrial districts/clusters and European TMSs (Buxey, 2005; Menzel and Fornahl, 2010; Potter and Watts, 2011).

We believe that this controversy arises from the fact that much of the literature that attempts to explain location fails to consider it as a root cause, instead viewing it as a proxy for factors that influence outcomes of interest. As such, there is a lack of understanding regarding the strong relationship between location, the business model[6], and firm performance in the TMS (Beugelsdijk, 2007; McCann and Folta, 2008; Gaganis et al., 2019). In a globalized environment, being located in an industrial cluster (agglomerated mode) and striving to achieve an efficient alignment between structure and manufacturing strategy can increase productivity and innovation, leading to positive effects on product and process quality and flexibility. This positions the firm in market segments that are less vulnerable to low-cost competition, ultimately enhancing profitability (Abernathy et al., 2006; Abecassis-Moedas, 2007; Flach and Unger, 2022). In other words, location and business model decisions can play a pivotal role in the industry and region life cycle.

Therefore, the second objective of this study was to explore different firm characteristics and their association with profitability before and after international trade liberalization: productive subsector, size, and ownership. Moreover, the combination of size and productive subsector was also examined. Our aim was to determine whether high value-

[6] As has been suggested by DaSilva and Trkman (2014), we used the business model concept due to its potential to explain firm performance through the study of the capture and creation of value added reflected in the combination of their resources and implemented strategies.

added (HVA) textile-clothing subsectors (Northern European Model [NEM]) demonstrate greater resilience to global competition compared with small manufacturers, which are geographically clustered and more focused on low value-added (LVA) textile-clothing subsectors (Southern European Model [SEM]).

To this end, we examined firm characteristics, the regional spatial distribution of the European textile-clothing industry, and its profitability. Within the European Union (EU), the TMS is under threat from globalization and severe competitive pressure driven by World Trade Organization (WTO)-induced market liberalization (Veugelers, 2013). However, at the same time, according to data from 2019, there are still 160,000 companies in the industry that employ 1.5 million people, generating a turnover of 162 bn euros (European Commission, 2019).

To achieve these different objectives, we studied firms located in the five most significant producers in the industry —three in the South (Spain, Italy, and Portugal) and two in the North (France and Germany)—with the highest combined employment, production, and the number of firms in this sector (Stengg, 2001; Pickles and Smith, 2011). The business model combines the firm's characteristics with their manufacturing strategies (Teece, 2010). Consequently, textile-clothing business models in Northern and Southern Europe differ. In Southern Europe (Italy, Spain, and Portugal), firms are organized into networks of small- and medium-sized enterprises (SMEs) that have limited vertical integration, are embedded in their local territories, and are dedicated to LVA textile-clothing products. In contrast, in high-income Northern European countries (e.g., France and Germany), textile-clothing firms are characterized by HVA production and larger and more vertically integrated and internationalized firms (European Commission, 2019).

Our research findings revealed that firm profitability, location mode, and firm characteristics (i.e., size and ownership) of companies in the European textile-clothing industry performed differently before and after international trade liberalization agreements. Furthermore, manufacturing strategy, based on quality and high-value-added products, continued to be critical for survival.

These results have implications and contributions across various knowledge domains. From a regional science perspective, our findings clarify the role of firms' strategic

decisions in explaining the uneven profitability of clusters (Martin and Sunley, 2011) and raise questions regarding the link between the location effect and the industry's life cycle (Potter and Watts, 2011). For scholars in the field of international economics, our work sheds light on the determinants behind the varying effect of trade liberalization policies on companies (Mukherjee and Chanda, 2017). From a managerial perspective, our results may stimulate firms' proactive behavior and innovative drive and help them to adapt to their environment and critical situations (Manyika, 2012; Wenzel et al., 2020). In addition, in line with previous research (Tödtling and Trippl, 2005; McDonald et al., 2007; Nathan and Overman, 2013), our conclusions suggest that industry policies for the TMS (at both the EU and country level) should be location and context-specific.

The paper is organized as follows: Section 2 summarizes the study's theoretical background and outlines several hypotheses tested. Section 3 describes the data and methodology. Section 4 presents and analyzes the panel regression results to verify the hypotheses proposed. Section 5 concludes with a synthesis of our main conclusions.

2. THEORETICAL BACKGROUND

Buckley and Ghauri (2004) have argued that globalization and market deregulation have created significant challenges for European economies, where the textile-clothing industry is a prime example (Abernathy et al., 2006). This has been further complicated by the fact that European countries are diverse in income, production structures, and labor force skills (Marques, 2010; Georges et al., 2013). Industries themselves are heterogeneous and comprise multiple subsectors that vary in terms of product characteristics, market conditions, employment, and value-added, as well as structural attributes, level of vertical integration, and territorial relationships (Jones and Hayes, 2004; Scott, 2006; Belussi and De Propris, 2013). This diversity is reflected in firms' varying modes of location (level of geographical agglomeration) and the business models they employ (productive subsector, firm size, and ownership).

2.1 Location mode and firm’s profitability

Similar to other TMSs, a considerable proportion of the European textile-clothing industry tend to be concentrated geographically, forming industrial clusters (for example,

in Lombardy and Piedmont regions in Italy, and the North Region of Portugal). The ISTAT (2015) confirmed this trend in Italy using data for local labor systems, employment, and exports, indicating that around 30% of activities in the sector were carried out within territorial networks, such as industrial clusters/districts. This high level of geographical agglomeration is facilitated by the division of labor among small, cooperatively organized units (i.e., SMEs) in an industrialized geographical area that combines various social, cultural, and geographical characteristics, as originally noted by Marshall (1919). Clustering has been found to enable smaller firms to compete effectively with larger vertically integrated firms, according to the evidence on competitiveness and location (Porter, 1998). Becattini (2002) has also argued that, for SMEs in TMSs, the most significant challenge is not their small size but rather their isolation, i.e., their mode of location.

However, the process of trade liberalization in the European TMS has caused a decline in competitiveness for manufacturing industries that are geographically clustered (Dicken, 2003; Potter and Watts, 2011). This is due to reduced costs related to distance, transportation, and trade, which have led to the growth of imports from emerging markets outside Europe, particularly Asian countries (Krugman, 1991; Tan and An, 2019). For the textile-clothing industry, the quota system was terminated in 2005 (Conway, 2009), which caused a significant increase in the imports of cheaper products from these emerging markets.

As a result, the trade deficit between imports and exports of clothes to/from the Extra-EU (all countries outside of the EU) increased dramatically during 2005–2021. In 2005, imports were valued at EUR 56 bn and exports at EUR 37 bn, whereas in 2021 (the last year of the data series), imports and exports were worth EUR 93 bn and EUR 54 bn, respectively (Figure 1). Remarkably, a big jump was registered in imports from 2005–2010 (from 56 bn to 71 bn) (an increase of 33%). According to EUROSTAT (2021), imports mainly originate from China (30%), Bangladesh (18%), and Turkey (12%), while more significant importers include Germany (25%), Spain (15%) and France (14%)[7].

[7] A similar deterioration was recorded in 2005–2018, as evidenced by other European textile industry indicators, such as turnover (-14%), employment (-43%), and the number of companies (-23%) (see Appendix, figure A-1).

INSERT FIGURE 1

Figure 1. Trade of imports and export textiles and clothes to/from the EU. Notes: The graph plots the year (x-axis) against the trade (y-axis), expressed as billions of €. The red solid and blue dotted lines represent exports and imports, respectively.

This boom in imports has threatened the survival of the European textile-clothing industry and, in some cases, has led to a new strategy based on importing inputs from low-labor-cost countries and/or relocating production activities to those countries (Sammarra and Belussi, 2006; DeMartino et al., 2006). In this way, traditional production activities have been progressively replaced by non-production activities, such as design, sales, and marketing, as well as decisions by firms to establish multiple locations.

The significant increase in imports from low-labor-cost countries has endangered the existence of the European textile-clothing industry, and some companies have had to resort to new strategies like importing inputs or moving their production activities to these countries. This has led to a shift from traditional production activities towards non-production activities such as design, sales, and marketing, as well as an increase in multi-location operations.

Consequently, researchers have become increasingly skeptical of industrial clusters and their capacity to overcome the challenges of market deregulation (Belussi and De Propris, 2013). Some of the research points to the decline of the positive effect generated by the clustered location (Menzel and Fornahl, 2010; Potter and Watts, 2011). Puig and Marques (2011) studied the evolution of the location effect on the Spanish textile-clothing industry under globalization, which they defined as a period of rapid liberalization of worldwide trade in this industry, focusing instead on the effects of location on productivity (a variable that is very much correlated with profitability). Their results showed that clustering had a positive effect, and this effect was greater in more disaggregated geographical units than in the region and had the highest level of specialization indexes. Wennberg and Lindqvist (2010) examined Swedish firms in other industries and found similar results, as did Maine et al.'s (2010) study of US firms.

Additional research on the textile-clothing industry has indicated that companies in industrial clusters were at a greater risk of going out of business than those in regions with multiple complementary industries (Staber, 2001a). Various factors can explain this adverse effect. For example, from the perspective of population ecology theory (Freeman and Hannan, 1983; Hodgson et al., 2017), in a crisis, population density (location) is a risk factor because higher density (i.e., the number of firms in the same sector in each geographic space and time) is related to a greater scarcity of resources, which in turn intensifies rivalry and results in cannibalization between the members of the organization. Another risk factor that can affect performance is the life cycle of the industry (subsector) in each territory (e.g., textile firms that are less technologically intensive or resilient to fashion moves) which significantly influences its ability to adapt to new changes (Fromhold-Eisebith et al., 2021). Other authors argue that a kind of lock-in effect (lack of related diversity) in the territories is due to an inability to incorporate needed innovations, and the aim becomes depleted by saturating market demand (Frenken and Boschma, 2007). Overall, questioning external economies in mature sectors such as the TMS can provoke agglomerations to generate diminishing returns (Neff et al., 2011).

As a result, some scholars have raised doubts about the effectiveness of public policies that encourage the formation of industrial clusters. For instance, Martin et al. (2011a) studied the case of France, while Yu and Jackson (2011) looked at the United States, and both questioned the effectiveness of these policies. The main criticism is that such initiatives are subject to selection bias, as they tend to focus on declining sectors and regions and may not be able to address the underlying issues that contribute to reduced productivity, employment, or exports in those targeted firms (Veugelers, 2013).

We believe that the controversy about location mode and its effect on a firm's profitability (economies of localization) is due to the diverse historical trajectories and cultural roots of the territories, which necessarily produce variation in existing structures and relationships in territorially-based companies' networks (Staber, 2001b; Belso et al., 2019). For this reason, the perspectives described above can be reconciled by considering the two alternative predominant types of effects, which are either centrifugal or centripetal (i.e., competition on the one hand and pecuniary external economies on the other) (Krugman, 1991; Li and Zhang, 2011).

Taking the competition effect caused by market liberalization as an example of the first type of effect (Albert et al., 2012), locations with many firms force down each firm's profitability as they compete among themselves. For example, Baum and Mezias' (1992) dynamic analysis showed that hotels located in densely populated regions experienced significantly higher failure rates. Taking the pecuniary external economies effect (in force during times of pre-liberalization) as an example of the second type of effect, a location that contains a large number of firms is beneficial as it allows those firms to establish vertical linkages with neighboring firms in the same industry (Lanaspa et al., 2016), generating agglomeration economies and creating horizontal linkages with neighboring firms in other industries, thereby decreasing production costs and increasing flexibility and profitability (Marques, 2008).

Among the clustered European textile-clothing firms, we considered that the agglomeration advantages might erode under the pressures of a crisis and deregulation, such as international trade liberalization. For this reason, we formulated the following hypotheses:

Hypothesis 1. The positive association between the clustered location of textile-clothing firms and profitability will be weaker after international trade liberalization agreements.

2.2 Productive subsector and profitability

Kotha and Orne (1989) defined manufacturing strategies as the organization's response to the challenges of its environment related to the main productive activity or subsector. In line with Dangayach and Deshmukh (2001), in this paper, the manufacturing strategy is understood as a consistent pattern of decision-making in the manufacturing function linked to the firm strategy. In contrast, firm characteristics refer to decisions about an optimal organizational configuration and may include, for example, choices about size, the number of establishments, degree of vertical integration, and ownership (Thomsen and Pedersen, 2000; Shafer et al., 2005; Galliano and Soulié, 2012). This distinction between the productive subsector and firm characteristics is key to understanding the main activity of the firm (as a proxy of its manufacturing strategy), and the organization of production (vertical integration and location mode) (Helsley and Strange, 2007).

According to Toyne et al. (1984), the production process of the textile-clothing industry includes all tasks from the early processing of natural and artificial textile fibers to their transformation into cloth. It does not include others, such as the sale and distribution of products. These tasks are the basis for a variety of intermediate and final products. Like other TMSs, the textile-clothing production process can be grouped into three primary cycles: the production of inputs, the transformation of inputs, and the production of outputs (Puig and Marques, 2010). In general, intermediate textile products are used as inputs for other products, and these subsectors are intensive in capital and skilled labor. Other activities related to producing outputs are dedicated to final textile products (home and technical textiles) and clothing products (wearing apparel). Of both subsectors, the former is also capital-intensive, while the latter (clothing output) is more labor-intensive (Fromhold-Eisebith et al., 2021).

The European Commission defines the textile-clothing industry as "*a diverse and heterogeneous industry which covers a wide variety of products (…). This diversity of end products corresponds to a multitude of industrial processes, enterprises, or market structures*" (European Commission, 2019). To put it differently, the textile-clothing industry's heterogeneity suggests that the products produced by each subsector, as well as the characteristics of the firms within each subsector, are highly diverse and exhibit varying levels of comparative advantage, as noted by Saki et al. (2019).

From the point of view of manufacturing strategies and product quality, we can distinguish two main types of subsectors: those that are very intensive in unskilled labor (LVA) and those that are more intensive in skilled labor (HVA) (Khandelwal, 2010; Veugelers, 2013). In simpler terms, this differentiation enables a clear distinction between the production and commercial aspects of the textile industry, making it more practical than other classification systems, such as those based on yarns, fabrics, textiles, and clothing. It also allows for identifying and isolating other sectors that support the textile industry, such as those related to textile machinery or chemistry. Moreover, it allows for alignment between manufacturing functions and competitive strategies at the firm level (Kotha and Orne, 1989).

Authors such as Buxey (2005) established that in a scenario of dismantled tariffs, a necessary condition for firm survival in the European textile-clothing industry is a focus on quality and specialization, and diversification in HVA subsectors and processes. Along the same lines, Jones and Hayes (2004), Abernathy et al. (2006), Scott (2006), and Belso et al. (2019) suggested a positive relationship between TMS firm survival and the technological intensity and innovation capability of firms. In the case of Belgian textiles, De Loecker (2009) estimated that removing barriers to trade induced efficiency gains, especially in larger companies with a more diversified production. Puig et al. (2009) found empirical evidence of a positive effect of specialization in HVA subsectors (home-technical) on firm profitability in the Spanish textile-clothing industry.

Some of the reasons that explain this positive association between HVA subsectors and profitability in a scenario of trade liberation are that companies can supply themselves internationally with products at a lower cost, which makes them more productive, and thus the loss of sales in local markets would be offset by an increase in exports (Khandelwal, 2010; Tan and An; 2019). However, this strategy, which is based on international outsourcing and offshoring, would also cause adverse effects, especially among smaller companies. On the one hand, the disappearance of numerous local suppliers would diminish the flexibility and efficiency of their production processes. On the other hand, these shifts would not be compensated for by increased exports due to the fixed export costs, financial limitations, and lack of skilled staff (Buxey, 2005; Abecassis-Moedas, 2007). In short, due to these trade-offs, the positive relationship between quality and profitability will remain after textile liberalization. The second group of determinants of textile-clothing firm profitability can be established as follows:

> ***Hypothesis 2.*** *The positive association between HVA textile-clothing firms and profitability will remain after international trade liberalization agreements.*

2.3 Firm characteristics and profitability

The economic-business literature has a long tradition of studying the determinants of firm profitability. In addition to the characteristics of the subsector, these works have also

analyzed the importance of other effects, such as the characteristics of the firms[8], to investigate whether differences between countries, with respect to the profitability of companies in the same subsector, are due to the particular configuration of that subsector in a given country (McGahan and Porter, 2002).

For the European textile-clothing industry, various researchers have examined the origin of these differences (Stengg, 2001; Taplin, 2006)—the US (Ha-Brookshire and Lu, 2010), India (Mukherjee and Chanda, 2016) and China (Tan and An, 2019). After reviewing this literature, it can be seen that no general conclusions have been reached; instead, research has produced partial findings that consider each territory's reality and the activities that effectively develop each firm.

On the one hand, textile-clothing manufacturers in high-income European countries such as Germany or France have traditionally focused on HVA subsectors involved in technical textiles and fashion products, and have organized their production through large, vertically integrated companies—and in some cases, through multinationals (Blancheton, 2021; Fromhold-Eisebith et al., 2021). These decisions have allowed them to maintain high levels of foreign trade in exports and imports, the latter of which was achieved by outsourcing to low-wage countries.

On the other hand, textile-clothing firms in Southern European countries have organized their production through small and medium firms geographically agglomerated with a low degree of vertical integration, being focused on one or more phases of the production process and end-products with low complexity. Moreover, according to their managerial role, they are independent, with a slight separation between ownership and control (Stengg, 2001). The reason for this configuration is that most of them are spinoffs (i.e., founded by incumbent firms from the same industry that are close to their parent companies), which enhances tie formation in the local network, which favors

[8] There is a continuous discussion in the field of business economics and strategic management regarding the significance of size and ownership on the economic and non-economic performance of firms, as assessed by measures such as profitability, productivity, innovation, exporting, survival, and growth (McGahan and Porter, 2002). However, other factors beyond the firm also contribute to this debate, including industrial structure (concentration) and industrial organization models (specialized firm and territorial networks versus vertically integrated firms). Hence, we considered size and ownership as characteristics of a higher-order element in the business model to distinguish different types of firm characteristics and the subsector under analysis (geographically agglomerated domestic SMEs vs. isolated large foreign firms).

collaboration, the harnessing of information, and knowledge concentration (Juhász, 2019).

Considering the above, two alternative realities can be observed, as Abecassis-Moedas (2007) and Pla-Barber et al. (2007) pointed out: One is characterized by internationally multilocated firms that, while coping with liberalization, can grow to a sufficient size to generate economies of scale and scope, and escape from the limitations of smallness, as evidenced by Mukherjee and Chanda (2016) and Tan and An (2019). Another is based on intense territorial cooperation between smaller firms that compete in reduced market niches and are thus less vulnerable to low-cost competition (Helsley and Strange, 2007; Belso et al., 2019).

In line with Krugman (1991) and Somlev and Hoshino (2005), the internationally multilocated firm model, as an example of predominance in a territory of a centrifugal effect, implies a more significant presence abroad, both through the use of more committed models of internationalization (Serra et al., 2012) and the presence in the organisms of control of foreign investors (Abernathy et al., 2006). In contrast, the international activities of participants in the cooperation model (i.e., the centripetal effect) revolve around importing or international subcontracting, and they would be located in an industrial cluster (Belussi and De Propis, 2013).

Thomsen and Pedersen (2000) reported that foreign ownership positively affected asset returns, which was attributed to primary objectives regarding economic performance. Moreover, given the pressure of the owners on management to adopt specific strategies and structures, ownership also conditions firm performance (Douma et al., 2006; Brouthers et al., 2007). Lin et al. (2011) have shown that foreign enterprises have the highest productivity in the Chinese textile industry, while state-owned enterprises have the lowest, and private enterprises are ranked second. In line with Enright (2003), foreign investments of multinational enterprises into the local environment and indigenous firms can bring substantial benefits in terms of resources and knowledge. However, Lu and Karpova (2012) noted that foreign ownership and financial resources were not significant predictors of the firm's R&D performance in Chinese textile firms. The results reported by Azzam et al. (2013) indicated that the effect of foreign ownership is sector-specific.

In other words, even though the nature of the contribution of foreign capital to profitability in firms is not established in the literature, it has been the focal point of many studies (Iršová and Havránek, 2013) and the interaction of multinational firms and regional clusters are worthy of further analysis (Mariotti et al., 2014). The ideas presented can be summarized in the following hypotheses:

Hypothesis 3. *The positive association between the size of textile-clothing firms and profitability will be stronger after international trade liberalization agreements.*

Hypothesis 4. *The positive association between foreign ownership of textile-clothing firms and profitability will be stronger after international trade liberalization agreements.*

Figure 2 briefly sets out the conceptual benchmark described and the resulting hypotheses. In summary, we explored the association between firm profitability and three factors: location in clusters (H1), productive subsectors (H2), and firm characteristics (H3) before and after trade liberalization.

INSERT FIGURE 2

Figure 2: Conceptual benchmark and hypotheses.

3. DATA AND METHODOLOGY

3.1 Description of sample

The study population of firms was taken from the European textile-clothing industry and was chosen based on various methodological and availability criteria. The production universe included NACE Rev. 2[9], codes 13 and 14, while the geographical universe was

[9] Division 13 pertains to processing textile fibers, including spinning, weaving, finishing textiles, and making textile products, but not clothing such as household linen, rugs, and cordage. Division 14 pertains to all clothing and accessories, made-to-measure or ready-to-wear, in all materials like leather, knitted and crocheted fabrics, and other materials. This includes outerwear, underwear for men, women, or children, work, city or casual clothing, and accessories.

limited to five European countries: Italy, Spain, Portugal, Germany, and France. These five countries were selected due to their data availability and representation of the European textile-clothing industry. They were the top five countries regarding production and employment in this industry within the EU (European Commission, 2019)[10].

The AMADEUS database[11], compiled by Bureau Van Dijk (ORBIS), is the most extensive database for European firm-level data. The database gathers data from national sources, usually from each national public company registry. Similar to recent research, such as Gaganis et al. (2019) and Fernández-Gámez et al. (2020), we extracted a sample from this database based on several criteria.

First, we selected the period of 2002–2009 as it was considered a time of significant changes in the textile-clothing industry due to trade liberalization policies (Tan and An, 2019). The removal of quotas on clothing imports into major markets occurred on January 1, 2005, allowing buyers to source clothing from any country and suppliers to export without restrictions, subject only to a system of national tariffs, non-tariff barriers, and WTO-sanctioned safeguards. To ensure consistency in the analyzed period, we separated it into pre-liberalization (2002–2005) and post-liberalization (2006–2009) periods. Second, the sampling was based on the company's primary code of "textiles" (subsectors 13.1 to 13.9) and "clothing" (subsector 14.2). Third, we eliminated all firms not regarded as "active." Fourth, we excluded very large firms (more than 1,000 employees), as they typically had dispersed ownership and were present in multiple locations (Galliano and Soulié, 2012), and kept only those firms determined by AMADEUS as large, medium-sized, or small. Finally, the selection of variables provided data for 12,066 firms (1,207 in Italy, 3,754 in Spain, 4,066 in Portugal, 2,396 in Germany, and 643 in France).

3.2 Operationalization and measurement of variables

3.2.1 Dependent variable

In this study, we assessed the impact of various factors on firm profitability. The ROA (return on assets) indicator was chosen for analysis due to its availability in AMADEUS

[10] See also Puig and Marques (2010) for the economic importance of the textile-clothing industry in certain countries of the EU.

[11] Since this research commenced, the AMADEUS database for European data has merged with the ORBIS database for worldwide data.

and its strong, positive, and statistically significant correlation with both sales and productivity (Douma et al., 2006; Puig et al., 2009; Mariotti et al., 2014; Gaganis et al., 2019). The validity of the ROA indicator has been assessed by examining profitability trends over time and comparing profitability levels among firms operating in the same sector (Bou and Satorra, 2010; Kukalis, 2010).

We have explored the dynamics of this firm's indicator, ROA, during 2002–2009. It was distinguished based on the productive subsector and territories. Figure 3a shows that the average profitability of companies constantly deteriorated, falling from 3.8% to -1.1%. This decline among low-added companies is especially relevant.

Regarding the location mode, Figure 3b shows that this decline in profitability has always been worse in territories with a high level of agglomeration. In contrast, there has been an uneven evolution between the other two (i.e., for levels of low and very high levels of agglomeration).

INSERT FIGURE 3a

Figure 3a. Evolution of ROA according to productive subsectors (2000-2009). Notes: The graph plots the year (x-axis) against the ROA (y-axis), expressed as a percentage. The red solid, the blue dotted, and the grey dashed lines represent the average, HVA, and LVA subsector, respectively. Values are averaged at the subsector variable level.

INSERT FIGURE 3b

Figure 3b. Evolution of ROA according to location (2000-2009). Notes: The graph plots the year (x-axis) against the ROA (y-axis), expressed as a percentage. The red solid, the blue dotted, and the grey dashed lines represent high, low, and very-high textile agglomeration, respectively. Values are averaged at the location variable level.

3.2.2 Explanatory variables

To test the hypotheses, the explanatory variables included location, productive subsector, and firm characteristics, and were in line with management and regional studies literature. However, they were limited by data availability.

Location mode: Coefficients of Specialization (CS)

Regarding location and agglomeration, the study's analysis was conducted at the regional level of geographic breakdown using location quotients (LQ) as a proxy (Cromley and Hanink, 2012)—henceforth referred to as coefficients of specialization (CS). Following the application of Renski (2009) for LQ and Puig and Marques (2010) for CS, the CS is a statistical measure that indicates the degree to which an economic activity (in this case, the textile-clothing sector) is present in a specific region compared to its presence in the entire reference sample. For methodological and data availability reasons, and in line with Crozet et al. (2004) and Menghinello et al. (2010), instead of calculating the CS at a province level (NUTS III), the CS was calculated at a regional level (NUTS II) in the selected countries using annual EUROSTAT employment data. The CS can be defined as follows:

$$CS_{kr} = \left({}^{E_{kr}}/_{E_r}\right) / \left({}^{E_k}/_{E_n}\right) \qquad (1)$$

where E_{kr} is employment in sector k in region r, E_r is total employment in region r, E_k is total employment in sector k, and E_n is total employment in the sample. A CS greater than '1' for a particular region indicates a regional specialization or that the region is more specialized than the reference sample average.

Table 1 shows the NUTS[12] II regions in the selected countries were identified as more specialized than the EU-27 average, distinguishing the pre-and post-trade liberalization subperiods. In Italy, the CS ranged from 0.1 up to 5.4; in Spain, from 0.3 up to 1.7; and in Portugal, from 0.2 up to 9.3. The higher number of regions with CS>1 is in these three countries. However, the increasing specialization index in the most highly-specialized regions is the most striking feature. As shown in the Appendix, textile-clothing turnover (Figure A-1), employment (Figure A-2), and firms (Figure A-3) have decreased across the EU; however, regions that were already more focused on this industry prior to liberalization showed a smaller decrease in employment than other regions, so their level of specialization relative to that of the EU has increased. This data feature constitutes

[12] The NUTS (regional units used by EUROSTAT) have been used in many studies. The NUTS are described at http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction.

some preliminary evidence that highly specialized regions could predominate a pecuniary external economies effect.

INSERT TABLE 1

To measure the location effect, we used the CS variable. Authors such as Lazzeretti et al. (2008) analyzed the advantages and disadvantages of using the CS as a measure of geographical agglomeration compared to other measures such as the Gini index. Most studies that use the CS tend to set a threshold value of '1' in order to distinguish between agglomerated and non-agglomerated firms, but also the importance of distinguishing between values close to '1' or very far away from '1' (in the latter case, they would be indicative of high regional specialization in the analyzed industry as opposed to a diversified region). In addition, it is also crucial to highlight the local, provincial, or regional level, where a large company could affect the index obtained. Therefore, following Puig and Marques (2011), in addition to taking the region as a base (NUTS II), we distinguished between two levels of agglomeration: (i) *high* when the CS is between '1' and '2'; and (ii) *very high* when it is higher than '2'.

Productive subsector

The textile literature identifies various subsectors that have different characteristics in terms of technological content and value-added along the textile value chain (Taplin, 2006; Lin et al., 2011), including the following five NACE Rev.2 subsectors, in particular: (1) Yarn (13.1 and 13.2); (2) Finished Products (13.3); (3) Home-Technical (13.9); (4) Knitted Articles (14.3); and (5) Clothing (14.1). Of these, subsector (3) had the highest technological content and end-product complexity and was therefore classified as HVA. In contrast, the remaining subsectors were considered LVA (Puig et al., 2009).

The strategic choice of a productive subsector within the textile-clothing industry is vital for a firm because it shapes profitability outcomes under trade liberalization, as highlighted by Buxey (2005) or Bernard et al. (2007). According to Khandewal (2010),

firms that are focused on a comparative advantage product will perform better under trade liberalization than those focused on a comparative disadvantage product. In the current context, where emerging markets are highly cost-competitive, Europe's comparative advantage is high technological content and high value-added (Manyika, 2012; Veugelers, 2013). Thus, we operationalized the role of manufacturing strategy using a dummy variable and assigned the value of 1 for the HVA subsector and 0 in all other cases.

Firm characteristics (size and ownership)

Regarding the characteristics of the firm, we defined two indicators: 1) size (small, medium, and large) (AMADEUS[13]); and 2) ownership[14], distinguishing between foreign and domestic firms (if the firm and its main shareholders are located in the same country) (Douma et al., 2006; Brouthers et al., 2007). In both cases, we created dummy variables.

The size dummies were defined for medium size (medium-sized firms were assigned the value of 1; otherwise, the value of 0 was assigned) and large size (large-sized firms were assigned the value of 1; otherwise, 0). The ownership dummy was assigned the value of 1 if the firm was foreign-owned and 0 otherwise.

3.3 Analysis Technique

Our empirical work was based on different studies that utilized the generalized least squares (GLS) method for panel data models, while considering that this method is computationally feasible for large firms (Kapoor et al., 2007; Hall and Guo, 2012). The GLS method tests the cross-sectional constraints imposed by the model through a

[13] For the investment size measurements, we used the classification provided by Bureau Van Dijk (ORBIS), which is based on three criteria: operating revenue, total assets, and employee number. Therefore, we refer to three types of firms: 1) "Large" are companies that met at least one of the following criteria: Operating revenue (turnover) ≥ 10 M. EUR, Total assets ≥ 20 M. EUR, Number of employees ≥ 150. 2) "Medium" are companies that met at least one of the following criteria: Operating revenue (turnover) ≥ 1 M. EUR, Total assets ≥ 2 M. EUR, Number of employees ≥ 15. 3) "Small" are companies not classified by any of the above categories.

[14] In AMADEUS, the relationship between a shareholder and a firm is defined according to the degree of independence, the direct or indirect nature of the relationship, or the ultimate owner's nationality. In our case, the parameters chosen for the definition of the citizenship of the owners (ultimate owners) required a minimum holding of 50.01% of the firm's capital. The main foreign shareholders were from 12 European countries (Austria, Belgium, Switzerland, Germany, Denmark, Spain, France, the United Kingdom, Italy, the Netherlands, Portugal, and Sweden) and the US.

likelihood ratio test, which determines whether the multi-factor model reasonably fits the data (Al-Shboul and Anwar, 2014).

The estimating equation is written as follows:

$$ROA_{irt} = \beta_0 + \beta_1 CS_{rt} + \beta_2 HVA_i + \beta_3 SIZE_i + \beta_4 FOREIGN_i + u_{irt}$$

where *i* is firm, *r* region and *t* period. Moreover, CS_{rt} was obtained by adjusting CS_{kr} from expression (1). For simplicity, the subindex *k* was eliminated because it is fixed as the textile-clothing sector. The *t* subindex is introduced to indicate that CS is calculated each year as some NUTII oscillate between low and or between high and very high CS. The remaining explanatory variables are time-invariant due to their nature in the AMADEUS database for time series and because their subtle changes are irrelevant for our purposes.

We ran two sets of panel regressions of the ROA on the selected variables, including the region, time, and region-time effects for the sample presented in Section 3. To identify the actual location effect, we checked if potential significance of the CS variable was not simply due to region and time heterogeneity. By including the region, time, and region-time effects in the model, any remaining significance of the CS variable can then be fully attributed to the effect of clustered location.

While these panel regressions showed an association between the explanatory and dependent variables before and after worldwide trade liberalization in the textiles and clothing industries, they also revealed the possible change in the SEM and NEM models. In both sets of regressions, random effects were used instead of fixed effects for both conceptual and econometric reasons (Lee and Yu, 2012). First, using random effects was conceptually more appropriate because we examined a sample of firms in a sample of countries; thus, we only used a subset of the population. This assumed the region- and time-level random effects were uncorrelated with more plausible explanatory variables. Second, the Hausman test revealed that we could not reject the null hypothesis that the coefficients estimated by the random effects estimator were consistent and efficient (Amini et al., 2012). In addition, in line with Croissant and Millo (2019), there is no interest in estimating the individual effects in a micro-panel. Therefore, these estimates

were preferable to the fixed effects estimates, which were consistent but not efficient. A recent study that has used random effects with similar data is Gaganis et al. (2019).

The technique used so far provides valuable insights. Moreover, we considered unobserved heterogeneity and endogeneity. Tables 3 and 4 show that region and region-time effects were relevant in most cases (for example, in the complete sample 135.78 and 749.25, p-valor<0.001). It is particularly relevant for the SEM, indicating that this is a territorially embedded model, unlike the NEM. This was similar to the study by Martin et al. (2011b), which measured the endogeneity of spatial agglomeration on the productivity of French firms, in turn influencing their profitability.

By distinguishing unobserved heterogeneity and endogeneity, the model can fit some relationships that could emerge in a firm with a high ROA, which may attract the interest of foreign investors and become a multinational subsidiary (Cook et al., 2011; Belussi and De Propis, 2013). In addition, while a high ROA may increase its size over time, a high ROA in the case of neighboring firms may increase their region's CS over time. In line with Martin (2014), we can observe that these are examples of self-reinforcing mechanisms of agglomeration that may generate path dependence; regions with very high levels of specialization in the textile-clothing industry may see those levels increase over time, as shown in Table 1. Similar findings have been observed among European firms (e.g., Martin, 2010; Staber et al., 2010) and in several dimensions of European economies (e.g., Marques, 2010).

4. RESULTS AND DISCUSSION

This section tests the theoretical hypotheses presented in Section 2. We explore the associations between firm profitability of the textile-clothing industry and location mode, productive subsector, and firm characteristics (i.e., firm size and foreign ownership) in the context of international trade liberalization agreements.

Table 2 provides a cross-tabulation of productive subsectors and size by country. HVA firms are under-represented in Italy, Spain, and Portugal and over-represented in Germany and France, both of which have a higher proportion of large firms in terms of size. According to Veugelers (2013), these results broadly allow us to identify a business

model that is present in Southern Europe, namely, the model that we have termed the SEM. Small firms characterize this model as focused on LVA subsectors. Another business model that is present in Northern Europe can be called the NEM, which is characterized by large firms centered in HVA subsectors.

INSERT TABLE 2

Table 3 presents the panel regression results for ROA, which distinguishes between the pre-liberalization (Model 1) and post-liberalization periods (Model 2).

INSERT TABLE 3

To examine the agglomeration advantages through the analysis of the profitability of textile-clothing firms, the first conclusion is that there was a decline during the pre- and post-trade liberalization periods. Model 1 revealed a positive association between clustered location with very high CS regarding low CS (Model 1, $\beta=6.694$, p-value<0.05); it also disappeared after international trade liberalization (Model 2, $\beta=3.144$, p-value>0.1). In other words, the externalities derived from geographical proximity were diluted after international trade liberalization.

These results are in line with previous studies that found an association between the effect of agglomeration and the life cycle of an industry (expansion and contraction). In this regard, authors such as Potter and Watts (2011) and Kukalis (2010) found no significant differences in financial profitability between clustered and non-clustered firms during periods of economic contraction. In the Spanish textile industry for the period 2001–2006, Puig and Marques (2011) evidenced the positive and significant impact of CS on productivity when the index of regional specialization was high. However, this impact decreased over time, coinciding with the end of tariffs on textile imports.

At the firm level, in European textile companies within an industrial cluster, the implementation of market liberalization policies led to the dilution of the externalities derived from geographical proximity. Given the above, Hypothesis 1 could not be supported. We did not find a weaker association between location and ROA; instead, no statistically significant association was observed between these two variables in Model 2 (post-liberalization).

To explore different firm characteristics and their association with profitability before and after international trade liberalization, we tested Hypothesis 2; that is, in terms of LVA, the positive association between HVA textile-clothing firms and profitability will remain after international trade liberalization agreements. As seen in Table 3, this relationship was detected during the pre-and post-trade liberalization periods (Model 1, β=1.994, p-valor<0.001; Model 2, β=1.453, p-valor<0.001). Based on these results, we could assert that the average profitability within that category was consistently significant when faced with regulatory changes such as trade liberalization. This significant association aligns with Dunford et al. (2016), and Saki et al. (2019). Moreover, the association remained because of the comparable pre- and post-coefficients. Therefore, Hypothesis 2 was verified. In other words, producing products with HVA seems essential after international trade liberalization.

Firm size was identified as the factor that showed the strongest persistent association with the profitability of the companies in our sample. Furthermore, large and medium companies, when compared with small firms, were positively associated with profitability (Model 1, β=5.739, p-valor<0.001 and β=3.597, p-valor<0.001; for Model 2, β=6.361, p-valor<0.001 and β=3.988, p-valor<0.001), and for both periods. This positive influence became stronger when we considered international trade liberalization. In the post-liberalization period, the advantages of medium- and large-sized firms were greater and statistically significant. Therefore, Hypothesis 3 was supported. This result is in line with the population ecology's postulates (Freeman and Hannan, 1983; Hodgson et al., 2017) and the limitedness—in terms of resources and capabilities—that smaller firms are confronted with as a result of environmental changes.

Nevertheless, an unexpected finding was the association between profitability and foreign ownership regarding domestic firms. In the pre-liberalization period, foreign ownership was not statistically significant (Model 1, β=-1.387, p-valor>0.1). This factor was statistically significant and negative after liberalization (Model 2, β=-3.251, p-valor<0.001). In other words, in the post-trade liberalization period, it was found that the presence of foreign members in the firms of the industry under analysis was detrimental to profitability and did not represent a positive competitiveness factor. Although this result contradicted previous studies (Blomstroöm and Sjöholm, 1999), it offers greater insight into whether foreign-owned firms in the textile-clothing industry can perform better than domestically-owned firms, and whether such differences have occurred after the worldwide liberalization of trade. Consequently, Hypothesis 4 was not verified.

Finally, in line with Tödtling and Trippl (2005), Tan and An (2019), and Fromhold-Eisebith et al. (2021), we accept that various historical, political, and economic factors have caused the textile-clothing industry to adopt different business models in European regions, which may have contributed to different levels of firm profitability. We characterized the business models by referring to the productive subsector (HVA vs. LVA) and firm size combined with the firm's location (Shafer et al., 2005).

To gain a more comprehensive understanding of the situation and to produce complementary results, we analyzed the last associations by considering the SEM (with small firms focused on LVA subsectors) and NEM (with large firms centered in HVA subsectors) regions for the selected countries (Table 4).

INSERT TABLE 4

First, in the model for the complete sample (Model 3), we can see how clustered location with very high CS regarding low CS was associated with firm profitability during the entire study period (Model 3, β=4.365, p-valor<0.1). Similar results were observed in the case of HVA subsectors and firm size.

When we split the sample between the two business models (Model 4 and Model 5), the association between location and profitability was not statistically significant. This controversial result produced by Model 3 is not surprising. On the one hand, as previously discussed, clusters can be the object of two opposing forces (centripetal and centrifugal) in times of crisis. On the other hand, the data analyzed can reflect these turbulences and become unstable over time. In addition, there were greater differences (heterogeneity) among the firms included in the complete sample than among those in the subsamples (NEM and SEM). Overall, these findings are worthy of a further multilevel analysis using repeat measures to consider the hierarchical structure of regions and countries and the supranational entities (north and south) and the interactions that exist between them, as has been suggested by Beugelsdijk (2007) and Fernández-Gámez et al. (2020).

In terms of the manufacturing subsector, the HVA level continued to be positive and significant in both models (4 and 5). Specifically, the effect of the firms' subsector was positively associated with profitability in the NEM (Model 5, β=3.117, p-valor<0.001) and in the SEM (Model 4, β=1.350, p-valor<0.001). According to size, similar conclusions can be made; that is, large and medium companies—when compared with small firms—were positively associated with profitability (Model 4, β=6.549, p-valor<0.001 and β=3.837, p-valor<0.001; for Model 5, β=6.406, p-valor<0.001 and β=5.054, p-valor<0.001). Moreover, these two positive associations between profitability, subsector and firm size were even more remarkable for firms operating under the NEM (Model 5).

In our study, foreign ownership was a disadvantage in the NEM. This is because the countries in this sample (Germany and France) are at a level of technological and business development that cannot be regarded as inferior to that of foreign investor countries (Model 5, β=-3.612, p-valor<0.001). Under the SEM, foreign ownership was not statistically significant (Model 4, β=-1.005, p-valor>0.1).

The results presented in Tables 3 and 4 show that larger firms focused on HVA textile-clothing subsectors have resisted global competition better than smaller firms centered in LVA textile-clothing subsectors. Furthermore, there was a significant association between profitability and companies aligned with the NEM model (HVA and sized companies). Some of the reasons that would explain this fact are that these companies are

not only multiproduct producers that have positioned themselves in the manufacture of higher quality goods, but due to their size, they have also suffered lower export market entry costs.

In other words, the elimination of quotas in importing countries—or the liberalization of trade—affects companies that operate mainly in domestic markets with current products (small companies) and facilitates offshoring and exports to the largest firms, which translates into improvements in efficiency, quality, and additional profits (De Loecker, 2009; Khandelwal, 2010; Tan and An, 2019).

5. CONCLUSIONS

This study had two related objectives. First, it aimed to examine the profitability of textile-clothing firms before and after international trade liberalization while considering the location mode (agglomeration). Second, the research explored different firm characteristics and the association with firm profitability in those periods: productive subsector, size, and ownership. To evaluate the advantages of agglomeration, we considered the existence of clusters in NUTS II regions with a CS greater than 1 and further distinguished between those with a CS greater than 2. For the productive subsector, we classified HVA and LVA firms, and we studied firm size and foreign ownership as business features. Finally, as a complementary analysis, we identified different behaviors in European countries: high value-added (HVA) textile-clothing subsectors (NEM) with large vertically integrated firms focused on producing HVA products.

Our research revealed that in a period of intense competition and market changes (2002–2009), on average, the NEM firms generated better profitability than SEM firms. This business model has been able to resist stronger global competition compared with small manufacturers, which were geographically clustered and more focused on low value-added (LVA) textile-clothing subsectors.

These conclusions suggest that European TMS firms faced with free-trade markets need to base their production strategies on product varieties that are superior in quality and for which size seems necessary (Flach and Unger, 2022). In addition, at the territorial level,

it is essential to rethink the organization's production system in terms of engaging in international outsourcing for phases that generate comparative disadvantages. At the policy level, there is a need to deploy policies that consider the distribution of firms in the territory and facilitate the recovery of agglomeration advantages.

Since our paper studied profitability in times of trade liberalization among a broad cross-section of textile firms in the EU economy by analyzing business-specific effects, the sector of activity, and location, the conclusions have different implications. At a theoretical level, we have highlighted the importance of location; hence, studying a firm's agglomeration is relevant to economic geography and international economics. Moreover, to understand the different paths followed by many European clusters, it is necessary to gain a more thorough understanding of the different business models implemented therein. Although the role of the territory also depends on the industry life cycle (Potter and Watts, 2011), our results indicated that the firms' strategic decisions moderated the extent to which trade liberalization has impacted the performance of location/agglomeration at regional levels. While this conclusion should be interpreted with caution due to the low explanatory power of the models employed (R-squared), it highlights how some strategies and policies may improve the performance of the textile-clothing industry. However, these would require a proactive managerial attitude and, as has been suggested in previous studies such as McGahan and Porter (2002), the consideration of manufacturing strategy and business characteristics. Notably, the results sound the alarm for European regional policy since the sample countries identified that the SEM was more adversely affected by turbulent events such as financial crises or trade liberalization. Therefore, given the outcomes obtained, manufacturing strategies and industrial policies should be location and context-specific.

Our research is subject to several limitations concerning the definition of agglomerated geographical areas and the analyzed business models. We defined the clusters at the NUTS II level for the regional-level data from EUROSTAT. Nevertheless, other authors have used the NUTS III level (e.g., O'Donoghue and Gleave, 2004), using data for the textile-clothing industry that cannot be obtained by means of typical data sources such as EUROSTAT or the Organisation for Economic Cooperation and Development (OECD).

According to Puig and Marques (2011), agglomerations should be defined at a more detailed territorial level. They suggest that studies of clusters at a less detailed geographic level are likely to find less evidence for the benefits of agglomeration.

In terms of the business models analyzed and identified, this study did not incorporate information (then incomplete) from other member states of the European Union, specifically those from Central and Eastern Europe, which are also impacted by the liberalization of world trade in the textile sector. Moreover, having a larger and more complete sample would allow us to revise the adopted approach of the econometric model regarding the nature of the effects (random versus fixed) (Baltagi, 2005).

Finally, the results of our study do not indicate direct causal relationships, but rather associations. Therefore, it could be interesting to dig deeper in order to determine the factors that cause certain outcomes or effects. Given the structure of our data and relationships, a multilevel analysis, such as that carried out by Bou and Satorra (2010) or Fernández-Gámez et al. (2020), could further elucidate the extent to which a given country contributes to variation of the ROA, and similarly, how much variation can be attributed to the industry and to the cluster. Further studies could be carried out to examine the hierarchical structure of supranational entities (north and south), countries, and regions.

Declaration of competing interest

The authors – Francisco Puig, Ana Debón, Santiago Cantarero, and Helena Marques, of the article entitled "Location, profitability, and international trade liberalization in European textile-clothing firms" declare that they have no conflicts of interest to disclose.

Data availability

The authors do not have permission to share data.

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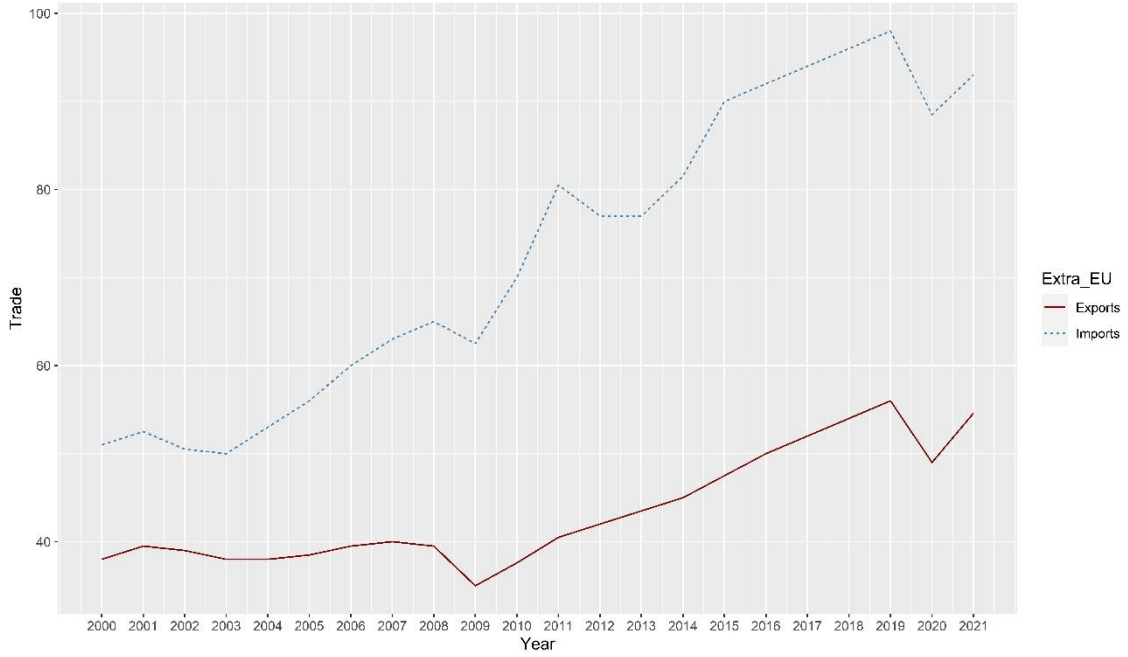
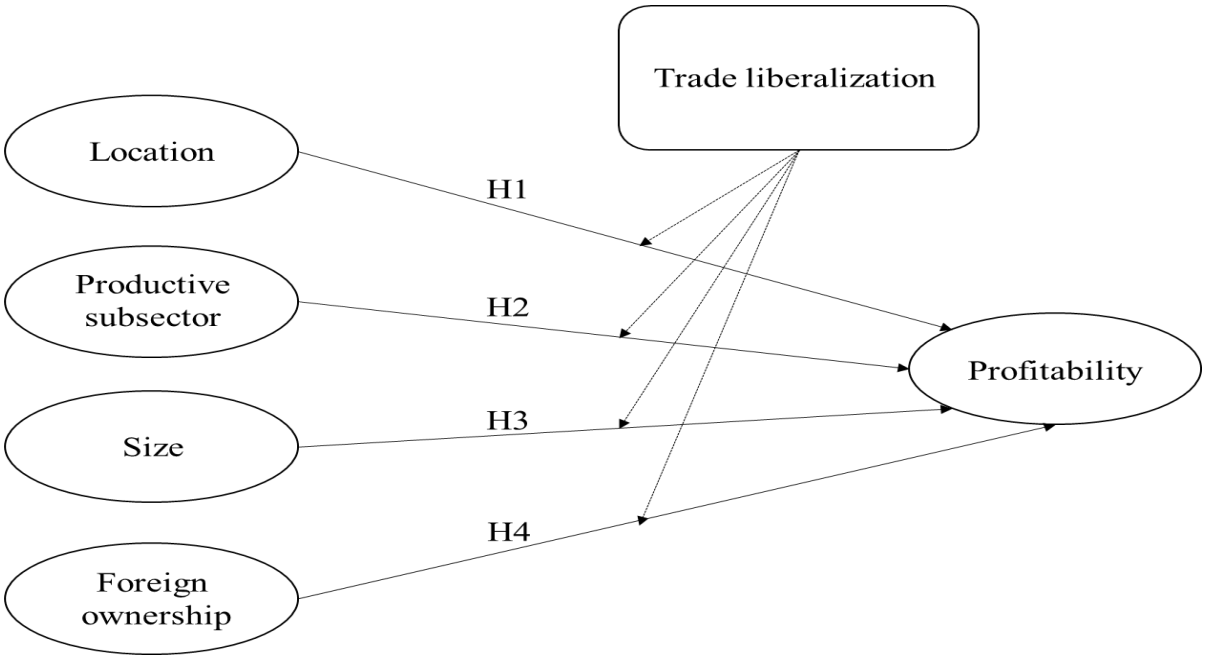
FIGURES AND TABLES

Figure 1. Imports and exports of textiles and clothes to/from the EU (billions of €)



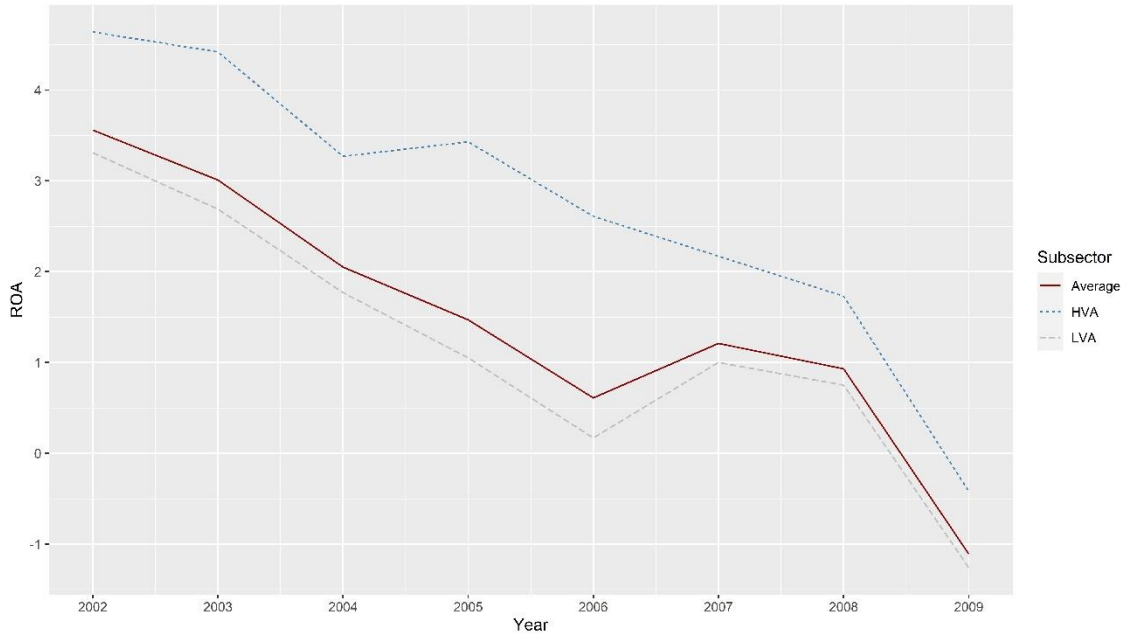
Source: own elaboration from EUROSTAT (2021)

Figure 2: Conceptual benchmark and hypotheses



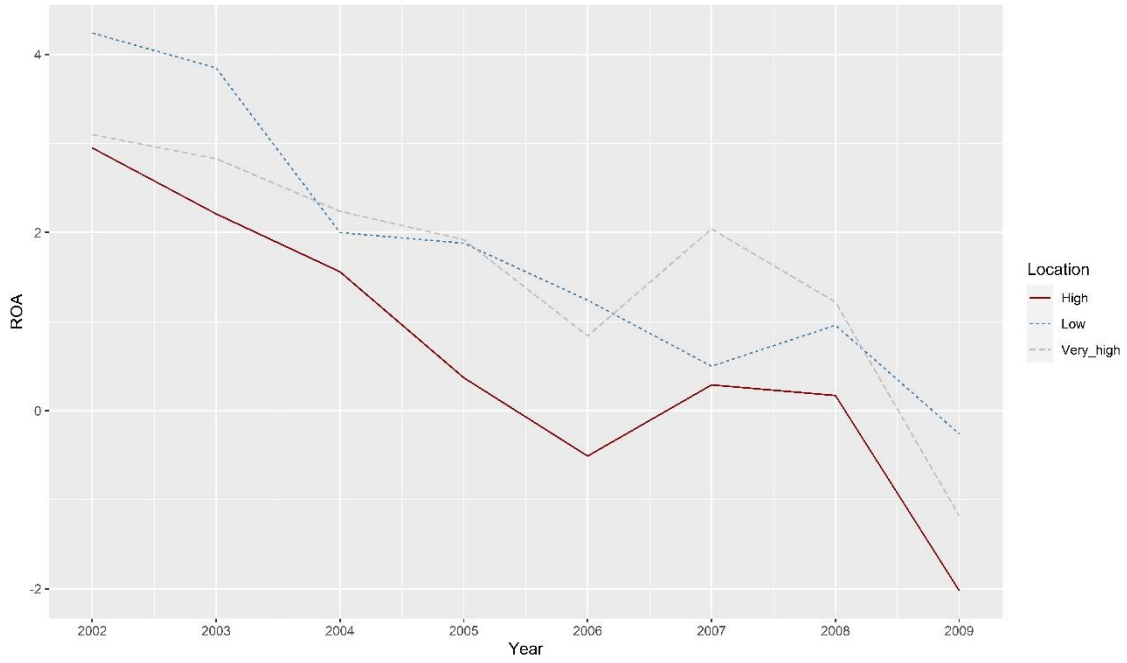
Source: own elaboration.

Figure 3a: Evolution of ROA according to productive subsectors (2000-2009)



Source: own elaboration.

Figure 3b: Evolution of ROA according to location (2000-2009)



Source: own elaboration.

TABLES

Table 1
NUTS II regions of the selected countries more specialized in textile-clothing than the EU-27 average.

Country	Region code	Region name	CS pre-liberalization	CS post-liberalization
ITALY	ite1	Tuscany	3.507	5.424
	itd3	Veneto	2.864	3.916
	itf1	Abruzzo	2.806	3.437
	ite2	Umbria	2.778	3.026
	itc4	Lombardy	2.680	3.160
	ite3	Marche	2.360	5.541
	itc1	Piedmont	2.028	2.329
	itf2	Molise	1.886	2.194
	itf4	Puglia	1.880	2.373
	itd5	Emilia-Romagna	1.808	2.368
SPAIN	es51	Catalonia	1.826	1.524
	es42	Castilla-la-Mancha	1.560	1.312
	es11	Galicia	1.424	1.748
	es52	Valencian Community	1.343	1.703
PORTUGAL	pt11	North	7.074	9.349
	pt16	Central	1.786	1.969
GERMANY	de24	Oberfranken	2.027	2.149
	de14	Tubingen	1.157	1.293
FRANCE	fr30	Nord-Pas-de-Calais	1.190	1.053
	fr21	Champagne-Ardenne	1.121	0.991

Source: Own calculation. In this table, the unit of reference for the coefficients of specialization at the regional level is the EU-27 average. For example, a coefficient of 3.507 for Toscana means that the Toscana region is 3.507 times more specialized in the industry than the European average (it has an employment share in this industry that is 3.507 times the EU's employment share in the industry).

Table 2
Textile-clothing subsector and size distribution of the sample firms.

	NEM		SEM			
	Germany	**France**	**Spain**	**Italy**	**Portugal**	**All**
LVA	-18,2*	-9,5*	7,0*	8,7*	7,5*	9061
HVA	18,2*	9,5*	-7,0*	-8,7*	-7,5*	3005
	Cramer's V = 0.202					
SMALL	5,1*	-17,0*	7,9*	-16,9*	6,8*	6521
MEDIUM	-5,6*	9,4*	-2,7*	5,3*	-0,5	4664
LARGE	0,7	15,1*	-10,1*	22,4*	-12,1*	881
	Cramer's V = 0.218					
TOTAL	2396	643	3754	1207	4066	12066

Source: Own calculation. Note: * represents significance at 5%. For example, a negative value in the first cell LVA -GERMANY means that the firm count falls short of the expectation; therefore, the characteristic is under-represented.

Table 3
Panel regression for ROA. Pre- and Post-trade liberalization period.

	Pre-lib. Period Model 1	Post-lib. Period Model 2
LOCATION		
Very high CS	6.694**	3.144
	(3.232)	(3.801)
High CS	-0.157	2.242
	(1.755)	(2.084)
SUBSECTOR		
HVA	1.994***	1.453***
	(0.334)	(0.333)
CHARACTERISTICS		
Firm size		
Large firms	5.739***	6.361***
	(0.537)	(0.540)
Medium firms	3.597***	3.988***
	(0.293)	(0.290)
Foreign ownership	-1.387	-3.251***
	(0.939)	(0.950)
Constant	12.779	4.200
	(5.466)	(4.113)
Region effects	149.54***	128.84***
Time effects	4.15	4.90
Region-time effects	360.04***	282.53
Observations	25070	33309
# sample firms	8608	9576
Wald Chi-squared	997.60***	1646.33***
R-squared	0.0542	0.0509
Within	0.0258	0.0427
Between	0.0606	0.0621

Source: Own calculation. Note: ROA (return on assets) indicator is the dependent variable, and the regression method is random effects (GLS regression). The Hausman test was run, and the null hypothesis that the difference in coefficients is not systematic cannot be rejected at a conventional 5% level. The significance of region, time, and region-time effects is tested using Wald tests built from the estimated dummy coefficients. Omitted categories: Location – low CS (less than 1); Subsector – LVA; Firm size – small firms; Foreign ownership – domestic firms. Standard errors in parentheses; *; **; *** represent significance at the 10%, 5% and 1% levels.

Table 4
Panel regression for ROA. SEM and NEM.

	Complete sample Model 3	SEM Model 4	NEM Model 5
LOCATION			
Very high CS	4.365* (2.552)	-0.265 (5.736)	5.028 (4.448)
High CS	0.687 (1.411)	-5.060 (6.504)	1.050 (1.507)
SUBSECTOR			
HVA	1.631*** (0.291)	1.350*** (0.309)	3.117*** (0.882)
CHARACTERISTICS			
Firm size			
Large firms	6.347*** (0.474)	6.549*** (0.542)	6.406*** (1.261)
Medium firms	3.973*** (0.254)	3.837*** (0.260)	5.054*** (1.090)
Foreign ownership	-2.110*** (0.828)	-1.005 (1.066)	-3.612*** (1.467)
Constant	4.573 (6.458)	0.688 (5.845)	4.488 (6.641)
Region effects	135.78***	52.35*	52.52
Time effects	7.62	52.03***	8.08
Region-time effects	749.25***	403.16***	301.43
Observations	58379	52243	6136
# sample firms	9944	8854	1090
Wald Chi-squared	2810.64***	1966.84***	595.80***
R-squared	0.0568	0.0406	0.0980
Within	0.0399	0.0338	0.0902
Between	0.0801	0.0525	0.1092

Source: Own calculation. Note: ROA (return on assets) indicator is the dependent variable, and the Regression method is random effects (GLS regression). The Hausman test was run, and the null hypothesis that the difference in coefficients is not systematic cannot be rejected at a conventional 5% level. The significance of region, time and region-time effects is tested using Wald tests built from the estimated dummy coefficients. Omitted categories: Location – low CS (less than 1); Subsector – LVA; Firm size – small firms; Foreign ownership – domestic firms. Standard errors in parentheses; *; **; *** represent significance at the 10%, 5% and 1% levels.

APPENDIX

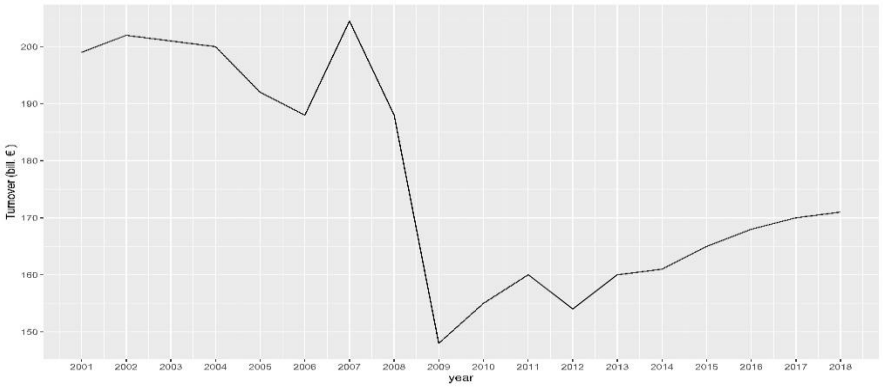


Figure A-1. European textile-clothing industry indicators, 2000-2018 (turnover). Notes: The graph plots the year (x-axis) against the turnover (y-axis), expressed as billions of €.

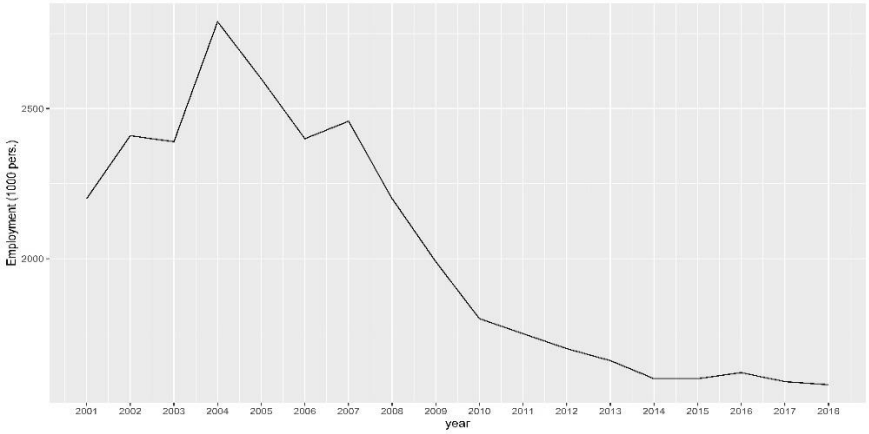


Figure A-2. European textile-clothing industry indicators, 2000-2018 (employment). Notes: The graph plots the year (x-axis) against the employment (y-axis), expressed as thousands of persons.

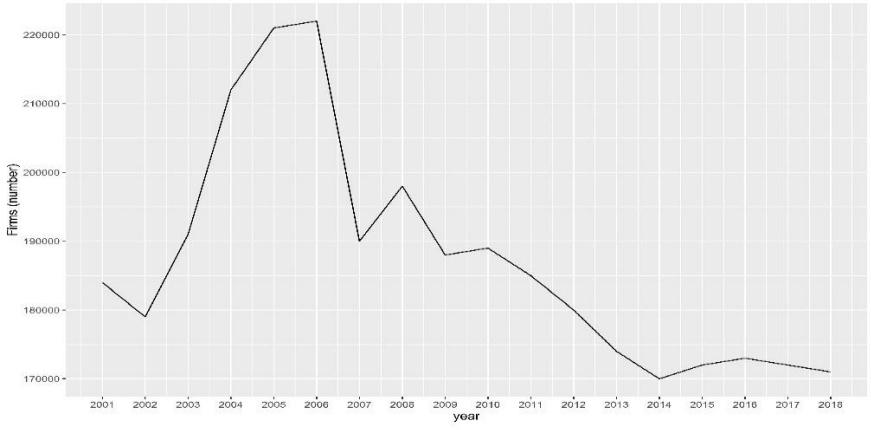


Figure A-3. European textile-clothing industry indicators, 2000-2018 (companies). Notes: The graph plots the year (x-axis) against the firm (y-axis), expressed as number of firms.