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To link to this article DOI: http://dx.doi.org/10.1007/s11575-025-00568-6

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Asymmetries in Firm-Level Globalization: The Case of Swiss Multinational Enterprises

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Abstract

This paper addresses the regional and global strategies of multinational enterprises (MNEs), with an application to the largest Swiss companies. We extend Rugman and Verbeke's (2004) classic approach to measure MNE globalization by adopting a multidimensional lens, whereby we focus on four distinct parameters that evaluate respectively: market success across geographic space (proxied by sales); investments as a response to foreign business opportunities (proxied by assets); human capital (as proxied by the employees' geographic distribution); and knowledge capital (as measured by patented innovations). We observe substantial discrepancies in globalization levels according to the parameter used. According to this study, the largest segment of companies (42.1%) remains home-regional in terms of sales. Bi-regional firms constitute the second largest category, comprising 28.9% of the sample. Only 21.1% of the companies can be classified as global in terms of sales distribution. Upstream activities such as knowledge capital seem to be more home-region oriented than downstream activities. One critical conclusion of this study is that not a single large Swiss MNE can be considered global in terms of knowledge capital creation.

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1 Introduction

This paper explores the geographic distribution of multinational enterprises' (MNEs') cross-border activity, a pivotal area in international business strategy (IBS) research. MNEs, often described as the 'architects of globalization' when viewed through a micro-level lens, operate with a geographic reach that, despite extensive research, has not been comprehensively assessed. The specific research question we therefore try to answer is *whether and how the globalization level of a country's MNEs (in this case Swiss MNEs) can reliably be assessed in a comprehensive fashion through the use of publicly available data?* The literature on the geographic scope of MNEs activities has focused primarily on companies based in large open economies such as the United States, China, Japan, Germany, France and the United Kingdom, which are the main home countries of Fortune Global 500 companies. There are very few studies dedicated to firms from small open economies such as Switzerland. One of the main exceptions is the study by Rugman and Oh (2008a) on Korea, based on a sample of the 11 largest MNEs. The present paper contributes to expanding the understanding of the international expansion strategies of MNEs from small open economies, with Switzerland as the focal country, selected because of the strong involvement of Swiss companies in international markets. The present paper enhances our understanding of the geographic distribution of MNE activity by refining Rugman and Verbeke's (2004) methodology. We offer an empirical assessment of Swiss MNEs' globalization levels and introduce new regional data across a set of four indicators. By incorporating data on downstream sales (a proxy for market success), upstream R&D (a proxy for knowledge capital), and the geographic distribution of overall assets (a proxy for investments and thus financial capital) and employees (a proxy for human capital), we provide a more comprehensive view of MNEs' internal network activities than prior research. We first outline the theoretical framework for identifying firm-level globalization indicators and for determining which firms can reasonably be classified as global. We then examine the primary approaches for estimating globalization levels, selecting Rugman and Verbeke's (2004) approach as the most relevant one. Finally, we assess the globalization levels of Swiss MNEs, expanding upon Rugman and Verbeke's (2004) foundational work with new parameters.

2 Theoretical Basis for Assessing MNE-Level Globalization

In the past twenty years, a multitude of studies have attempted to empirically measure firms' degree of globalization (Fisch & Oesterle, 2003; Marshall et al., 2020; Rosa et al., 2020; Rugman & Verbeke, 2004; Vahlne & Ivarsson, 2014). The variety of methods and indicators deployed underscores our incomplete comprehension of globalization, a term that still lacks a generally accepted definition. As a multidimensional concept, globalization's accurate evaluation at the

micro-level necessitates the inclusion of key aspects such as the breadth (or scope) and depth (or scale) of MNEs' international activities, thereby permitting the selection of suitable indicators that are conceptually sound (Asmussen, 2009) and can lead to robust results across contexts (Berrill, 2015). At least the following four choices require careful consideration in IB research on globalization levels: choice of reliable measures that permit generalization over time and across samples; choice of 'encompassing' measures; choice of credible globalization-level thresholds to classify firms; and choice of appropriate samples given the research questions at hand.

First, reliable indicators are a must for any assessment of globalization, which is core subject matter in IBS research. Numerous research questions in this field necessitate the empirical measurement of firms' globalization levels. The quest for reliable and generalizable metrics dates back to the 1980s (Kim, 1989) and remains pertinent today. Three decades ago, Sullivan (1994, p. 325) already pointed out the "lack of reliable measures" for evaluating firm-level globalization. This absence of such measures has been largely responsible for the fragmented empirical research over the past decades.

Second, in addition to reliability, a somewhat related challenge is the need for an 'encompassing' measure, a metric that encapsulates the key dimensions of the concept investigated. Given globalization's multidimensional nature, uni-dimensional metrics will likely fail to provide an accurate representation. In certain studies, such as Denis et al. (2002), the globalization metric has been limited to a dummy variable, a reduction deemed "disappointing" (Verbeke et al., 2018, p. 1106) as it provides limited insight into a company's actual level of globalization. Mudambi and Puck (2016) further noted the importance of selecting indicators that reflect the complexity of value chains dispersed across geographic borders. But once a dimension is chosen, scholars may still differ in the measurement methods they select. For instance, Rugman and Verbeke (2004) assessed globalization through the geographic distribution of sales, while Vahlne and Ivarsson (2014) evaluated it through the number of employees.

A *third* empirical challenge pertains to (perhaps unavoidable) arbitrary decisions made during the indicator selection process, often involving the adoption of arbitrary thresholds, for instance to categorize a company as domestic, regional, international, or global (Osegowitsch & Sammartino, 2008).

A *fourth* challenge concerns sample selection. Osegowitsch and Sammartino (2008) noted that scholars face a trade-off between data quality and quantity. Scrupulous analysis requires highly precise data, which generally leaves researchers with small samples. Thus, Fisch and Oesterle (2003) based their analysis on 11 German MNEs, while Vahlne and Ivarsson (2014) relied on a sample of 17 Swedish MNEs. When scholars aim to work with large samples, they must often deal with data that lack sufficient precision (Osegowitsch & Sammartino, 2008). This was the case in the study of Denis et al. (2002), who examined 44,288 US companies but measured globalization with a dummy variable. Finally, for various reasons, especially data (un)availability and related selection biases, the representativeness of a sample can be limited and this can potentially lead to an inaccurate picture of the actual state of globalization.

From a methods perspective, a company's degree of globalization can be measured either qualitatively or quantitatively (Knight, 2001). The categorization of the different indicators can be performed in various ways. Mudambi and Puck (2016) differentiated between upstream and downstream indicators, while Aggarwal et al. (2011) distinguished among performance-related, structure-related and behavioral metrics. It is also possible to differentiate between static and dynamic metrics, as Jankowska (2011) suggested. Another approach consists of distinguishing between uni- and multidimensional indicators (Fisch & Oesterle, 2003). Our own review of the literature led us to consider four indicators that are often publicly available: sales, assets, employment and R&D. Sales volumes, assuming these are achieved profitably, are the most common indicator of firm-level success in the marketplace. A large literature in IBS documents that many MNEs have great difficulty replicating their domestic market success and sales levels outside of their home country and home region (after correcting for home versus host region market sizes), see Verbeke and Lee (2021). Asset sizes reflect the presence of profitable business opportunities abroad, whereby the MNE has been willing and able to invest the financial capital it commands in these opportunities. Employment levels abroad reflect the presence of the MNE's own human capital, especially in non-commodity sectors. Finally, R&D levels abroad are a measure of the MNE's knowledge capital, which is a key driver of subsequent success in the global marketplace. These four measures, when taken together, provide a comprehensive understanding of a firm's degree of globalization and represent an improvement over prior studies, which have typically focused on one or two indicators only.

Sales are the most frequently used globalization metric in the literature (Fisch & Oesterle, 2003). Early in the field of IBS research, Vernon (1971) used sales to measure the geographic reach of MNEs. Other studies that have relied on this indicator include Rugman and Verbeke (2004), Dunning et al. (2007), Oh (2009), Aggarwal et al. (2011), Rugman and Oh (2013), Berril (2015), Jeong and Siegel (2020), and Rosa et al. (2020). The frequent use of sales has been justified by the fact that "only sales dispersion constitutes a true performance measure at the output level" (Rugman & Verbeke, 2004, p. 7). According to Oh (2009), sales provide a better description of foreign performance than a simple count of the number of countries in which MNEs operate, and it has been used, for instance by Flores and Aguilera (2007). Sales can be considered a downstream indicator of globalization, see Mudambi et al. (2018).

Assets, another commonly used indicator, provide a broader measure of a firm's degree of globalization. While sales offer insights into an MNE's downstream activities, assets allow for an analysis of all activities where the firm has invested financial capital, and in concert with sales offer a more comprehensive view (Berrill, 2015; Collinson & Rugman, 2008; Oh, 2009; Rosa et al., 2020; Rugman & Oh, 2013; Rugman & Verbeke, 2008). It can be debated whether assets constitute an upstream or downstream activity indicator. It is clearly an upstream indicator in conventional, labor-intensive manufacturing industries where production can be fully separated from downstream marketing and advertising, and where the latter activities are largely performed by other companies, e.g., distributors and other intermediaries (e.g., Rugman et al., 2009). In contrast, in some services industries where

production and consumption are inseparable, it could be used as a downstream indicator. Given the 'servicification' of many contemporary industries, whereby significant value adding services (and related assets) have become part of the product delivery and experience, the 'geographic distribution of assets' parameter is increasingly a proxy for the globalization of the firm's entire value chain through the use of its financial capital.

The geographic distribution of *employees* is a third, key indicator of a firm's global reach. The relevance of this parameter has been "strongly supported […] throughout the literature" (Czychon, 2020, p. 96). Ghemawat (2017) posits a positive correlation between the geographic distribution of an MNE's workforce and its size. Unlike sales and assets, which are performance-related (sales volumes achieved demonstrate foreign market success; foreign asset sizes reflect desirable investment opportunities and their capture through usage of the MNE's financial capital), international employment has been viewed more as an indicator of the MNE's structural configuration (Aggarwal et al., 2011). Several studies have used 'employees' as a relevant indicator of globalization (e.g., Martelli & Abels, 2011; Rugman & Collinson, 2004; Vahlne & Ivarsson, 2014). It is included, along with sales and assets, in the calculation of the Transnationality Index (TNI) (UNCTAD, 2007).

Finally, foreign *R&D* can be considered as an indicator of globalization, and it is mostly a better proxy than *assets*, to assess the firm's strengths in the upstream sphere, and especially its knowledge capital. A large literature suggests that in the early stages of MNE expansion (and with the exception of acquisition activity), foreign R&D centers may be focused primarily on tailoring products and services to local markets to mitigate the liability of foreignness (LOF) (Holmes et al., 2016). However, advances in technology have elevated the role of these overseas subsidiaries in the innovation process and in holding the MNE's knowledge capital (Cantwell, 1995; Cantwell & Mudambi, 2000; Rugman & Verbeke, 2001). As Caves (1982, p. 198) posited: "R&D activities themselves predict the rise of MNEs." We view the geographic dispersion of R&D activities as a significant indicator of globalization.

Various studies have employed the geographic distribution of R&D as a measure of firm-level globalization, but it is often overshadowed by other indicators such as sales or assets. Sullivan (1994, p. 331) underscored the importance of R&D intensity, deeming it potentially the: "principal means of gaining market share in global competition." This measure was further expanded upon by Vahlne and Ivarsson (2014) to include data on the R&D workforce and large R&D units. Belderbos et al. (2013) introduced an alternative measure for R&D, namely patent-related data, in the context of R&D internationalization.

In the IBS literature, it is common to express certain dimensions as ratios, comparing the extent of a firm's foreign operations to its total operations. This is the case for three of the above parameters: foreign sales to total sales (FSTS), foreign assets to total assets (FATA), and foreign employees to total employees (FETE) (e.g., Marshall et al., 2020; Rugman & Oh, 2013). However, a similar ratio for R&D is conspicuously absent in the literature.

The above indicators, when viewed individually, offer valuable but only partial insight into the degree of MNE globalization. In our view, all four indicators are critical to paint a more encompassing picture of a company's actual level of

globalization: sales volumes cover the MNE's ultimate success in the global marketplace. Asset volumes, employment levels and R&D levels reflect the deployment of financial capital, human capital and knowledge capital respectively, thereby covering key components in the entirety of the firm's internal value chain.

3 Main Methodologies Used in the Literature

Rugman and Verbeke (2004, p. 3) sought to demystify the elusive concept of globalization, a "poorly understood phenomenon," by empirically investigating the geographic dispersion of MNEs. Their analysis encompassed the world's 500 largest MNEs (2002 Fortune Global 500), a selection justified by these companies' significant global influence as they: "account for over 90% of the world's stock of FDI and they, themselves, conduct about half the world's trade" (Rugman & Verbeke, 2004, p. 3). The Triad (European Union, NAFTA, and Asia) formed the regional focus of their study, given the concentration of major MNEs and innovation hubs within these regions. Rugman and Verbeke (2004) proposed four categories of firms:

- Home-regional companies: At least 50% of their sales occur within their home region.
- Bi-regional firms: At least 20% of their sales occur in two regions, but no single region accounts for 50%.
- Host-regional companies: at least 50% of their sales occur in a region other than their home region.
- Global firms: Each region of the Triad accounts for at least 20% but less than 50% of their sales.

This groundbreaking work sparked a vibrant debate on the level of MNEs' globalization, often referred to as the regionalization/globalization debate. Critics, sometimes labeled "globalists," challenged the methodology of the "regionalization hypothesis" on two fronts (Jeong & Siegel, 2020, p. 1144).

First, Mudambi and Puck (2016) identified a bias in the regionalists' approach, such as Rugman and Verbeke's (2004) and Asmussen et al.'s (2015) studies, as it predominantly considers downstream metrics (particularly sales) when evaluating globalization. This focus neglects upstream activities such as R&D, thereby failing to capture the full spectrum of globalization. It is nonetheless worth noting that several studies in the 2000s took into account not only downstream elements but also upstream parameters, for instance Oh and Rugman (2006) analyzing the top 100 cosmetic industry MNEs, Rugman and Oh (2008a) studying Korean MNEs, and Rugman and Oh (2008b) using data from Asian firms. In these groundbreaking studies, the authors explored the asymmetry between upstream and downstream activities using data on sales and assets.

Secondly, the regionalists' use of regions and thresholds for firm classification has been criticized (Jeong & Siegel, 2020). Osegowitsch and Sammartino (2008) conducted an in-depth study on firm classification, concluding that the use of arbitrary thresholds did not yield robust results and required refinements. Consequently, the persuasiveness of the regionalists' evidence was considered debatable (Aggarwal et al., 2011; Dunning et al., 2007; Vahlne & Ivarsson, 2014).

In response to the inconsistencies in assessing firm globalization, Aggarwal et al. (2011) proposed a straightforward classification of firms. This scheme captures two central dimensions of globalization: breadth (scope) and depth (scale). The breadth dimension divides the world into six regions, namely Africa, Asia, Europe, North and Central America, Oceania, and South America and then classifies firm-level activities as domestic, regional, transregional, or global. Depth is represented by the level of involvement in foreign sales and investments (measured by the number of subsidiaries, as in Berrill, 2015), ranging from "low" to "deep".

Aggarwal et al., (2011, p. 564) thus proposed a compact matrix to evaluate the "degree of multinationality" at the firm level, offering a comprehensive classification system. The scheme's strength lies in its coverage of all possible geographic regions and in the absence of thresholds, thereby supposedly avoiding "empirical pitfalls" (Berrill, 2015, p. 96). However, its limitation is the consideration of only two indicators of firm-level globalization (Rugman & Verbeke, 2008), unlike Sullivan's (1994) nine-dimensional approach.

The entropy index, inspired by Jacquemin and Berry (1979), measures geographic dispersion and has been widely used in empirical studies (Kim, 1989; Oh, 2009; Qian et al., 2008; Rugman & Oh, 2013). Its popularity stems from its adaptability to diverse data sets, such as sales, assets, and number of subsidiaries (Oh, 2009), see Eq. (1), where $NBTB_i$ represents the number of subsidiaries in country i over the total number of subsidiaries:

$$ENT = \sum_i NBTB_i \bullet log(1/NBTB_i) \tag{1}$$

Entropy, a measure of a company's geographic dispersion, considers both the diversity and significance of operational regions, offering a more comprehensive view than a simple country count (Flores & Aguilera, 2007). However, Verbeke et al. (2018) have critiqued its inability to account for the 'distance' between nations or areas (Ghemawat, 2017). For instance, a Swiss firm's sales in Switzerland, Austria, and Germany or in Switzerland, Brazil, and Japan would yield identical entropy indices, despite supposedly differing 'added distance' levels being in play (cf. Hutzschenreuter & Voll, 2008).

Since 1995, UNCTAD's Transnationality Index (TNI) has evaluated the global footprint of major nonfinancial firms by considering assets, sales, and employment ratios (FATA, FSTS, and FETE). R&D's absence in the TNI methodology reflects its lower frequency of use in the literature compared to the three other

indicators. The aim of the TNI is to "assess the degree to which the activities and interests of companies are embedded in their home country or host countries" (UNCTAD, 2007, p. 13). The sales ratio (FSTS) is calculated as the proportion of foreign sales to total sales, as shown in Eq. (2) for firm i. Similar computations apply to FATA and FETE for assets and employment, respectively. Equation (3) illustrates the TNI calculation for firm i, encompassing sales, assets, and employment:

$$FSTS_i = \frac{foreign\ sales_i}{total\ sales_i} = \frac{foreign\ sales_i}{domestic\ sales_i + foreign\ sales_i} \qquad (2)$$

$$TNI_i = \frac{FATA_i + FSTS_i + FETE_i}{3} \qquad (3)$$

A higher TNI reflects a firm's stronger inclination towards foreign markets. However, the TNI's utility is limited as it neglects the geographic breadth of international activities, fails to differentiate between firms with globally distributed operations and those concentrated in few countries (Ietto-Gillies, 2021). This omission undermines the TNI's effectiveness as a standalone indicator of globalization, despite its frequent usage in IBS research (for instance, Rugman & Collinson, 2004 and Dunning et al., 2007).

It is important for managers and public policy makers to understand fully the globalization levels of MNEs, and this for at least two reasons. First, senior managers in MNEs tend to overestimate the reach of their companies' firm-specific advantages (FSAs) and to think that past success recipes in particular locales can easily be emulated in other geographic locations. In reality, high globalization is much more difficult to achieve than typically assumed (Verbeke & Lee, 2021). Insight into the actual globalization levels of their own firm and that of their competitors may be a useful input for strategy formation by senior management. Second, there is increasing societal criticism, especially in developed, market-based economies that supposedly global firms command too much power in world markets. Understanding the often-limited level of globalization of a country's largest MNEs may moderate such criticism and prevent public policies based on wrong assumptions of market power that could severely hamper the operations of domestic and foreign firms alike. It is therefore useful to measure MNEs' distribution of activities across geographies and to have the ability to classify firms in categories aligned with the extent of this distribution, even if such an approach necessarily entails some arbitrariness in selecting thresholds. A central point consists of using a holistic measure encompassing both upstream and downstream activities of the reviewed firms. We therefore selected Rugman and Verbeke's (2004) approach as the foundation of our analysis, examining the globalization levels of Swiss MNEs, but in doing so also covering a more encompassing set of indicators, thereby providing a more comprehensive picture of globalization levels.

Table 1 Geographic segmentations by indicator

Indicators	Geographic segments				
Sales	EMEA	NA	APAC	ROW	Switzerland
Assets	EMEA	ROW	–	–	Switzerland
Employees	EMEA	NA	APAC	ROW	–
R&D	EMEA	NA	APAC	ROW	Switzerland

APAC, Asia/Pacific; EMEA, Europe, Middle East, and Africa; NA, North America; ROW, Rest of the World

This table shows the geographic segments that have been analyzed for each indicator. Differences are due to company reporting practices, which sometimes limit data availability. When available, data for Switzerland are also displayed

Reference: Composed by the authors

4 Assessment of the International Integration of Swiss MNEs

4.1 Data and Sample

Our research centers on Swiss MNEs featured in the SMI Expanded (SMI Exp.), a compilation of the 50 most substantial and liquid Swiss stocks[1] (SIX, 2023). The firms included in the SMI Exp. are drawn from the Swiss Performance Index (SPI), representing a total market value of CHF 1,573 billion as of the SPI listing date. The SPI comprises more than 200 companies, including the 50 companies listed in the SMI Exp. Our study is limited to the 50 companies in the SMI Exp. because of the lack of relevant data for our purposes on the other firms included in the SPI. Many of the smaller firms would not have qualified as MNEs anyway. Furthermore, the 50 companies listed in the SMI Exp. represent 95% of the Swiss market in terms of market valuation, according to SIX (2023).

We gathered data on these firms' geographic distribution of sales, assets, employees, and R&D. The primary data sources were annual reports, with data carefully collected for each company. The Refinitiv Datastream, Refinitiv Eikon, and FactSet databases were employed to validate and supplement these data. The regional breakdown includes the home region, encompassing Eastern, Central, and Western Europe, as well as the Middle East and Africa (EMEA). It also includes the Asia Pacific region (APAC), North America (NA) – comprising the NAFTA members Canada, Mexico, and the United States – and the rest of the world (ROW). Unless otherwise stated, EMEA incorporates Switzerland. The decision to include the Middle East and Africa within EMEA was dictated primarily by the reporting practices of Swiss MNEs, which typically preclude a more detailed breakdown. Table 1 provides a summary of the geographic segmentation for each indicator.

Sales data for the year 2019 were collected from company annual reports or financial statements. In many instances, geographically segmented information was

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[1] For more information regarding the methodology and the composition of the indices, see SIX (2023).

available, and the data could be entered directly into our database. In some cases (15 firms), minor adjustments had to be made to the data due to inaccuracies.

The information disclosed by the firms on their asset distribution in 2019 did not match the precision of their sales data. Most companies did report some geographic segments for assets in their annual report, but generally in a less detailed way than they did for sales. We were unable to collect sufficiently precise information regarding the NA and APAC segments for most firms. These segments, where available, were therefore combined into a single segment, together with ROW.

Collecting regional data on employees was even more challenging than collecting asset data. In some instances, information was available in annual reports, but in most cases, it had to be extracted from sustainability reports. Four companies were removed from the final sample due to a lack of data.

Finally, R&D was measured using patent data collected from Patstat, the database of the European Patent Office (EPO). Patstat provides patent-related data from more than 100 patent offices worldwide over a long period (De Rassenfosse et al., 2014). Patents are a commonly used indicator of R&D activity locations (e.g., Belderbos et al., 2013; Cantwell & Piscitello, 2005). In the context of IBS and the measurement of firm-level globalization, the only empirical study where R&D is measured, at least to the best of our knowledge, is the study of Vahlne and Ivarsson (2014).[2] Notably, a query in Patstat that only references an MNE's name would miss those patents registered in the name of any other entity in the MNE network. For example, the medical MNE Novartis owns a subsidiary named Farmanova based in Istanbul, Turkey. If Farmanova were to register a patent in its own name and, for some reason would not mention Novartis, then this patent would not be identified by our query, although it clearly belongs in the output of Novartis' innovation network. To prevent this situation from occurring, we retrieved the complete lists of subsidiaries for all companies in the sample from FactSet and Refinitiv Eikon. Using two different databases increases the chances of covering the entire network of subsidiaries. For each firm's list of subsidiaries, we collected the number of patents by country and aggregated the results into the following geographic segments: Switzerland, EMEA, NA, APAC, and ROW. To provide a representative overview of the R&D geographic footprint, we collected data over a 10-year time horizon (2010–2019), as in the recent study of Huang and Li (2019).

Appendix I shows our initial sample ($N=50$) from the SMI Exp. Upon review, we found duplicate entries for three companies (i.e., Lindt & Sprüngli, Roche, and Schindler). We retained the entry with the greatest market value for each and eliminated the duplicates. Further, we excluded two companies due to absent sales data (ABB and AMS Osram), three for missing assets data (Bachem Holding, Dufry, and Swiss Re), and four due to incomplete employee data (Alcon, Geberit, Lindt & Sprüngli, and SIG Group). We successfully obtained patent-related data for all firms in the sample.

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[2] The authors asked managers of Swedish MNEs about the region in which their companies conduct "significant R&D operations" in order to assess the geographic footprint of innovation activities (p. 236). For more information, see Vahlne and Ivarsson (2014).

After these adjustments, our final sample comprised 38 companies, see Appendix II. These MNEs had a combined market capitalization of CHF 1,346 billion in 2019, employed approximately 1.3 million people globally, and generated total sales of CHF 536 billion. Given the modest size of our final sample ($N=38$), we assessed its representativeness within the Swiss market context. As of 2023, the SMI Exp. represents an estimated 95% of Swiss equity market capitalization (SIX, 2023). Notably in 2019, the two predominant sectors within our sample, "Industrials" and "Financials," contributed approximately one-third of Switzerland's GDP (Switzerland Global Enterprise, 2019).

Table 2 presents a comparative analysis of our sample's economic sector composition with a broader SPI subset. The compositions exhibit substantial similarity, with the Basic Materials sector marking the most significant deviation at 6.9 percentage points. A Pearson correlation coefficient of 0.87, statistically significant at the 5% level, suggests a strong positive correlation between the two samples and thus that the compositions of the two samples are closely aligned.

4.2 Methodology

Our methodology, grounded in Rugman and Verbeke (2004) and refined by Rosa et al. (2020), utilizes four indicators: sales, assets, employment, and R&D. We further validated our results through a sensitivity analysis, examining the impact of varying thresholds on the classification of firms (see below).

In the sphere of sales, we retained the original four firm categories: (i) home-regional companies, realizing at least 50% of their sales in their home region (EMEA for Swiss firms); (ii) bi-regional firms, achieving at least 20% of their sales in two regions, but not exceeding 50% in any single region; (iii) host-regional companies, making at least 50% of their sales in a non-home region; and (iv) global firms, with each Triad region accounting for at least 20% but less than 50% of their sales.

For assets, due to data limitations, we had to adapt the classification. Here, we distinguish between: (i) home-regional firms with at least 50% of assets in their home region; (ii) ROW-oriented companies, holding less than 20% of their assets in the home region or at least 80% in the ROW segment.

By including additional indicators to measure human and knowledge capital, we obtain a more comprehensive overview of MNEs' structural configuration. This key contribution allows us to estimate their globalization level in a more encompassing way.

To evaluate the robustness of our analysis, we conducted a sensitivity analysis (see for example Pannell, 1997, p. 139), informed by Osegowitsch and Sammartino (2008). These authors critiqued the thresholds used by Rugman and Verbeke (2004) for creating an unjustified hierarchy with too many home-regional firms and for lacking theoretical grounding.

As indicated above, we performed a number of sensitivity analyses. We first reduced the host-region threshold from 20% to 15%, following Osegowitsch and Sammartino (2008). This adjustment was expected to increase the number of bi-regional and global firms in the sample. We subsequently increased the host-region

Table 2 Sample representativeness of Swiss MNEs

Economic sector	TRBC code	% sample (N = 38)	% SPI (N = 207)
Basic Materials	51	13.2	6.3
Industrials	52	21.1	22.2
Consumer Cyclicals	53	5.3	9.7
Consumer Non-Cyclicals	54	10.5	6.3
Financials	55	21.1	19.8
Healthcare	56	13.2	15.0
Technology	57	10.5	11.6
Utilities	59	0.0	1.4
Real Estate	60	5.3	7.7
Pearson correlation coefficient	σ	0.87*	

This table shows the composition of our sample (N = 38) by economic sector compared with a subset of the SPI (N = 207) as of 31.12.2019. Shares might not add up to exactly 100% due to rounding

TRBC refers to The Refinitiv Business Classification of economic sectors

* $p \leq 0.05$

Reference: Composed by the authors, based on Refinitiv Datastream

Table 3 Sales geographic orientation of Swiss MNEs

Sales geographic orientation				
Global	Home-regional	Bi-regional	Host-regional	Other
8 (21.1%)	16 (42.1%)	11 (28.9%)	1 (2.6%)	2 (5.3%)

This table shows the number and percentage of MNEs in each category ($N=38$) for the sales criterion (year 2019), according to the classification proposed in Rugman and Verbeke (2004)

Firms that do not match any of the categories are reported in the category "Other."

Reference: Composed by the authors

threshold to 25%, which should decrease the proportion of bi-regional and global companies due to the stricter condition imposed. However, we did not conduct a sensitivity analysis for the assets variable due to the absence of requisite data.

The value of these tests lies in the magnitude of variations induced by the threshold changes. Comparing the testing thresholds (15% and 25%) to the initial threshold (20%) yields two types of information. First, it provides an indication of the robustness of the analysis—the smaller the number of MNEs switching from one to another category, the greater the robustness of results. Second, it allows for a deeper structural analysis of the sample. The effects of threshold variations on the sample classification provide insights into the sample composition, particularly regarding firm categorization.

4.3 Results and Analysis

Table 3 shows the 2019 geographic orientation of sales. The largest segment of companies (42.1%) remains home-regional. Bi-regional firms constitute the second largest category, comprising 28.9% of the sample. A total of eight companies, or 21.1% of the final sample, can be classified as global. As anticipated, these firms primarily operate within the Triad regions (EMEA, NA, and APAC) and span the following sectors: Basic Materials, Industrials, Consumer Non-Cyclicals, Healthcare, and Technology.

As expected, the three companies with the highest market capitalization in our sample, Nestlé, Novartis, and Roche, are classified as global (Table 4). Five of the eight global companies rank among the top ten in terms of market value, aligning with O'Hagan-Luff and Berrill's (2016) findings that larger firms tend to be more global. Four companies, namely Adecco Group, Clariant, Georg Fischer, and Straumann, narrowly missed the global classification by less than 2% of their total sales.

Our data reveal larger segments of global (21.1% vs 9.3%) and bi-regional (28.9% vs 10.1%) companies, as compared to Rosa et al.'s (2020) study on Fortune Global 500 firms. This trend towards higher globalization levels is aligned with Czychon's (2020) meta-analysis, which indicated a decline in home-regional firms over time. In addition, there are inherent differences between Swiss MNEs and Fortune Global 500 ones, which are predominantly from larger nations such as the United States and China and face distinct market dynamics. Asmussen (2009) highlighted the

Table 4 Global MNEs from Switzerland (sales)

Rank	Company	Percentage of total sales			
		% EMEA	% NA	% APAC	% ROW
1	Nestlé	31.2	36.7	23.1	9.0
2	Roche	21.6	49.9	23.8	4.6
4	Novartis	37.8	34.2	20.7	7.2
6	Lafarge Holcim	39.6	27.5	24.3	8.6
13	Schindler	43.8	21.3	27.1	7.7
19	SGS	43.8	23.9	32.3	0.0
20	Givaudan	36.0	26.5	26.3	11.1
27	Logitech	30.9	36.0	26.4	6.7

This table shows the eight MNEs in the sample ($N=38$) that are global according to the sales criterion (year 2019). The data show the share of sales (%) in each geographic segment

Reference: Composed by the authors

Table 5 Geographic orientation of assets in Swiss MNEs

Geographic orientation of assets		
Home-regional	ROW-oriented	Other
27 (71.1%)	2 (5.3%)	9 (23.7%)

This table shows the classification of the firms according to the location of their assets ($N=38$) (year 2019), based on Rugman and Verbeke (2004)

Firms that do not match the two main categories are reported in the category "Other."

Reference: Composed by the authors

importance of a firm's home country and region as a driver of its internationalization patterns, a sentiment echoed by Rugman and Oh (2013), who argued that internationalization is influenced by the size of a firm's home country.

Regarding assets, the available data permit only a home-regional, ROW-oriented, or 'Other' classification. A substantial 71.1% of the sample, comprising 27 companies, are home-region oriented (Table 5). Only two companies, or 5.3% of the sample, have ROW-oriented assets. The remaining nine companies could be bi-regional, host-regional, or global. These findings align with Rugman and Verbeke (2008) and Rugman and Oh (2013), who found for their samples that a large portion of MNE assets is located within the firm's home region (78.0% and 78.1%, respectively). Collinson and Rugman's (2008) study on Japanese MNEs revealed a high regional orientation of assets, with an average of 83% from a sample of 64 companies. This underscores the continued importance of the home region as the locus for most MNEs' asset base, whether this locus be Switzerland or Japan.

Regarding the geographic distribution of employees (year 2019), the largest segment is that of home-regional companies (57.9%) (Table 6). Four of the companies

Table 6 Employees' geographic orientation

Employees geographic orientation				
Global	Home-regional	Bi-regional	Host-regional	Other
4 (10.5%)	22 (57.9%)	9 (23.7%)	2 (5.3%)	1 (2.6%)

This table shows the classification of the firms according to the distribution of their employees (*N* = 38) (year 2019), based on Rugman and Verbeke (2004)

Firms that do not match any of the four many categories are reported as "Other."

Reference: Composed by the authors

Table 7 Geographic orientation of R&D in Swiss MNEs

R&D geographic orientation				
Global	Home-regional	Bi-regional	Host-regional	Other
0 (0.0%)	28 (73.7%)	0 (0.0%)	5 (13.2%)	5 (13.2%)

This table shows the classification of MNEs according to the number of patents registered during the period 2010–2019 (*N* = 38), based upon the criteria of Rugman and Verbeke (2004)

Firms that do not correspond to any of these criteria are reported as "Other."

Reference: Composed by the authors

are global. One bi-regional company missed the global classification by less than 2% of its total number of employees.

Employee data appear very different from the sales data and suggest fewer global MNEs. Many Swiss MNEs do employ a significant portion of their workforce outside of their home region, but only a minority (10.5%) have achieved global status. Vahlne and Ivarsson's (2014) study on Swedish MNEs suggested that 70% of the firms could be classified as global, but with a lower threshold. They classified a company as global if at least 40% of its employees were located outside of its home region. If we applied this threshold, the share of global MNEs in our sample would increase from 10.5% to 60.5%.

Approximately one quarter of Swiss MNEs (23.7%) exhibit a bi-regional orientation in terms of employees, with six oriented toward the EMEA and APAC segments and three toward EMEA and NA. Overall, Swiss MNEs' workforces are more home-region oriented than these firms' sales volumes, with only four firms classified as global.

Table 7 presents the geographic orientation of R&D activities. According to Rugman and Verbeke's (2004) criteria, the sample lacks global or bi-regional companies, with the majority (73.7%) being home-regional firms. The home region (EMEA) emerges as the primary area for Swiss MNEs to innovate. Among the four indicators studied, R&D activities display the strongest home-country orientation. However, this may be somewhat of an overestimation as patents from innovations in other regions may be filed by their headquarters, typically located in their home country.

Table 8 Sensitivity analysis

	Threshold	Global	Home-regional	Bi-regional	Host-regional	Other
	15%	44.7	42.1	10.5	2.6	0.0
Sales	20%	21.1	42.1	28.9	2.6	5.3
	25%	5.3	42.1	42.1	2.6	7.9
	15%	26.3	57.9	10.5	5.3	0.0
Employees	20%	10.5	57.9	23.7	5.3	2.6
	25%	2.6	57.9	26.3	5.3	7.9
	15%	0.0	73.7	2.6	13.2	10.5
R&D	20%	0.0	73.7	0.0	13.2	13.2
	25%	0.0	73.7	0.0	13.2	13.2

This table shows the results of the sensitivity testing applied to the sample (N = 38). The figures represent the shares of firms (%) for each category (Rugman & Verbeke, 2004) according to the threshold used (15%, 20%, 25%)

Reference: Composed by the authors

Our analysis of the four indicators, functioning as proxies for respectively market success achieved, financial capital allocated, human capital deployed and knowledge capital generated, yields several insights. First, the home region (EMEA) emerges as the dominant region for Swiss MNEs across all indicators, with shares ranging from 42.1% for sales to 73.7% in the case R&D. Second, our study reveals a relatively high proportion of companies with global status, particularly in terms of market success achieved (21.1%), as compared to prior studies (Rosa et al., 2020; Rugman & Verbeke, 2004). Third, we observe significant differences across indicators. For instance, sales and knowledge capital generation both show a home-regional orientation, but the latter activities are more heavily concentrated in the home region. Heavily R&D-based Swiss companies, for instance in pharmaceuticals, do show a preference do retain the bulk of their patenting activity in the home region. In fact, not a single company can be classified as either global or bi-regional for knowledge capital generation, whereas half of the sample is either global or bi-regional in terms of market success achieved. This observation confirms Mudambi et al.'s (2018) hypothesis that upstream activities, in this case patent generation from R&D, are more spatially concentrated than downstream ones, proxied here by sales volumes achieved. Fourth, we note a relatively low incidence of host-regional firms, with host-region orientation based on R&D having the highest occurrence at 13.2%.

Table 8 presents the results of the sensitivity analysis for market success achieved, human capital deployed, and knowledge capital generated but keeping the 50% home-region threshold unchanged. As expected, the number of companies classified as global in terms of market success decreases when increasing the host-region threshold percentages from 20% to 25%. Interestingly, the proportion of bi-regional companies increases as this threshold rises, which can be attributed to the shift in companies from having global to bi-regional status. In contrast, when lowering the thresholds to 15%, a significant proportion of the sample (55.2%) meets the

Table 9 Globalization status of Swiss MNEs

Orientation	Sales	Assets	Employees	R&D
Global	21.1	–	10.5	0.0
Home-regional	42.1	71.1	57.9	73.7
Bi-regional	28.9	–	23.7	0.0
Host-regional	2.6	–	5.3	13.2
Other	5.3	–	2.6	13.2
Total	100.0	–	100.0	100.0

This table shows the Swiss MNEs' geographic orientation for sales, assets, employees, and R&D in % of the sample ($N=38$)

(-): Indicates that the shares could not be calculated due to lack of reliable data

Reference: Composed by the authors

requirements of either the global (44.7%) or the bi-regional (10.5%) category for the sales parameter.

When looking at both sales and human capital deployment, the usage of varying thresholds greatly affects the number of supposedly global firms, but there is no such effect when focusing on knowledge capital generation. On this last criterion, no global firms are present, irrespective of the threshold used.

Table 9 synthesizes the primary findings of this study. The first observation is that the home-regional category is the most significant across all four indicators. While the figures vary (from 42.1% for market success achieved to 73.7% for knowledge capital generated), the majority of Swiss companies remain home-regional, as defined by Rugman and Verbeke (2004). This is consistent with the findings of scholars such as Qian et al. (2008) and Rugman and Oh (2013). However, a closer look suggests a need for further nuance. The shares of global MNEs are relatively high, particularly when compared to those in prior studies using the same methodology, i.e., Rugman and Verbeke (2004) and Rosa et al. (2020). As noted earlier, global firms represent 21.1% of the sample in terms of market success and 10.5% in terms of human capital deployed. In both cases, bi-regional companies clearly occupy the second position, with 28.9% and 23.7% of the companies in the sample, respectively. When combined, bi-regional and global companies represent 50.0% (market success achieved in terms of sales) and 34.2% (human capital deployed in terms of number of employees) of the sample. These findings echo those of 'globalists' such as Aggarwal et al. (2011) and Vahlne and Ivarsson (2014), suggesting that MNEs' ability to generate at least 20% of their sales in host regions may be on the rise. But overall, the share of global firms still remains a fraction of home-region oriented firms that continue dominating for each criterion.

5 Limitations and Further Empirical Research

Our study has a few limitations, which we outline below. First, the methodology proposed by Rugman and Verbeke (2004), and also adopted in this study, has faced criticism, particularly regarding the use of specific thresholds to assess firm-level globalization (e.g., Berrill, 2015; Osegowitsch & Sammartino, 2008). To address these concerns, we conducted a sensitivity analysis. Collecting data over a longer period of time (e.g. 10 years) could provide additional insight into globalization level trajectories of Swiss MNEs.

Second, we did not explicitly examine, in contrast to Rugman and Oh's (2008a) study, the specific roles of FSAs and CSAs of Swiss MNEs in their geographic expansion. Answering this question could be the subject of a follow-up study, using our present analysis as a baseline for further research at the level of individual companies. In this realm, we would suggest deepening the research on Swiss MNEs' geographic expansion building upon Rugman and Oh's work, which focuses on the differential strengths of upstream and downstream FSAs. For example, Oh and Rugman (2006, p.167) found that: "the cosmetic MNEs' strength of geographic scope upstream FSAs lags behind their downstream FSAs" with the exception, at that point in time, of the company Avon. Rugman and Oh (2008a, p.12) similarly found that "the large Korean MNEs' strength of geographic scope upstream FSAs lags behind their downstream FSAs, as with other Western MNEs". Likewise, in their study on the international competitiveness of Asian firms, Rugman and Oh (2008b, p.66) showed that in terms of geographic scope, "the development of upstream FSAs is lagging behind that of downstream FSAs". A similar analysis of how underlying FSAs explain downstream versus upstream geographic scope could be undertaken for our sample of Swiss companies.

Finally, the third limitation involves the indicators themselves. Globalization, a concept that cannot be directly measured, requires the use of proxies. The four indicators used in our study aim to approximate globalization as accurately as possible and include both market success achieved and three types of firm-level capital, but they are not flawless. Depending on factors such as industry and country of origin, other combinations of indicators may be more suitable for assessing globalization.

6 Conclusion

This study expands our understanding of the international diversification strategies of MNEs from small open economies, with Switzerland as the focal country, selected in particular because of the strong involvement of large Swiss companies in international markets. Our study has shed additional light on the issue of geographic breadth and depth choices by Swiss MNEs. Building upon an extended version of Rugman and Verbeke's (2004) methodology, we have unraveled the asymmetrical patterns of globalization exhibited by MNEs, as a function of the criteria used to measure globalization. The ambiguity surrounding the notion of

'globalization' has led to diverging interpretations and findings surrounding this phenomenon. Our study makes a novel contribution by testing the asymmetry of globalization (a discussion initiated, *inter alia*, by Oh & Rugman, 2006, Rugman & Oh, 2008a, 2008b) using richer and more diverse data from MNEs in a small open economy. Our approach confirms Rugman et al.'s (2012) findings of asymmetry, but those results were largely driven by data from large open economies. As a result, this study makes a significant contribution to the existing literature on the regional and global strategies of MNEs.

Our research has led to three main observations: a pronounced home-region orientation among Swiss MNEs, notable proportions of global and bi-regional firms, and most importantly, significant variations in globalization level as a function of the indicators chosen.

By using a critical market success indicator (sales) as well as three proxies for the MNEs' capital, namely financial capital (investments in assets), human capital (deployment of employees) and knowledge capital (patent generation resulting from R&D), we were able to cover more fully than prior research the globalization of MNE internal networks. Our approach permitted a more comprehensive overview of the geographic distribution of firm-level activities, and we were able to avoid the types of biases identified by Mudambi and Puck (2016).

Specifically, a majority of Swiss MNEs are oriented toward their home-region, i.e., Europe, the Middle East and Africa. Regardless of the indicator used, home-regional companies represent the largest share in our sample (from 42.1% for sales to 73.7% for R&D). Nevertheless, the shares of global and bi-regional firms appear to be relatively high, especially as compared to those in the studies of Rugman and Verbeke (2004) and Rosa et al. (2020). This discrepancy with previous studies can be partly explained by the size differences among the MNEs' home countries (with Switzerland being a small economy, relying heavily on foreign linkages), but they may also indicate a trend toward higher levels of globalization, as suggested by Jeong and Siegel (2020). An extension of the study, focusing on the degree of globalization of Swiss MNEs over a period of several years could lead to more insight on the time-related dynamics at play.

Finally, as noted above, significant variations can be observed when using different indicators. Innovation activity seems to be concentrated within the home-region, whereas more downstream activities, as proxied by sales, appear to have greater geographic dispersion. This study, focusing on a small open economy's MNEs, confirms Rugman et al.'s (2012) findings of asymmetry that were largely driven by data for large open economies. Further empirical work should therefore attach great importance to the selection of indicators used to assess the globalization level of MNEs, with due attention devoted to the most critical value chain activities performed by MNEs from a specific country or from particular economic sectors.

Appendix I: Swiss Multinational Enterprises—SMI Expanded (N = 50).

Appendix I shows the list of companies constituting the SMI Expanded ($N=50$), ranked according to market value (in CHF mio) on 31.12.2019.

50	Company	Market value	50	Company	Market value
1	Nestlé	311'825.2	26	Barry Callebaut	11'735.2
2	Novartis	232'265.7	27	Lindt & Sprüngli	11'627.0
3	Roche	220'604.6	28	Julius Bär	11'174.8
4	Zurich Insurance	59'409.4	29	Temenos	11'140.6
5	ABB	50'669.6	30	Schindler 'P'	10'024.5
6	Roche 'B'	49'216.0	31	Adecco Group	9'999.9
7	UBS Group	47'176.9	32	Baloise Group	8'540.0
8	Richemont	39'703.3	33	Swiss Prime Site	8'498.4
9	Swiss Re	35'588.9	34	Lindt & Sprüngli 'P'	8'053.2
10	Credit Suisse Group	33'496.5	35	Swatch Group	7'812.7
11	Lafarge Holcim	33'075.4	36	Logitech	7'583.7
12	Givaudan	27'988.3	37	Clariant	7'169.9
13	Alcon	26'945.2	38	Helvetia Holding	6'802.5
14	Swisscom	26'553.7	39	PSP Swiss Property	6'128.0
15	Lonza Group	26'302.4	40	Flughafen Zürich	5'425.0
16	Sika	25'782.9	41	SIG Group	4'948.0
17	Partners Group	23'693.6	42	VAT Group	4'906.5
18	Geberit	20'120.9	43	Dufry	4'855.5
19	SGS	20'056.8	44	Belimo Holding	4'483.4
20	Kühne und Nagel	19'584.0	45	Georg Fischer	4'031.2
21	Swiss Life	16'320.3	46	AMS-Osram	3'315.2
22	Schindler	15'910.8	47	Tecan	3'227.5
23	Straumann	15'091.4	48	Galenica Group	2'992.5
24	EMS Chemie	14'887.1	49	Bachem Holding	1'083.3
25	Sonova	14'264.2	50	Zur Rose Group	935.2

Reference: Composed by the authors, based on Refinitiv Datastream.

Appendix II: Swiss Multinational Enterprises in the Sample (N=38).

Appendix II shows the list of companies constituting the final sample used in the present study ($N=38$), ranked according to market value (in CHF mio) on 31.12.2019.

38	Company	Market value	38	Company	Market value
1	Nestlé	311′825.2	20	Sonova	14′264.2
2	Novartis	232′265.7	21	Barry Callebaut	11′735.2
3	Roche	220′604.6	22	Julius Bär	11′174.8
4	Zurich Insurance	59′409.4	23	Temenos	11′140.6
5	UBS Group	47′176.9	24	Adecco Group	9′999.9
6	Richemont	39′703.3	25	Baloise Group	8′540.0
7	Credit Suisse Group	33′496.5	26	Swiss Prime Site	8′498.4
8	Lafarge Holcim	33′075.4	27	Swatch Group	7′812.7
9	Givaudan	27′988.3	28	Logitech	7′583.7
10	Swisscom	26′553.7	29	Clariant	7′169.9
11	Lonza Group	26′302.4	30	Helvetia Holding	6′802.5
12	Sika	25′782.9	31	PSP Swiss Property	6′128.0
13	Partners Group	23′693.6	32	Flughafen Zürich	5′425.0
14	SGS	20′056.8	33	VAT Group	4′906.5
15	Kühne und Nagel	19′584.0	34	Belimo Holding	4′483.4
16	Swiss Life	16′320.3	35	Georg Fischer	4′031.2
17	Schindler	15′910.8	36	Tecan	3′227.5
18	Straumann	15′091.4	37	Galenica Group	2′992.5
19	EMS Chemie	14′887.1	38	Zur Rose Group	935.2

Reference: Composed by the authors, based on Refinitiv Datastream.

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