Aspects of Measuring Firm-Level Multinationality

Patrik Vaněk

Abstract

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This paper explores the ambiguity of the methods of measuring firm-level multinationality. The focus is on identifying the main criteria for evaluating the quality of methods for measuring the multinationality of multinational enterprises (MNEs), as it is practical to map the discrepancies and differences. The evaluation is structured to highlight the advantages and limitations of methods proposed by other authors in the international business (IB) literature.

The main finding is the recognition of seven key aspects in measuring firm-level multinationality defined as follows: (1) aggregation, (2) complexity, (3) indicators, (4) geography, (5) robustness, (6) country effects, and (7) flexibility. The proposed list can serve as grounds for selecting which methods to use for research, evaluation of the quality of proposed methods, and development of an entirely new method of measuring firm-level multinationality. The main contribution of this paper is its proposal of an optimal approach to each of the seven aspects.

Keywords

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Introduction

Multinational enterprises (MNEs) belong among key factors determining the development of international trade and the global economy. Some authors are convinced that MNEs *"are best symbolised by an octopus whose tentacles try to grasp the whole world"*, as Dörrenbächer (2000, p. 119) mentions in his work. Various methods of measuring the firm-level multinationality were proposed and used to measure the extent to which firms *grasp the world*. The degree of firm-level multinationality is a key dimension that spans all theoretical frameworks, levels of empirical analysis, and domains of investigation in international business (IB) research (Aggarwal et al., 2011). Although the authors' effort is to understand the phenomenon of the MNE and its multinationality, there isn't probably any agreed approach to defining or measuring firm-level multinationality (Aggarwal et al., 2011). Even though the authors' effort in the area of international trade is "the desire to understand the nature of the empirical phenomenon of the multinational enterprise and its activities" (Cantwell and Brannen, 2016, p. 1025). There have been many research articles focused on a firm's degree of internationalization (see Aggarwal et al., 2011; Czychon, 2020), studying both its antecedents and consequences (Marshall et al., 2020), and developing method to capture and classify it.

Data on firm-level multinationality are used for various research in management science, microeconomics, and political science (Dörrenbächer, 2000). The key topics in IB include the regional-global debate and the relation between firm-level multinationality and performance (Aggarwal et al., 2011). In management science, scholars use multinationality to study the mentioned linkages of the degree of multinationality with the financial performance of firms (Dörrenbächer, 2000; Qian et al., 2008; Verbeke and Asmussen, 2016; Nguyen, 2017). Another significant debate concerning multinationality is on whether large MNEs have global or regional character (Rugman and Verbeke, 2004; Osegowitsch and Sammartino, 2008; Asmussen, 2009; Aggarwal et al., 2011; Rosa et al., 2020). However, various studies came to contradictory conclusions. In microeconomics, studying multinationality provides information on concentration issues of the power of MNEs in the economy. In political science, the multinationality of MNEs is used to explain underdevelopment in third-world countries, problems of state sovereignty, declining trade union power, resulting in development of policies toward domestic and foreign MNEs.

Inconsistent methods of measuring multinationality result in contradictory conclusions (Osegowitsch and Sammartino, 2008; Aggarwal et al., 2011; Czychon, 2020), neglecting or at least downplaying critical issues such as endogeneity and reverse causality (Verbeke and Asmussen, 2016), and little practical appeal for the use in empirical studies (Banalieva and Dhanaraj, 2013). The validity of each

study is dependent upon a chosen method. If the method does not capture and measure a firm's multinationality degree properly, there is a risk of either (1) inappropriately empirically confirming hypotheses or (2) falsely rejecting legitimate hypotheses because of invalid measurement (Marshall et al., 2020).

This could be prevented if the authors in the area of international trade agreed on a strong and robust classification system for distinguishing the degree of firm-level multinationality (Aggarwal et al., 2011; Berrill, 2015). Thus, such a method could provide a better understanding not only on the regionalization/globalization debate but also provide a tool to compare the results among various research conducted in the IB field.

For all those reasons, we see it as beneficial to compare various ways of measuring firm-level multinationality, other authors' reviews and critiques in the IB field, and to provide a list of aspects to compare, evaluate and develop methods of firm-level multinationality. Specifically, the paper's contribution to related debates is by identifying seven key aspects. Moreover, various approaches within defined aspects are reviewed and identified as ideal, optimal, usable, or best avoided. The identification process involved a comprehensive review of the related literature. The identification process involved a comprehensive review of the related literature, bringing aspects together and identifying the appropriateness of each approach for measuring firm-level multinationality.

The paper is structured as follows. In Section 1, we start with a review of the literature on approaches to measuring multinationality, dividing them into three parts: early times, Rugman's influence, and Aggarwal's influence. In Section 2, we explain the methods of our work. In section 3, we then discuss various approaches based on the seven aspects identified in the literature. Each aspect is widely discussed and an optimal approach to each aspect is presented in a separate summary. Finally, in the last section, we present our findings, mention the limitations of our work, and suggest directions for future research.

1   Approaches to measuring multinationality

Based on Dörrenbächer's (2000, p. 119) assumption that there is more than one way to "correctly" measure internationalisation, this paper concentrates on the "meaningfulness of different criteria and indices" as well. To compare key factors of what makes a classification applicable for measuring a firm's multinationality we start with a brief review of existing classifications. It is practical as each classification was developed to deal with a specific task or in a response to shortcomings of previous approaches. Czychon (2020) provides a list of classifications including approaches by Bruck and Lees

(1966), Sieber (1970), Rugman and Verbeke (2004), Asmussen (2009), and Aggarwal et al. (2011). Another approach worth mentioning was introduced by Marshall et al. (2020). Other authors developed methods of measuring multinationality through indices such as Sullivan (1994), UNCTAD (1995), and Ietto-Gillies (1998), which were already compared by Dörrenbächer (2000).

1.1 Early times

The first classification to mention is one by Bruck and Lees (1966) who measured the foreign involvement of the largest US industrial corporations. They considered empirical data and foreign to total (F/T) measures for firm classification and analysed the firms' operations based on sales, earnings, assets, employment, or production. Firms were classified as follows using thresholds: (1) multinational those with over 50 % of operations overseas, (2) internationally oriented those above 25 %, (3) significant foreign operations (over 10 %), and (4) small foreign operations (below 10 %).

The use of thresholds is likewise considered as part of the classifications by Sieber (1970 in Czychon, 2020) who based on the percentage of foreign (capital) investments classified firms as (1) international with a stake of at least 25 %, (2) multinational with stake more than 50 % and (3) world corporation if the stake is more than 75 %.

Unlike them, Sullivan (1994) and UNCTAD (1995) have developed a composite index measuring multinationality using multiple indicators. Sullivan (1994) started with a total of nine indicators and using an analysis on he came up with 5 indicators meeting statistical standards. Namely F/T ratios of sales, assets, subsidiaries, working experience of top management, and the psychic dispersion of international operations.

Unlike Sullivan, UNCTAD "selected its three individual indicators based on preliminary assumptions about their usefulness in expressing the phenomenon of internationalisation" (Dörrenbächer, 2000, p. 123). The selected indicators are used to compute the Transnationality index (TNI) which evaluates the scope of foreign operations of a company. The aim of this "widely-cited" (Rugman and Collinson, 2004, p. 472) index is to capture fully the extent of involvement of transnational corporations in the world economy (UNCTAD, 1995). The index is calculated as the arithmetic average of the sum of F/T ratios of sales, assets, and employment in order not to favour any industry. The higher the TNI value, the greater the extent of the company's transnationality.

1.2 Rugman's influence

The most cited classification was introduced in the paper by Rugman and Verbeke (2004) to support Rugman's hypothesis that the global strategy of companies is a myth and that companies are mainly regional in their character. Their classification is 'regiocentric' and applies thresholds on the

distribution of global sales under consideration of the broad triad concept (Ohmae, 1985), i.e., North America, Europe, and East Asia. It builds on the classification developed by Rugman and Brain (2003), which did not include the category of host-regional company. Based on the classification authors concluded that the largest MNEs did not have a global orientation and that the world was "semi-globalized" (Rugman and Verbeke, 2004, p. 17).

Many other studies were conducted based on this classification, mainly by Rugman and his co-authors. All of them confirmed the regional character of companies in different parts of the world (Rugman and Brain, 2003; Rugman and Collinson, 2005; Rugman and Oh, 2008, Rugman et al., 2012) and sectors (Rugman and Girod, 2003; Rugman and Collinson, 2004) primarily using data on sales, exceptionally data on assets (Rugman and Brain, 2003; Rugman and Oh, 2008; Rugman et al., 2012).

The classification received strong criticism as defined thresholds are not empirically supported nor robust (Osegowitsch and Sammartino, 2008), classification is unable to include companies out of the triad, and it ignores the category of a domestic company. The last shortcoming was addressed by Hejazi (2007) who subsequently extended the approach to include a domestic dimension. Rugman et al. (2012) partially addressed the mentioned limitations as they added the F/T ratio of sales to the previously exclusively used R/T ratio, incorporated the domestic firm category, and adjusted the thresholds based on Osegowitsch and Sammartino (2008). Rosa et al. (2020) have revisited Rugman and Verbeke (2004), defended proposed thresholds and acknowledged shortcomings of triad-approach and the limitations due to the home-country effect.

Some authors have modified Rugman's approach. Elango (2004) has operationalised the regional sales ratio as sales within the home region (excluding sales of home country) divided by the total sales. He also developed a new measure named global sales ratio which captures the sales outside the home-triad region.

Significant refinement of Rugman's approach came with Asmussen's (2009) work based on the proposition of a multidimensional index of regional and global orientation (Czychon, 2020). This method was supposed to solve all shortcomings of Rugman and Verbeke (2004). His approach suggests normalizing the data on the distribution of sales by connecting them with gross domestic product (GDP) distribution to deal with the so-called home-country effect. It is the incorporation of an objective criterion of globalization, that Asmussen (2009) sees as its main contribution. The criterion was suggested by Fisch and Oesterle (2003) as they stated that an ideal global firm should match its distribution of sales with the distribution of global GDP. Moreover, the method helps to align the theory and empirical methodology by linking indices R and G to a theoretical construct – the liability

of foreignness. Whilst the classification provides additional and sophisticated insight (Czychon, 2020), the combination of indices has a "little practical appeal" (Banalieva and Dhanaraj, 2013, p. 92).

1.3   Aggarwal's influence

The objective of Aggarwal et al. (2011) was to develop a classification that can "encompass the important dimensions of multinationality while at the same time being intuitive and easy to use" (Aggarwal et al., 2011, p. 562). They decided to use two dimensions to measure the multinationality, namely breadth and depth. The breadth dimension examines the geographical reach of the company's activities, from domestic to global. The depth dimension includes two levels: shallow (international involvement measured through sales) and deep involvement through FDI (measured by the existence of subsidiaries). Based on the geographical range of sales and subsidiaries, 16 subcategories are defined. Those are subsequently clustered into 4 main categories: domestic, regional, transregional, and global.

The approach has many spin-offs and adaptations conducted by Aggarwal's co-authors such as Berrill and Kearney (2010), Hutson and Laing (2014), Berrill (2015), O'Hagan-Luff and Berrill (2016), Geiger and O'Hagan-Luff (2020). According to Czychon (2020), those works demonstrate "how the application of different measures and contingencies can lead to the generation of different results".

2   Methodology

We develop a list based on various aspects of measurements and classifications of firm-level multinationality that were mentioned in the IB literature. The list is based on papers developing new methods where authors mention criteria why the proposed method is better than previous ones (e.g., Sullivan, 1994; Asmussen, 2009; Aggarwal et al. 2011; Marshall et al., 2020), commentary and critique papers (e.g., Osegowitsch and Sammartino, 2008; Ietto-Gillies, 2022; etc.), literature comparing different approaches (e.g., Dörrenbächer, 2000; Czychon, 2020), and empirical papers using proposed methods in various research (e.g., Rugman and Verbeke, 2004; Oh, 2009; Rugman et al., 2012; Berrill, 2015; Geiger and O'Hagan-Luff, 2020; etc.). We focused on developing a logical and complete list of aspects. The list addresses various approaches to measuring firm-level multinationality and reflects the issues mentioned and studied by other authors. Each aspect has its section providing detailed insight on possible approaches, issues, and resolutions ending with a summary. It is important to mention, that aspects of measurement methods overlap and influence each other. For this reason, we often refer to other aspects.

3   Discussion of the seven aspects

When studying separate approaches to measuring multi-nationality, areas in which some approaches are stronger or weaker crystallise. No approach is perfect as the ideal theoretical model differs significantly from what is practical and possible to compute given the data availability. The ideal approach should "encompass the important dimensions of internationalization while at the same time being intrusive and easy to use, which involve a trade-off between accuracy and simplicity" (O'Hagan-Luff and Berrill, 2016, p. 206).

The proposed framework builds on the work of Dörrenbächer (2000) and Czychon (2020) who conducted a comparison of methods measuring the firm-level multinationality. Dörrenbächer (2000) reviewed three methods and compared them based on issues of reliability, exactness, and validity of the measures. His findings are reflected throughout our list as every aspect might suffer from these issues. Czychon (2020) reviewed classifications concerning six criteria, namely the number of classes, consideration of subgroups, affiliation and diversity between classes, examination levels, scientific theory perspectives, and the order of content. We addressed his criteria in aggregation and robustness aspects. Marshall et al. (2020) named five aspects (advantages) why their method is better than those frequently used. They specified that their method is explicitly a theory-based measure of internationalisation, measures the degree to which a firm has penetrated the rest of the world's market to the degree it has in its primary market, captures the combined effects of the breadth and depth of internationalisation across the globe, is easy to calculate and interpret, and is calculable for more firms than other methods. All those aspects are addressed in our list. Ietto-Gillies (2022) studied the Transnationality index and focused on its dimensionality, aggregation, methodological inclusivity, and selection of companies for which the index is computed. The first three aspects are represented in our list. The last one is linked to the TNI as a list of the most transnational companies rather than TNI as a method to compare companies, therefore is unrelated to our work.

3.1   Aggregation

An important feature of examining the multinationality of companies is the ability to distinguish the extent to which companies are internationalised. There are three ways, namely (1) using an index, (2) dividing MNEs into categories, or (3) mix of those two. The indices allow the comparison of all companies on a single scale, categorisations create clusters of companies with a similar degree of internationalisation.

3.1.1   Developing an index

Indices are a synthetic representation of specific phenomena (Ietto-Gillies, 2022). Creating indexes, one should think of two main issues: (1) setting the scale and (2) the complexity of the index. Within the first point, it is important to ensure that both extreme values of the index are theoretically achievable, meaningful, interpretable, and ideally, normalise the scale from 0 to 1. The second key point focuses on the number and relationship of dimensions/indicators/indices that are used for the final index.

The index can be based on one dimension (e.g., Asmussen, 2009), or several ones (e.g., Sullivan, 1994; UNCTAD, 1995). Even though a composite index based on several dimensions (indicators) may seem a good idea for making comparisons between companies, sectors, and countries (Dörrenbächer, 2000), it suffers from several issues (Ietto-Gillies, 2022). The reason is that averaging/weighting multiple different elements provide an index that is less easy to interpret than original indicators and it may hide the overall structural change happening in the economy (Ietto-Gillies, 2022). Finally, individual indices are more informative, and their results are more applicable than composite indices of multinationality. Due to this, Ietto-Gillies (2022) recommends that TNI (UNCTAD, 1995) should focus more on individual indicators as policymakers' interest "is likely more on each component […] rather than at the general level of transnationality as such". Dörrenbächer (2000) states that it would be easier to find indices for intra-industry comparisons than for cross-industry research and that the aim of the research might guide the construction of a method. Multiple-indices approach was presented in Asmussen (2009) where a series of 4 indices were developed. All indices are based on the same dimension (sales) and represent different components of multinationality (intra-regionalization, inter-regionalization, internationalization, and globalization). All indices range from 0 to 1 and it is clear and meaningful what both extremes represent.

3.1.2   Categorization

Categorization is a common way how to aggregate companies for further research. The categories can then be included in the model as a continuous (index) or dummy (categories) variable, or a certain group or groups of companies can be selected for research. When creating or choosing a categorization method, it is important to consider several areas, namely (1) its completeness, (2) the number of categories and their hierarchy, and (3) the classification method. If a multidimensional classification is used (e.g., Aggarwal et al., 2011), the classification should be reasonably simple as otherwise the scheme 'blow up' when dimensions are added (Aggarwal et al., 2011).

Categorization is hard to do in a case a method uses an index. For example, both Sullivan (1994) and UNCTAD (1995) can distinguish only one category—domestic firms when the index is close to zero. As both those methods are based on F/T ratios, they can measure internationality, but cannot express multinationality and recognize the way of internationalization.

The individual categories should be distinguishable from each other, clearly defined, and reflect the real degrees or ways of internationalisation of companies. Based on the literature two groups of classification can be observed: foreignness and regionality based. Foreignness-based classifications (e.g., Bruck and Lees, 1966; Sieber, 1970) are the older ones using primarily F/T ratios. More recent classifications recognise the scale/scope of activities among various regions. Among those papers, three key levels of internationalisation can be defined, namely domestic, regional, and global (i.e., Asmussen, 2009; Aggarwal et al., 2011; Rugman et al., 2012). Therefore, every methodology using categorisation should include these three key ones. For example, the classification by Rugman and Verbeke (2004) is often criticised for leaving no space for domestic firms as it inflates the relative size and importance of the home region and therefore exaggerates estimates of regionalism (Osegowitsch and Sammartino, 2008; Asmussen 2009; Aggarwal et al., 2011). Many companies which were described by Rugman and co-authors as regional are national instead with no or little regional sales.

According to Czychon (2020), the number of classes ranges from a minimum of three to a maximum of five or, respectively, up to 16 for the classification he studied. Excluding the exception of Aggarwal et al. (2011) who have 16 classes that can be reduced to 4, the average number of the classification studied by Czychon (2020) is four. As mentioned, the most common categories include domestic/national, (home-)regional, and global/world company. Other classes include host-regional (Rugman and Verbeke, 2004; Asmussen, 2009) and multi-regional classes such as bi-regional (Rugman and Verbeke, 2004) or trans-regional (Aggarwal et al., 2011). In the case of foreignness-based classifications, classes are commonly used distinctions such as an international, multinational, and global company. The only approach using a hierarchy for classifications is Aggarwal et al. (2011) as they have 16 categories describing the relation of the scope of two dimensions—sales and branches. These categories are then reduced to 4 main ones based on the more internationalized dimension of the two.

Two ways to divide companies into categories are used in the literature, either based on thresholds or the relationship of several indices (e.g., Asmussen, 2009). Both variants have important shortcomings. In the case of thresholds, it is their setting and subsequent robustness, which was strongly criticized in the case of the method developed by Rugman and Verbeke (2004). In the case of classifications based on index relationships, there is a problem with usability, as there may be a problem with "classes" being more of a theoretical benchmark than a category for empirical work. For example, in the case

of the method proposed by Asmussen (2009), a global company is described as one that has its activities spread between areas according to GDP. Therefore, it is an unattainable ideal.

3.1.3   Summary

As mentioned, there are three ways of examining the MNEs' multinationality: (1) using an index, (2) dividing companies into categories, or (3) mix of those two. The decision on which one to use should reflect the purpose of the study and the data needed for research. In the case of using an index, the optimal approach is to use a multi-index approach (Ietto-Gillies, 2022) with a meaningful and normalised scale rather than using composite indices, which suffer from various issues and therefore should be avoided. The use of a single index might be appropriate depending on the purpose and scope of research. In the case of using categorization, categories of the optimal method should be distinguishable, clearly defined and cover at least domestic, home-regional, and global categories. Methods not covering those key categories should be avoided. Building on this, ideal methods should reflect degrees and ways of internationalisation of an MNE.

3.2   Complexity

The approaches to measuring multinationality can be broadly grouped into three groups based on their complexity, namely (1) scope, (2) scale, and (3) complex metrics. Scope metrics are the most simplistic ones as they rely only on the counts of foreign subsidiaries/offices or the number of countries where the MNE is active. Scale metrics, on the other hand, rely on the extent of activities such as sales, assets, and employment abroad. Simply said, scope metrics measure the quantity of internationalisation, and scale metrics its quality. The last group, complex metrics, include entropy measure and other measures using weights in the formula (e.g., Asmussen, 2009; Marshall et al., 2020).

Usually, only one type of measure is used in the method of measuring multinationality. Yet, some studies use both types (scope and scale) together. Simply adding two types together (e.g., Sullivan, 1994; Ietto-Gillies, 2022) does not help and only further confuses matters (Rugman and Oh, 2011). Even though some authors call for mixed approaches, such as Ietto-Gillies (2022) who suggests adding a scope measure (number of foreign countries where a firm is active) to TNI (UNCTAD, 1995).

The study by Oh (2009) suggests that scale and complex measures (such as entropy measures) based on sales or assets should be preferred. Simple country and subsidiary counts guide research to the wrong conclusion such as that MNEs are more globally dispersed than they truly are.

3.2.1 Scope metrics

The international scope is a measure of the breath or dispersion of international operations of MNEs (Nguyen, 2017; Marshall et al., 2020) and such proxies have significant shortcomings. Most common ways to measure the scope of multinationality include counts based on the number of foreign countries where a firm operates (NOFC), counts of the number of foreign subsidiaries or offices, the ratio of foreign subsidiaries to total subsidiaries (FBTB), etc., as listed in Rugman and Oh (2011). NOFC is described as a pure scope metric by Oh (2009) and FBTB as a 'pseudoscope' metric because it better suggests the firm's degree of international involvement. All metrics can be transformed from home country to home region level, as done for example in Oh (2009) to describe the scope of a firm's operations outside the home region.

Scope-based metrics do not consider the nature of foreign operations, and whether they are engaged in value-creating activities or not (Nguyen, 2017). As a result, they provide "simplistic and potentially misleading information" about the foreign involvement of an MNE (Rugman and Oh, 2011). Rugman and Oh (2011) state clearly that there is no theoretical justification for scope metrics and recommend calculating multinationality using F/T ratios and their variations. Scope metrics might make firms operating in many countries seem to be more internationalised than they are, as MNEs can operate in many countries and yet have relatively small F/T ratios (Rugman and Oh, 2011).

Scholars, according to Rugman and Oh (2011), appear to use scope metrics because they are easily attainable from annual reports.

3.2.2 Scale metrics

The scale metrics measure the extent of a firm's activities abroad using data on sales, assets, employment, etc. abroad. These measures reflect the "initial home-country-centric foundational theories of internationalization" such as Ansoff's international expansion model, Johanson and Vahlne's Uppsala model, and Dunning's Eclectic Model (Marshall et al., 2020, p. 1134). Marshall et al. (2020) state that these more than 40-year-old prospects for internationalisation use the MNE's domestic market as a reference point for studying international expansion. During those 40 years, there have been enormous changes to the international business environment and the home country may not be as dominant as it used to be. Therefore, the use of foreign to total measures does not provide enough information about firm internationalisation (Marshall et al., 2020).

Two main scale measures are F/T ratios of sales (FSTS) and assets (FATA). These measures represent the degree of internationalisation due to a downstream (marketing side – sales) and upstream

(production side – assets) firm-specific advantage (Oh, 2009). Scale measures, of course, can be transferred to the regional level as well to measure the R/T ratios (as developed by Oh, 2009). It is probably the FSTS ratio, which is the oldest and easiest way to calculate a firm-level internationalisation and therefore the most popular (Rugman and Oh, 2011; Nguyen, 2017; Marshall et al., 2020). F/T ratio of assets is not frequently used in the literature (Nguyen, 2017) and if so, usually together with the ratio of sales (UNCTAD, 1995; Rugman and Collinson, 2004). Other authors who rely on scale measures are listed in the work of Rugman and Oh (2011).

Marshall et al. (2020, p. 1140) urge scholars to no longer use F/T measures given their "confirmed and significant home-country-size bias". Ietto-Gillies (2022) states that their critique is appropriate in the context of research on the marketing potential. In the case of government policies, F/T measures seem to her appropriate as the government focuses on the home country, and data on other countries can be merged. Apart from home-country-size bias, another drawback of the F/T ratio is that data on sales sometimes merge data on exports from the home country abroad together with sales made by foreign subsidiaries in host countries (Hennart 2011; Rugman and Oh 2011) and therefore mix the sales made by home and host country.

Rugman and Oh (2011) call for more work to be done building on Asmussen (2009) where GDP was used to measure the size of a country. Until a good country-size metric is more widely accepted, Rugman and Oh (2011) suggest continuing to use scale metrics such as F/T and R/T. As more large firms report and disclose their sales and assets according to broad geographic regions, such as North America, Europe, and the Asia Pacific (Nguyen, 2017), scholars are allowed to replace the traditional F/T multinationality metrics with the R/T ratio.

3.2.3   Weighted metrics

Complex metrics can be considered those that include weights for the "normalisation" of company values according to geographical areas of origin. These methods can be built on both scope and scale metrics. Therefore, arguments mentioned in the sections for scope and scale metrics apply here as well. Two approaches can be recognised for complex metrics, differing mainly in the number of geographical areas considered: (1) the GDP-normalised ratio of two geographical areas and (2) the sum of normalised values for individual geographical areas (so-called entropy measures).

The first approach is used in the works of Asmussen (2009) and Marshall et al. (2020). The second one is described and used, for example, by Oh (2009). The entropy measure is described as Jacquemin and Berry's (1979, in Oh, 2009) type of measure for geographic diversification (Oh, 2009). It reflects both the multiplicity of foreign markets and the equality/inequality of the size of the foreign operations

(Qian et al., 2008). The higher the value of entropy measure is, the more geographically dispersed MNE is. An alternative might be an approach by Perriad (1995) who uses the Gini index to measure the extent to which the distribution of a firm's regional activities complies with the total distribution around the world, as mentioned in Dörrenbächer (2000). Kutschker (1993, in Dörrenbächer, 2000) proposed that foreign activities should be weighted according to their geographical and cultural distance to the firm's home country.

3.2.4 Summary

Scope metrics provide "simplistic and potentially misleading information" (Rugman and Oh, 2011) and therefore should be avoided in the research on the multinationality of MNEs. Scale metrics are preferred (Oh, 2009; Rugman and Oh, 2011; Ietto-Gillies, 2022) at least until good complex metric building on Asmussen (2009) is widely accepted (Rugman and Oh, 2011). The appropriateness of using scale metrics depends on the purpose of the research (Ietto-Gillies, 2022). Yet, the optimal approach is seen in developing complex metrics based on weights or entropy measures (Asmussen, 2009; Rugman and Oh, 2011; Marshall et al., 2020).

3.3 Indicators

Indicators are the basis of every method and therefore need to be given proper attention. Firstly, it is necessary to introduce their classification for clearer work with them. Secondly, to describe the possibility of their combination in proposed methods, limitations due to data availability, and finally to present the most significant ones.

Most commonly used indicators, according to Nguyen (2017), include foreign market penetration measured by the ratio of foreign to total sales, foreign production presence measured by the ratio of foreign to total assets/subsidiaries/employees, foreign sales dispersion of foreign sales based on segment data, country scope defined as the number of foreign countries where MNE operates, cultural and institutional diversity of foreign countries entered and attitudinal attributes such as top managements' international experience/orientation. This results in the offer of six main variables, namely sales, assets, employees, capital, relationships, and orientation (Czychon, 2020).

Sullivan (1994) divides all mentioned indicators into three groups, namely (1) structural, (2) performance, and (3) attitudinal indicators. Structural indicators provide a picture of the international entanglement of a firm, performance indicators try to give a picture of the degree of a firm's success or failure abroad, and attitudinal indicators try to measure top management's international orientation and experience (Sullivan, 1994; Dörrenbächer, 2000).

Alternatively, Czychon (2020) proposes the separation of indicators into two groups, so-called (1) tier-one and (2) tier-two variables, based on the findings drawn from his analysis of classifications. Tier-one variables can be, based on their wide acceptance throughout the literature identified as standardisable. On the other hand, tier-two indicators differ regarding their setup. Therefore, it can be concluded, that tier-one variables include Sullivan's (1994) structural and performance indicators. And tier-two variables include Sullivan's attitudinal indicators.

As Asmussen (2009, p. 1202) has stated, to get a full picture of a firm's multinationality, "we need to look beyond any one particular aspect and combine different indicators in composite indices". Those are in broad consensus seen as more suitable to measure multinationality as a single indicator cannot satisfactorily measure the overall degree of multinationality (Dörrenbächer, 2000). Dörrenbächer (2000) describes three main issues, namely (1) bias, (2) possible contradictions, and (3) measurement errors. The first point describes the problem of one-item metrics as they represent only one part of the phenomenon of a firm's multinationality. Therefore, the metric can be biased toward companies from one specific industry (Dörrenbächer, 2000). The second point covers the possibility that a single dimension can lead to contradictory results concerning the multinationality (such as in the case of debate on regionalisation/globalisation of MNEs) as they capture only one aspect of multinationality, and other important circumstances remain hidden (Asmussen, 2009). Even though, single item metrics facilitate replication (Sullivan, 1994), using a single indicator might distort the validity of the method as it does not allow for systematic control of measurement error into account and therefore increase the probability of Type I or Type II error (Sullivan 1994), which is covered by Dörrenbächer's (2000) last point.

On the other end, each method requires a different mix of data and so does each research. This is a reason, why F/T metrics using sales as a variable are the most common. The more complex metric is, the more data it might require. This can be a problem as it is the data requirement that determines which companies can be studied. The data can be obtained from databases (such as ORBIS), annual rankings of the largest companies (e.g., Fortune Global 500, Forbes Global 2000, TNI), annual reports, etc. Therefore, it is important to keep this in mind when choosing or developing a method to measure multinationality. As the more complex the metric is, the smaller range of companies can be studied which means the representativeness of the sample could be limited. In general, a higher level of data availability can be expected for publicly traded companies. At the same time, more information will be available on corporations from the US and the EU than, for example, from China, Brazil, etc. Differences in data availability may also vary depending on the size of companies and the sector in which they

operate. This limitation cannot be eliminated. However, it must be kept in mind and acknowledged in the study.

3.3.1 Structural indicators

According to Dörrenbächer (2000), structural indicators include two subgroups, indicators (1) relating to foreign activities and (2) relating to governance structures. Indicators such as the number of countries a company is active in, number or proportion of foreign affiliates, amount or proportion of foreign assets, value-added abroad, of foreign employees, etc., are included in the first subgroup. The other group includes indicators such as the number of stock markets on which a company is listed and the amount or proportion of shares owned by foreigners or non-nationals serving on the board of directors. Only the most common proxies are presented.

Assets as a proxy of the degree of multinationality are used by multiple authors, e.g., Bruck and Lees (1966), Sullivan (1994), UNCTAD (1995), Rugman and Collinson (2004), and Rugman and Oh (2008). Studying the distribution of assets means that scholars follow the prevailing concept of multinationality based on FDI (Ietto-Gillies, 2022). Ietto-Gillies (2022) describes this as a possible issue as the "most influential and dynamic sector of our age" as she describes the digital sector as underestimated. Many companies in the digital sector are highly internationalised but they are light on FDI as they appear to have lower levels of fixed assets. Yet they have large amounts of sales around the world (Ietto-Gillies, 2022). Therefore, the number of foreign assets as a proxy for multinationality made sense for a long period in the 20th century (Ietto-Gillies, 2022). Nowadays the representativity of assets widely differs across sectors.

The number of employees as a dimension of employment around the world is used for example by Bruck and Lees (1996) and UNCTAD (1995). Ietto-Gillies (2022) states that "due to high levels of externalisation, the employment data no longer reflects the true situation of large companies in relation to their production, sales/revenue or control over the production process." The use of this dimension is criticised as well by Dörrenbächer (2000) who mentions the exact definition of the employee is missing. Therefore, it is not clear whether data are a simple headcount, a conversion into full-time equivalents, estimation based on assets, etc. Furthermore, he questions if it is viable to compare employment without considering the large sectoral and national differences.

The number of subsidiaries is used, for example, in the work of Aggarwal et al. (2011) as one of two dimensions, in Sullivan's (1994) composite index is used in the form of the F/T ratio. Another way of tackling the geographical variation of a firm's internationalisation is through its geographical spread. In other words, to focus on the number of countries a company is active in (e.g., Ietto-Gillies, 1998).

3.3.2 Performance indicators

Dörrenbächer (2000) recognises two groups of performance indicators—foreign sales and operating income abroad. Foreign sales can be measured based on demand (foreign sales by customer location) or supply (sales of foreign affiliates). Operating income abroad is understood as a sum of the operating income of foreign affiliates.

According to Dunning et al. (2007) and other authors (see Sullivan, 1994), it seems to be justified to use sales in individual regions (demand version) as a proxy for the geographical distribution of economic activity. Yet they point out that other variables than sales should be added to the analysis. For example, Rugman and Collinson (2008) used data for both sales and assets. Using sales as a proxy is the most common approach in the literature, as they provide good information about the firm's performance and success abroad (Rugman and Oh, 2011). It is important to note that no large differences exist between the geographic scope of sales (downstream) and the geographic scope of assets (upstream), according to literature (Rugman and Brain, 2003, Osegowitsch and Sammartino, 2008). Even though, overall downstream activities are more internationalised than upstream activities (Oh, 2009).

The sales/revenues have the best data of all the other variables, in terms of reliability, coverage, and comparability (Ietto-Gillies, 2022). "Revenue as a concept is more homogeneous – and thus more comparable across sectors than, for example, assets. It could be argued that, when expressed in value terms, they are both comparable. However, the variable assets whether in value form or not correspond to different objectives and strategies of companies. Revenue in its value-form expresses one half of the profits equation and this is true across the variety of companies and sectors" (Ietto-Gillies, 2022).

It should be kept in mind, that there is an exchange rate problem when comparing the internationalisation of companies on a historical or a national basis (Dörrenbächer, 2000). Another possible influence that occurs from time to time is the relocation of an MNEs headquarters abroad (Dörrenbächer, 2000).

3.3.3 Attitudinal indicators

Attitudinal indicators, according to Dörrenbächer (2000), include soft and hard indicators. The first group includes proxies connected to the management style used in the firm, the other group includes measurements of the international experience of top managers.

One of the authors who used soft attitudinal indicators is Sullivan (1994) who estimated the psychic dispersion of the international operations of a firm by calibrating the dispersion of the subsidiaries of a firm among the psychic zones of the world as identified by Ronen and Shenkar (1985 in Sullivan, 1994). Each zone has, according to Hofstede (1993 in Sullivan, 1994), a unique cognitive map of the principles of management. Therefore, Sullivan (1994) "presumed that the greater the dispersion of an MNE's subsidiaries across these zones, the greater the psychic dispersion of its international operations". This is criticised by Ramaswamy et al. (1996) as using the psychic dispersion of internationalisation concept, a company operating in France and the United Kingdom has a higher psychic dispersion of its internationalisation than a company operating in Japan, India, Israel, and Brazil (Dörrenbächer, 2000).

Sullivan (1994) has included the hard indicators through the length of international experience. Ramaswamy et al. (1996) criticised this approach and proposed better yardsticks for the international mindset of the management such as the geographic spread of the company, its policy, and its administrative heritage as mentioned in Dörrenbächer (2000).

3.3.4 Summary

To get a full picture of a firm's multinationality, researchers need to combine different indicators (Dörrenbächer, 2000; Dunning et al., 2007; Asmussen, 2009). Studying multiple indicators helps scholars to get less biased results and lower the probability of contradictions and errors (Dörrenbächer, 2000). Preferred are so-called tier one indicators (Czychon, 2020) which cover objective, standardised ones. The most common indicator is sales (Nguyen, 2017) which has the best data of all the other variables, in terms of reliability, coverage, and comparability (Ietto-Gillies, 2022). The ideal approach is then to reflect the purpose of the study, specifics of studied sectors and the data availability (Ietto-Gillies, 2022).

3.4 Geography

This section addresses two key issues related to geography. Firstly, the extent to which the methods cover the countries of the world economy (geographical range), and secondly, the question of how the methods divide the world into regions (geographical areas).

3.4.1 Geographical range

A method needs to be able to cover the whole global economy to stay relevant and applicable in the future. The main problem with the triad approach is that more and more large corporations are appearing in developing countries (Freund, 2016) which therefore cannot be included in the

classifications based on the triad approach (Stevens and Bird, 2004). While business activity is at present concentrated in these regions, there is no certainty that this will continue to be the case (Berrill, 2015). The triad-region approach appears in works by Rugman and his co-authors such as Rugman and Verbeke (2004). Rosa et al. (2020) state that in certain sectors it would be reasonable to add the category rest of the world, but they emphasise that the Triad regions did and still do represent the main economies and locations of the largest companies in the world.

Another problem with the triad-region approach based on Ohmae (1985) is the "ill-defined" regions of the Triad itself, as reported by Berrill (2015). There are many approaches in the literature, from the core triad covering only the USA, the EU, and Japan to the extended triad covering the whole of North America, Europe, and Asia. The variant of the Triad considered by Rugman and Verbeke (2004) and subsequently by Rosa et al. (2020) is the one covering North America, Europe, and the Asia Pacific. Therefore, they exclude companies from the Middle East, South America, and the whole continent of Africa and Australia.

Moreover, companies located in areas of the triad that operate significantly in areas outside the triad will not be able to reach the required thresholds and therefore the number of bi-regional and global firms might be underestimated, as acknowledged by Rosa et al. (2020). For example, several bi-regionally oriented companies were close to achieving a global sales orientation but did not achieve this status because of sales outside of the Triad regions (Rosa et al., 2020).

3.4.2 Geographical areas

There are many approaches to how to divide the world into regions and all of them can be included in one of two possible approaches – relative and fixed. The relative-regions approach (RRA) relies on the location of the home country, e.g., the distinction of the home country (HC), rest of the region (ROR), and the rest of the world (ROW) by Asmussen (2009). On the contrary, the fixed-regions approach (FRA) uses defined regions that are similar for every single company, e.g., triad regions by Rugman a Verbeke (2004) and continents used by Aggarwal et al. (2011).

RRA can be used in many vary similar forms. Methods using F/T ratios (e.g., Sullivan, 1994; UNCTAD, 1995) distinguish only the home country and the rest of the world (foreign area). Asmussen (2009), as mentioned, proposes three areas – HC, ROR, and ROW. Some authors include, and others exclude HC from the home region. An exception is an approach of Marshall et al. (2020) which proposes the primary market as a base unit instead of the home country or home region. The primary market is then defined as a country or a region with the highest value for the revenues/GDP ratio.

FRA approach is used in studies such as Rugman and Verbeke (2004), and Aggarwal et al. (2011). The strict-geography approach divides the world into smaller or bigger geographic areas, usually defined on continents (e.g., six inhabited continents by Aggarwal et al., 2011) or economic centres (the Triad by Rugman and Verbeke, 2004, and Rosa et al., 2020).

A problem occurs when classification makes no distinction between activities in the home country and other countries in the home region (Westney, 2006; Dunning et al., 2007; Eden, 2008; Osegowitsch and Sammartino, 2008). In such a case company with activities mainly in the home country and then outside of the home region (with limited activities in the rest of the home region) will still be classified as home-region oriented. Even a company with little or no foreign sales is recognised as home-regional in this case.

Ideally, classification could use country-based data to fully understand the dispersion of foreign activities. Yet, as mentioned by Casella and Formenti (2018 in Ietto-Gillies, 2022), only a small number of firms provide data on, for example, the geographical distribution of total assets. This is one of the reasons why the methodology of Rugman and Verbeke (2004) can be used so widely, as a significant number of the largest companies report their geographical distribution of sales/assets according to triad regions in their annual reports. However, according to Asmussen (2009), the question of what the 'correct' dimension of geographic aggregation is can only be answered empirically. He suggests researching different region groupings using his R and G indices to achieve the lowest Z values within the regions, as regions are groupings of countries that are relatively similar and relatively dissimilar to countries in other regions (Verbeke and Asmussen, 2016).

3.4.3   Summary

Every method needs to apply to any company from anywhere in the world. The best dimension of geographic aggregation is according to Asmussen (2009) a great question to be answered empirically. In the literature, the most common is an approach based on continents (e.g., Aggarwal, 2011) or relative based on the distance to the home country (e.g., Asmussen, 2009). Triad approach should be avoided, as well as methods making no distinction between activities in the home country and other countries in the home region (Stevens and Bird, 2004; Westney, 2006; Dunning et al., 2007; Eden, 2008; Osegowitsch and Sammartino, 2008).

3.5   Robustness

For every method, it is important to be robust so that outputs are correct and applicable. Otherwise, the given method can, in extreme cases, cause contradictory conclusions. One example for all could be the regionalization/globalization debate. Based on the literature in the field of IB, two issues with

the robustness of methods measuring multinationality arise—whether the approach is (1) theory-based and (2) robust within its rules.

3.5.1 Theoretical framework

Each method is based on theoretical foundations. Within the literature, three ideas can be observed, which overlap and complement each other. Specifically, these are (1) foundational theories of internationalization, (2) liability of foreignness, (3) firm-specific advantages, and (4) equal spread of firm and global activities.

The first ideas, the home-centric foundational theories of internationalization, presume greater risks inherent in foreign environments and use the firm's home market as a reference point for evaluating the internationality of firms (Marshall et al., 2020). It includes Ansoff's international expansion model, Johansson and Vahlne's Uppsala Model, and Dunning's Eclectic Model, as referred by Marshall et al. (2020).

The other idea relates to the concept of liability of foreignness and firm-specific advantages. It originates with the work of Hymer (1976). According to Asmussen (2009), Hymer described the disadvantages faced by MNEs when competing against domestic firms abroad, such as foreign firms' lack of information about the host market, host-market discrimination against outsiders, and exchange rate risk. Firm-specific advantages (FSAs) in the work by Rugman and his co-authors. FSAs describe the "non-location-bound nature of the MNEs' knowledge base" (Rugman and Verbeke, 2004, p. 6). The assumption is that the successful deployment of downstream FSAs results in sales. Firms able to deploy their FSAs (measured by sales) only in their home region are therefore regional, those with extensive downstream FSAs in two regions are bi-regional, etc.

Both the liability of foreignness and firm-specific advantages are highly interconnected as both address limits of international transferability of a firm's knowledge, brand names, limits of acceptance by customers, etc.

Marshall et al. (2020) refer to Fisch and Oesterle (2003) and Asmussen (2009) who theorise that a global firm "penetrates each country's market such that its penetration in its original home country is no longer distinguishable from its presence in any other country. Both Asmussen (2009) and Marshall et al. (2020) expressly derived their ratios based on Fisch and Oesterle's (2003, p. 3) understanding that "a global MNC reflects the global activities of the world's economies, i.e., their degrees of spread are equal".

3.5.2   Robust formula

The second area is the robustness of the measurement method itself. There are mainly two possible issues, namely incorrect setting of (1) the weights of individual indicators, and (2) cut-off points determining the categories. Both areas are further discussed.

The first area focuses on methods combining multiple indicators, where authors may choose to assign different weights to different components of the formula. The setting of weights can significantly change the output of the entire methodology. Authors such as Sullivan (1994), UNCTAD (1995), and Aggarwal et al. (2011) chose not to specify the weights, yet they are present and equal to one. Weights are therefore not used within the methods of measuring multinationality explicitly, but their use is possible and should be kept in mind (Dörrenbächer, 2000).

The second area draws attention to possible problems arising when setting cut-off points. For this purpose, thresholds (e.g., Rugman and Verbeke, 2004; Rugman et al., 2012; Rosa et al., 2020) or relationships of several indices (Asmussen, 2009) are used in the literature. As their thresholds are not empirically based, Rugman and Verbeke (2004) were strongly criticized by other scholars such as Osegowitsch and Sammartino (2008) and Berrill (2015) for using them. According to literature, set thresholds (1) underestimate the number of global firms from strong economies, and (2) are biased toward defining firms as home-regional.

The underestimating of the number of global firms happens as companies from strong economies such as the USA are unlikely to achieve the required thresholds in the other two regions. This issue relates to the home-country effect discussed later.

The bias towards defining firms as home-regional is caused by the 50% home-oriented threshold. A firm can be globally active, yet if they have 50 % of their activities in the home region, they are classified as a regional company. This "overwhelmingly drives Rugman's classification" as when a firm exceeds it, other thresholds do not matter (Osegowitsch and Sammartino, 2008). This should not be the case. A strong presence in a home region should not negate the worldwide success of a company (Osegowitsch and Sammartino, 2008). Rosa et al. (2020) who revisited the original work by Rugman and Verbeke (2004) are defending set thresholds. Rugman and his co-authors have addressed the critique and have loosened the thresholds in their later work (e.g., Rugman et al., 2012) for them to be robust. A similar problem appears in the method presented by Asmussen (2009). He does not use thresholds explicitly, but relationships of indices, as he draws attention to the lack of theoretical justification for the use of thresholds at all. In his case, a firm is described as home-regional if its intra-regionalization is to a greater extent than its inter-regionalization. Therefore, a company might have a

global presence, yet if it is closer to GDP distribution in the home region than globally, it will be considered a regional company.

Osegowitsch and Sammartino (2008) point out that the result of any classification is always sensitive to the choice of cut-off points. Therefore, it is important to test the classification for robustness. According to Osegowitsch and Sammartino (2008), it is "disconcerting" that Rugman's classification hasn't been tested for robustness, given the "contentious nature" of the classification system.

3.5.3 Summary

For methods to be robust, it is important to be theory-based (Marshall et al., 2020) and their setting should be tested for robustness (Osegowitsch and Sammartino, 2008). Subjective weights and non-empirical thresholds must be avoided (Osegowitsch and Sammartino, 2008; Berrill, 2015).

3.6 Country effects

When comparing the multinationality of individual companies, the importance of both (1) domestic (home-country effect) and (2) foreign economies (rest-of-the-world effect) must also be considered, as each country is differently significant in the global economy. The optimal way how to deal with both effects is to use GDP as a normalising proxy.

3.6.1 Home-country effect

Various scholars point out that the comparison of companies from different countries can be severely skewed and thus not meaningful due to the so-called home-country effect (HCE) (Asmussen, 2009; Rosa et al., 2020; Ietto-Gillies, 2022). The reason for HCE is the neglect of the differences in the relative size of the domestic and host economies and its result is incomparability of companies from different countries, especially if their significance differs. The ignoring of HCE results in a bias towards companies from smaller countries that are forced to internationalise due to a limited internal market. Most classifications suffer from HCE, as they use conventional multinationality measures (i.e., F/T ratios for sales, assets, and counts of entered countries or foreign subsidiaries) which ignore the size of the domestic country (Oh, 2009). Just a few of them address the issue, e.g., Asmussen's (2009) method and RIMS (Marshall et al., 2020).

Both Asmussen (2009) and Marshall et al. (2020) normalise the distribution of global sales by controlling the distribution of global GDP. The idea is that the distribution of sales of a global company should match the distribution of GDP in the global economy (Fisch and Oesterle, 2003; Asmussen, 2009). As a result, scholars should be provided with easily applicable classification for statistical cross-country and cross-region comparisons (Asmussen, 2009). Even though GDP-based measures are

"admittedly coarse indicators" of market size, they have a distinct advantage of being widely available and comparable (Ellis, 2008, p. 358, in Marshall et al., 2020). Other authors recommend using GDP as a proxy for the significance of the economy and its relative market size as well (Banalieva and Dhanaraj, 2013; Marshall et al., 2020; Rosa et al., 2020).

3.6.2   Rest-of-the-world effect

Another issue with comparing companies' multinationality is the effect on the rest of the world (ROWE). This effect describes a limitation of a method unable to distinguish the importance of individual foreign countries or regions. ROWE is the most significant in a case of methods using simple F/T and R/T ratios (e.g., Bruck and Lees, 1966; Sullivan, 1994; UNCTAD, 1995; Rugman et al., 2012) as even though a company might be strongly internationalised, it does not tell anything about its multinationality as all foreign activities might be concentrated in one or just a few countries. Other approaches address the issue partially, as they study the distribution in more areas. Some of them divide the world on the level of main economic regions (triad approach by Rugman and his co-authors), and some of them on the level of continents (Aggarwal et al., 2011, and the spin-off studies). In the case of the method developed by Aggarwal et al. (2011), the problem arises due to using the scope metric, as they only count the number of countries where companies conduct business activities. Scope metrics cannot tell the significance of countries and therefore suffer from ROWE in general. Asmussen's method addresses the ROWE partially as well, as a company might operate in only one country in the ROW area, yet if its sales meet the GDP in the area, it might be classified as a global company.

The ideal solution to the ROWE might be to study the activities of companies in each country while normalising their share by GDP. However, this is unrealistic as large companies usually provide information on the distribution of their activities only at the level of larger geographical units, and only the most significant markets are reported separately. The more realistic solution might be to monitor the significance of business activities across the continents and normalise them based on the GDP. The reason for this is that the more regions a method are distinguish while using a scale or weighted metrics, the more the influence of ROWE is limited.

Moreover, not addressing ROWE might be appropriate if the method is used to study the internationality instead of the multinationality of domestic companies (Ietto-Gillies, 2022). For example, in the situation of studies by a government for a purpose of building policies toward local-based MNEs.

3.6.3   Summary

To reflect the size/significance of different economies, various authors recommend using GPD as a proxy to normalise the international distribution of firms' activities (Asmussen, 2009; Banalieva and Dhanaraj, 2013; Marshall et al., 2020; Rosa et al., 2020). The ideal method would control for the effect of every economy, but this is unlikely given the data availability. Therefore, the optimal approach might be in controlling for the relative size of the home country, rest of the home region and rest of the world (following the work of Asmussen, 2009) or other world regions. Metrics not controlling for country effects should be avoided.

3.7   Flexibility

In the ideal world, there would be a universal method, uniformly used across literature, which would allow the comparison of the results of various studies (Aggarwal et al., 2011). However, this seems unrealistic for many reasons. For example, Hassel et al. (2003) rejected the possibility of a universal approach to multinationality. Other reasons for the unlikeliness of the universal approach are the diversity of needs and focus of individual studies and the limited data availability. As Aggarwal et al. (2011) mention, the lack of an agreed approach to measuring the degree of firm-level multinationality lead to disparate findings across similar studies which complicates the confirmation or rejection of previous findings. The discipline has therefore stymied.

To address both the need for a widely used method of measuring the multinationality and limitations of a universal approach, we propose to develop a flexible method. This method could serve as a framework for adjusting the needs of individual research. The framework would ensure all the other aspects are considered and therefore the method used is not biased, does not provide contradictory results, and its results are comparable across studies.

Flexibility is needed when deciding on the (1) indicator type, (2) number of indicators, (3) weights of individual indicators, (4) indicator for normalising, and (5) number of differentiated regions. So far, in the literature, the need for flexibility is mentioned in connection with the first three points. Methods are commonly flexible with the indicator used, but scholars usually do not mention this feature. Among exceptions is Asmussen (2009) who states that his metric can be easily adapted to other indicators such as assets. The number of indicators is generally fixed. Yet, some methods using indices could be easily transformed for a higher or lower number of indicators such as UNCTAD (1995) as their methodology is straightforward. Dörrenbächer (2000) mentions that it is the aim of the research that might give some guidance on how to construct the method and reflect the first and third points. Generally recommended indicator for normalising is GDP (Asmussen, 2009; Banalieva and Dhanaraj, 2013; Marshall et al., 2020), yet in the case of studying a specific industry, other indicators such as

asset or sales distribution might be of better use (Asmussen, 2009; Ietto-Gillies, 2022). To our best knowledge, only the method proposed by Marshall et al. (2020) is flexible in terms of geography as they focus on the primary market of MNE instead of the home country. These two do not need to overlap. As the data availability is improving in time, in future we might be able to study the distribution of a firm's activities to a greater extent. Just as methods using the Triad approach got obsolete (Stevens and Bird, 2004; Berrill, 2015) as more and more MNEs are emerging outside the defined Triad (Freund, 2016), methods dividing the world into blocks might get obsolete in time as well. Therefore, we recommend that newly designed methods of measuring multinationality should therefore address this issue and propose a framework to scale the division of the world into larger or smaller blocks.

3.7.1 Summary

As we suggested, the flexibility of methods matters as a universal approach is not possible (Hassel et al., 2003) and its absence results in the fragmentation of the research on the firm-level multinationality (Aggarwal et al., 2011). The flexible framework could address both these issues. The ideal method should provide flexibility on the (1) indicator type, (2) number of indicators, (3) weights of individual indicators, (4) indicator for normalising, and (5) number of differentiated regions.

Conclusions

The paper examines methods of measuring firm-level multinationality and focuses on the related issues mentioned throughout the IB field. We categorised these issues into seven interconnected groups to build a comprehensive list of key aspects for evaluating or comparing various measures of multinationality or developing an entirely new sustainable framework for use in IB research. The defined seven aspects are (1) aggregation, (2) complexity, (3) indicators, (4) geography, (5) robustness, (6) country effects, and (7) flexibility. In this paper, each aspect has its subchapter which serves as a discussion of various approaches and always concludes with a summary.

The limitations of our study are threefold. Firstly, chosen approaches do not represent the whole variety of measuring multinationality. Yet, this paper includes the most influential methods and covers a wider range than, for example, Czychon (2020) who made an alternative comparison of classifications of multinationality. Secondly, the aspects for comparison were chosen based on the existing literature, not empirically. The last limitation relates to the proposed list of aspects as they partially overlap and influence each other. This limitation cannot be eliminated due to the complexity of the topic.

Based on our review, we identified two key areas on which scholars should be focused for the future development of methods of measuring firm-level multinationality. Firstly, scholars should focus on the empirical comparison of the most influential methods proposed in the literature on the same sample of data. This can further help to understand the bias due to the method used and empirically express the significance of different approaches to the seven aspects. Secondly, we propose the development of a flexible framework addressing the seven aspects proposed in this paper. The main advantages of such a framework will be the comparability of results across studies, controlling for possible bias and contradictory results. Both our recommendations can be addressed simultaneously.

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