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Into the unknown: The extent and boldness of firms' international footprint

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Abstract

Research Summary: Firms make footprints as they internationalize. Going beyond simple measures of firms' internationalization, we conceptualize and measure the extent of a firm's international footprint as the number of location-mode combinations it is active in, whereas the boldness of the footprint shows how widespread (across modes and locations) firms' international activities are, compared to other firms with similar extent. Extent describes the complexity of international activities, and boldness captures the risk-taking associated with operating in less known contexts. Consistent with a microfoundations lens on global strategy, we find that boldness correlates with managerial risk-taking attributes, while the extent of internationalization strongly correlates with capabilities conducive to managing more complex operations. These measures offer a highly suitable tool for analyzing the relationship between internationalization and performance.

Managerial Summary: Traditional ways of measuring firms' international footprints do not describe well what they do globally. We develop a more nuanced and sharper view of firms' international footprints and a new way of thinking about the roles of complexity and risk-taking in internationalization; what we call the

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extent and the boldness of a footprint, respectively. The new measures are potentially particularly useful for analyzing the relationship between internationalization and performance, which is at the core of what strategy research may offer to managers and business decision-makers. The new measures are a stepping-stone toward a better and managerially relevant understanding of global strategy decisions.

KEYWORDS

complexity, foreign operation modes, internationalization, microfoundations, risk-taking

1 | INTRODUCTION

Firms engage in international business because they see opportunities to profit from foreign operations. However, internationalization also increases the complexity of business activities firms conduct and force them to engage in more unknown operations (Benito & Welch, 1997; Johanson & Vahlne, 1977). These features and trade-offs in firms' international operations can be characterized by firms' international footprint.¹

Models of the internationalization process posit that firms would start internationalizing toward relatively more familiar markets with lower commitment intensive modes (such as exports). This reduces the complexity and perceived risk of their operations. Gradually, firms will engage in more commitment intensive modes of international operations and move to less familiar contexts (Johanson & Vahlne, 1977). Hashai (2011) highlights that firms tend to choose a dominant path of internationalization, either by expanding their modes of operation in familiar markets or by entering unfamiliar markets using operation modes they know. Expanding along both paths is perceived as riskier than sticking to a single path of internationalization. As result, at a given point in time, only the more experienced firms will exhibit an international footprint combining different operation modes in different foreign markets. Providing a complementary view, Verbeke, Li, and Goerzen (2009) argue that the choice of a firm's international expansion path is highly firm-specific. Hence, firms will exhibit an international footprint that reflects their specific capabilities. In line with this view, extensive evidence has been provided on the role of firm-specific assets, including innovative capacity and productivity, on the degree of internationalization across modes and markets (Tan, Su, Mahoney, & Kor, 2020).

These views are centered around the role of experience and other firm-specific factors in affecting firm strategies, but they underplay the role and characteristics of managers, which is at the heart of some of the more recent developments in strategy research emphasizing the importance of microfoundations. Surprisingly, this literature has received less attention in the context of global strategy (Contractor, Foss, Kundu, & Lahiri, 2019), despite the central role of managers in international business research—starting from earlier works on the internationalization process of the firm (Johanson & Vahlne, 1977) and on managerial decision-making in foreign direct investments (Aharoni, Tihanyi, & Connelly, 2011).

In this paper, we conceptualize the aggregate firm-level construct of an international footprint, in terms of the capabilities and risk-taking attitudes of individual actors, namely top managers. We develop a novel way to conceptualize and measure the key dimensions of the firms' international footprint. We define the *extent* of international footprint as the set of international *operations*, each of which is a configuration with a mode and foreign market combination; such as exports to USA, or manufacturing in China (Asmussen, Benito, & Petersen, 2009). The extent is associated with higher complexity of foreign operations and, therefore, a need for greater managerial capabilities: the larger the extent of the international footprint, the greater the need to mobilize a wider set of capabilities (Narula, Asmussen, Chi, & Kundu, 2019). We also define the *scope* of the international footprint as the product of the number of modes and markets the firm is active in. By comparing the scope (potential extent) to the realized extent, we can capture whether the firm conservatively specializes in specific modes/markets (more familiar to the firm) or engages in combinations of modes and markets that are less familiar (more unknown) to the firm, and hence riskier. We call this measure the *boldness* of the footprint. We submit that firms whose managers have a greater appetite for risk will operate with a bolder international footprint. Our more granular and multi-dimensional conceptualization allows us to improve on the various unidimensional measures of internationalization used in the literature, such as export share, the number of markets a firm serves, or whether it is involved in foreign direct investment (FDI).

To corroborate our conceptualization and measurement of international footprints, we use a unique data set of over 14,000 firms in seven EU countries, which allows us to control for several firm characteristics normally associated with firm capabilities and risk-taking (such as size, age, innovation, IT investments, performance reward systems), as well as for sectoral and country characteristics. After controlling for a large vector of confounders, we find a robust association between managerial capabilities and risk-taking attitudes and the extent and boldness of the international footprint. In particular, we find support for the hypotheses that larger management teams and older CEOs tend to be associated with a greater extent of international operations, but not with greater boldness, in line with the idea that these managerial characteristics are associated with greater managerial capabilities, but not necessarily higher risk-taking propensity. Instead, firms whose top management team (TMT) has more international experience exhibit greater extent and boldness of the international footprint, suggesting both higher capability to manage complex operations and higher risk-taking propensity. Finally, firms managed by a CEO who is part of the family that controls the firm have a tendency to choose an international footprint with more limited extent and boldness, consistent with the view that these firms may have both lower managerial capacity and higher risk-aversion.

This study makes two main contributions to global strategy research. First, it develops a novel and comprehensive conceptualization of international footprints, which provides a more nuanced and granular depiction of firms' internationalization. Yet, it is tractable in terms of measurement, as we demonstrate in this study. Second, we extend research on the micro-foundations of global strategy. Previous studies have looked at how the characteristics of the CEO and TMT affect unidimensional measures of internationalization, but lack a comprehensive view on how these factors affect the overall footprint of firms' international operations.

The rest of the paper is organized as follows. The next section presents the theoretical framework. Then, we illustrate how we conceptualize the extent and boldness of the international footprint of the firm and we develop some testable hypotheses. Next, we present the data and variables, followed by a description and discussion of the econometric results. Conclusions ensue.

2 | THEORETICAL BACKGROUND

Firms' internationalization can be characterized in terms of the configuration of the number and spread of foreign markets in which the firm operates and by the amount of resources committed to each market, or the firm's operation mode on each market. The combination of the markets in which a firm operates and the modes it engages in defines its international footprint (Benito, Petersen, & Welch, 2009). Each new foreign operation entails some degree of additional complexity and perceived risk.

A source of complexity is the fact that operating abroad with different internationalization modes in different foreign markets may require different capabilities, knowledge, and expertise (Tan et al., 2020). While some of the capabilities required to expand into new markets and to engage in a new foreign operation mode are complementary—such as the capacity to deal with regulations, which is important for both entering new markets and use a new foreign operation mode—many are not. For example, expanding into new markets via export requires capabilities related to coordinating downstream activities, while engaging in foreign direct investments requires coordinating both upstream and downstream value chain activities, finding the right location for setting-up production facilities as well establishing relations with local suppliers (Hashai, 2011). Fulfilling an export order or engaging in importing intermediate inputs from foreign counterparts may require in-depth knowledge of custom procedures, whereas entering into a contract with a partner in a foreign country implies possessing a deep understanding of legal aspects and capability to govern inter-firm relations.

At the same time, operating in different markets also requires acquiring different sets of capabilities and knowledge (Johanson & Vahlne, 1977). For European firms, doing business with European counterparts tends to be easier due to both cultural and institutional proximity, including commonalities in business practices and legal environments. However, doing business in China requires different sets of specific skills and knowledge. Having to face greater diversity of cultures, customers, competitors and regulations puts pressure on firms to fragment its attention geographically. The complexity of foreign operations requires more information processing capacity (Herrmann & Datta, 2005; Sanders & Carpenter, 1998). In addition, as noted, while some of the knowledge related to certain modes of operation can readily be transferred across markets (e.g., once firms learn how to engage in exporting, they could use that knowledge to serve a different market), there is also substantial market-specific knowledge, so that once a firm has acquired knowledge about a given market, it may use it to expand in that market, but using a different mode (Putzhammer, Fainshmidt, Puck, & Slangen, 2018).

It is also well established in the literature that foreign expansion is perceived as risky or bold by managers of internationalizing firms. Besides the operational risk that each market and operation mode entails,² the perceived risks derive from the unfamiliarity with foreign markets and operation modes. Such risks result from the “liability of foreignness” (Zaheer, 1995), which entails that in order to enhance the success of their foreign operations, companies need to learn about the institutions in the host markets (Barkema & Drogendijk, 2007). This leads firms to expand first into neighboring countries or within the same cultural blocs or regions (Johanson & Vahlne, 1977). Similarly, engaging in unfamiliar foreign operations entails a certain degree of risk stemming from venturing into the unknown, and this does not necessarily relate to the varying degree of resource commitments associated with different operations. For a firm that masters the art of expansion via foreign direct investments, engaging in licensing agreements may be perceived as riskier, since it involves developing a new set of abilities (Tan et al., 2020).

At any given point in time, managers of international firms need to make crucial decisions on how to utilize their limited bundle of resources to expand their foreign operation modes and/or their geographic scope (Hashai, 2011). These decisions define the international footprint of a firm, in terms of extent and boldness. Some firms will extend their operations more than others, facing the complexity that more extensive international operations entail (Verbeke et al., 2009). Still, among firms with a similar extension of foreign operations, qualitative differences will also emerge. Some firms may conservatively choose to expand along the geographic dimension but reduce uncertainty by limiting their internationalization to a limited set of operation modes, while others may reduce uncertainty by focusing on few foreign markets but extending their foreign presence by engaging intensively in each market, through several operation modes. As Hashai (2011) notes, “firms may find it more efficient to develop capabilities that are specific to either path of internationalization rather than simultaneously develop capabilities in both paths” (p. 998–999). Only the bolder firms may simultaneously engage in both the market and mode dimensions, for example by tailoring specific operation modes in each market, increasing the layers of unfamiliarity, and hence the risk.

The extant literature has emphasized the role of firm characteristics leading to a certain international footprint. Prominent in this debate is the role of firm experience. It has been emphasized that firms start by serving familiar markets with low commitment modes, and with experience they increase commitments and venture into more unfamiliar markets (Johanson & Vahlne, 1977). Furthermore, in the context of born global firms, it has been shown that firms may concentrate resources on the expansion along a single internationalization path (either across geographies or operation modes) thus exhibiting a footprint expanding along both paths only as they accumulate experience. However, these explanations based on process and experience have been challenged and some studies have provided evidence that firms do not necessarily follow an evolutionary path to internationalization (Barkema & Drogendijk, 2007; Benito & Gripsrud, 1992). Other studies have focused on the role of firm-specific assets in allowing the firm to overcome the complexity and risks associated with internationalization across modes and markets. These studies have focused on the role of innovation, productivity, intangible assets and IT (Békés & Muraközy, 2018; Castellani & Zanfei, 2007; Tan et al., 2020).

The literature we have discussed so far emphasizes the role of experience and other firm-specific factors in affecting firm internationalization strategies. These are clearly key factors, but recent developments in strategy research have been advocating a focus on microfoundations to examine the explanation of an outcome at a level of analysis lower than the outcome itself (Felin, Foss, & Ployhart, 2015). In particular, this lens allows to view, in line with the long standing literature on upper echelons (Hambrick & Mason, 1984), a macro/organizational-level construct, such as the footprint of a firm, as the result of the aggregation of backgrounds, skills, experiences and decision-making of a subset of individuals within the organization, such as the top managers.

Surprisingly, this literature has received less attention in the context of global strategy (Contractor et al., 2019). As Hutzschenreuter, Pedersen, and Volberda (2007) point out, managerial intentionality and the possibility of managers making deliberate strategic choices toward further internationalization have not been very prominent in the IB literature. This is not to say that the role of managers has been neglected in international business and global strategy research. Indeed, earlier works on the internationalization process of the firm (Johanson & Vahlne, 1977) and managerial decision-making in foreign direct investments (Aharoni et al., 2011) had recognized the key role of managerial decisions and perceptions in shaping firms' internationalization. More recently, studies grounded in behavioral theory have argued that managers do not always behave in the way theory predicts (Buckley, Devinney, &

Louviere, 2007; Elia, Larsen, & Piscitello, 2019), and that managerial perceptions of risk and returns may affect location decision (Ambos, Cesinger, Eggers, & Kraus, 2019). Research has also addressed the role of the characteristics of the CEO and TMTs on the degree of internationalization, the international entry mode, and risk-taking, but these studies tend to look at unidimensional measures of internationalization. Indeed, this is a somewhat more general concern that can be referred to the literature interested in the determinants of internationalization. Studies tend to focus either on the degree of internationalization or the modes of internationalization. In the first stream of research, studies typically focus on one mode of internationalization (most often export or FDI) and emphasize the depth and breadth of internationalization a firm has chosen to pursue with that specific mode (Castellani, Montresor, Schubert, & Vezzani, 2017; Sullivan, 1994). The depth of internationalization is generally measured by the share of foreign sales (or assets) over total sales (e.g. Sanders & Carpenter, 1998; Tihanyi, Ellstrand, Daily, & Dalton, 2000). The breadth of international expansion instead refers to indicators based on the geographical spread of a firm international operations, which is often measured referring to the number of countries (or supranational regions) in which the firm either sells or has set-up foreign subsidiaries (e.g. Herrmann & Datta, 2005).

Research on the modes of internationalization has typically investigated the choice between export, FDI, and contractual modes (e.g. Békés & Muraközy, 2016, 2018; Castellani & Zanfei, 2007); the choice of the equity commitment in foreign market entry (e.g. Herrmann & Datta, 2005; Nielsen & Nielsen, 2011); or the establishment choice, usually M&As versus green-field FDI (e.g. Boellis, Mariotti, Minichilli, & Piscitello, 2016; Matta & Beamish, 2008).

In sum, the literature on the determinants of firms' international expansion is extensive but it generally either focuses on the geographic dimension or on the mode of internationalization. These relatively narrow perspectives do not allow one to have a comprehensive view on the overall footprint of firms' international operations.

This study addresses this gap. In the next section, we elaborate on how we conceptualize the international footprint of the firm in a novel and comprehensive way, which provides a more nuanced and granular depiction of firms' internationalization, allowing us to neatly measure it and relate it to complexity and risk-taking. Then, based on the extant literature, we develop some testable hypotheses on how the characteristics of CEOs and TMTs shape both the capacity and the propensity of the firm to engage in a more complex and/or bolder footprint.

3 | CONCEPTUALIZING FIRMS' INTERNATIONAL FOOTPRINT

Our starting point for conceptualizing firms' international footprints is the idea that firms choose a configuration of their foreign operations that combines modes and markets. *Modes* are types of interactions with foreign businesses and include commerce (import and export) and production (outsourcing, FDI). *Markets* are a set of distinct geographies, in our case broad categories such as North America or Africa. An *international operation* is a single configuration with a mode and market combination, such as exports to North America.

We define a firm's *international footprint* as the configuration of its set of different international operations. For instance, a firm could have the following vector of international operations: {exports to North America, imports from China, FDI in North America}.

While the footprint is a multi-dimensional phenomenon, its main strategic features can be summarized by a few measures. First, we define the *extent of the international footprint* as the

number of international operations. The larger the extent, the higher the complexity of managing international operations. Second, we define the *scope of the international footprint* as the product of the number of modes and regions the firm is active in. This metric also measures the maximum extent the firm can reach with the markets and modes it conducts. Another interpretation is that scope is the size of a matrix spanned by the markets and modes a firm is active in. For the firm in the example above,³ the extent of the footprint would be 3, whereas the scope would be $3 \times 2 = 6$.

Combining the extent and scope of the international footprint allows to characterize the boldness of the firms' international operations. Firms with a larger scope relative to their extent will be considered to have a bolder internationalization strategy. In other words, when comparing two firms having the same extent of internationalization, the one that spans the larger matrix conducts a bolder strategy, because it engages in internationalization along multiple dimensions. In the extreme, we could envision a firm using different modes in each market in which it operates, thus denoting an attitude to operate in relatively more unknown territory, and thus higher risk-taking in its international strategy.

The example in Table 1 clarifies our point. Suppose we have three different firms showing different footprints across three possible locations (L_1 , L_2 , and L_3) and three possible operating modes (M_1 , M_2 , and M_3). Firms A, B, and C all have three foreign operations (their extent is the same) but with quite different footprints. Firm A has chosen to exploit its knowledge of location L_1 , by operating there with three different modes. Instead, firm B has expanded abroad building on its knowledge and capabilities in mode M_1 and engages in all three locations with that mode. Finally, firm C has chosen a different strategy, which is to serve each market with a different mode. This firm engages in an expansion path along both markets and modes. One could hypothesize that the strategy of firm C is tailored for each market and is not constrained to exploiting accumulated capabilities and knowledge in modes or markets. In this respect, we contend that firm C is willing to engage in relatively more uncharted territory. For the same extent of the international footprint, which we measure by the number of foreign operations in which the three firms are involved, firm C takes on a bolder internationalization footprint, since it combines more layers of uncertainty across modes and locations. This view is in line with Hashai (2011) who notices that some firms may choose to expand along the market dimension but reduce uncertainty by limiting their internationalization to a limited set of operation modes, while others may reduce uncertainty by focusing on few foreign markets but extending their foreign presence by engaging intensively in each market, through several operation modes. He notes that "firms may find it more efficient to develop capabilities that are specific to either path of internationalization rather than simultaneously develop capabilities in both paths" (pp. 998–999). Only the bolder firms will simultaneously engage in both the market and mode dimensions, for example tailoring-specific operation modes in each market, increasing the layers of unfamiliarity, and hence the risk.

TABLE 1 Conceptualizing extent and scope in international footprints

Mode	Location		
	L_1	L_2	L_3
M_1	A	B	C
M_2	A		B
M_3	A		C

TABLE 2 Measuring the extent and scope of international footprints

Firm	Extent (number of operations)	Number of modes (M)	Number of locations (L)	Scope (matrix size, i.e., $M \times L$)
A	3	3	1	3
B	3	1	3	3
C	3	3	3	9

Building on this conceptualization, we notice that for the same number of operations, firm C has a larger scope, that is, it spans a larger matrix of possible combinations of modes and locations. As shown in Table 2, while for firms A and B the scope of internationalization is equal to 3 (3 modes \times 1 location, and 1 mode \times 3 locations, respectively), for firm C, it is 9 (3 modes \times 3 locations). A, B, and C all have the same extent of internationalization footprint, but C has a greater scope.

So far, we have considered that each mode and market has the same potential contribution to our measures. But, as we discussed in the previous section, there are more and less demanding modes and markets. To account for this, we will use weighted measures of extent and scope, as illustrated in the section on our empirical approach.

It is of interest to compare our measures with standard unidimensional measures of internationalization. One such measure is the number of international locations a firm operates in. According to this measure, the internationalization pattern of firm B and C is the same—even though firm C's activities involve operating with different internationalization modes in each market. Firm B chooses to internationalize more conservatively using an internationalization mode they know, while firm C adopts a bolder strategy that is not constrained by using the using an internationalization mode they know. A second measure focuses solely on modes, by for example, asking whether the firm conducts M_3 (e.g. FDI). Such measure would find the strategy of firms A and C equivalent, but, again C has chosen to boldly tailor its strategy to the locations they operate in, while the strategy of firm A is more conservatively engaging with M_3 only in the location it is more familiar with.

4 | HYPOTHESES DEVELOPMENT

Based on the discussion above and by adopting the lens of microfoundations of global strategy, we aim at explaining why firms exhibit international footprints with different features. Microfoundations can be interpreted both as “levels” and as “a call for the explanatory primacy of individuals” (Felin et al., 2015). In our case, we refer to the “microfoundations as a levels” argument where the causes of an outcome are located at a level of analysis lower than that of the outcome itself (Contractor et al., 2019; Felin et al., 2015). In particular, we aim at explaining how the firm-level strategy that leads to a certain configuration of the international footprint, emerges from the characteristics, experiences and decision making of senior managers (Hambrick & Mason, 1984). It is important to notice that a microfoundations perspective requires that individual actors, such senior managers in our case, are actually heterogeneous and have the necessary decision-making autonomy and authority. If individuals were homogeneous and malleable entities, it would be less relevant to focus on their characteristics, while routines and organizational features would likely be crucial (Contractor et al., 2019).

As highlighted by Contractor et al. (2019), some of the salient aspects of senior manager attributes relate to their capabilities, international experience, and global mindset, and to other personal characteristics including age, gender, and risk tolerance. In addition, it is noted that the literature has paid insufficient attention to the role of managerial characteristics in closely held companies and family firms.

Our overall proposition is that a higher extent of the international footprint would be associated with higher managerial capabilities that allow for managing more complex operations, while greater boldness would be associated with more managerial risk-taking. To examine this, we develop a set of testable hypotheses on the role of managerial attributes in shaping the extent and boldness of the international footprint.

4.1 | Managerial capability and the size of the management team

A key aspect of managerial capability of a firm is the size of its management team. Larger groups have more skills and abilities, which endow them with greater information processing capacity and allow to solve more complex problems. Consistently with this view, Haleblian and Finkelstein (1993) found that firms with larger management teams performed better when dealing with complex situations, and Sanders and Carpenter (1998) found that the degree of internationalization of a firm is associated with the size of its top management team. This leads to our first hypothesis.

Hypothesis (H1). *The size of the management team is positively associated with the extent of the international footprint.*

4.2 | International experience of the top management team

The international experience of the TMT is associated with international knowledge and general competencies and can account for the higher ability of more internationally experienced leaders to take on more complex internationalization strategies (Herrmann & Datta, 2005; Nielsen & Nielsen, 2011). TMT international experience also provides managers with greater confidence, which helps them reduce the anxiety associated with operating under conditions of greater uncertainty and with the ability to more accurately assess risks and returns related to internationalization strategies, which increases their willingness to undertake riskier operations such as acquisitions or greenfield investments (Buckley et al., 2007; Nielsen & Nielsen, 2011). This leads to our second hypothesis.

Hypothesis (H2). *TMT international experience positively affects both the extent and the boldness of the international footprint.*

4.3 | Family management

Contractor et al. (2019) argue that the literature has paid insufficient attention to the role of managerial characteristics in closely held companies and family firms. Though, one key characteristic that has attracted substantial research is whether non-family members are in senior manager

positions or as members of the board of family-owned firms. In particular, it has been noted that having non-family managers has a positive impact on the internationalization of family firms (Majocchi & Strange, 2012). Since products need to be adapted to foreign markets and eventually manufactured abroad, internationalization requires managerial expertise, which forces family-managed firms to hire professional managers with the required expertise (Hennart, Majocchi, & Forlani, 2019). Also, it has been documented that family CEOs tend to work fewer hours relative to professional CEOs (Bandiera, Lemos, Prat, & Sadun, 2018) and are less likely to adopt managerial best practices (Bloom & Van Reenen, 2007). In contrast, since professional managers are selected from a larger pool of managerial talent (Burkart, Panunzi, & Shleifer, 2003), they tend to possess greater generic human capital and managerial talent (Chang & Shim, 2015). This suggests that family-managed firms have a lower capacity to manage complex international operations. In line with this view, Stadler, Mayer, Hautz, and Matzler (2018) find that family managers are more suited to lead diversification rather than internationalization.

Furthermore, when family-managed firms decide to venture abroad, they choose less risky ways of internationalizing (Hoskisson, Chirico, Zyung, & Gambeta, 2017), as family managers are likely to be more concerned than non-family professional managers about protecting the family's socioemotional wealth (De Massis, Frattini, Majocchi, & Piscitello, 2018). This may lead them to avoid risky but potentially profitable growth opportunities (Fernández & Nieto, 2006) and to internationalize toward regions that are "culturally close" (Gómez-Mejía, Makri, & Larraza-Kintana, 2010).

However, as discussed earlier in this section, a pre-condition for any study on micro-foundations is the role of the delegation of managerial autonomy and authority. This is particularly relevant in the case of family firms and it affects how non-family CEOs can use authority to make risky decisions in relation to internationalization footprints. Often, family members sitting in the board hire CEOs, but might not delegate full autonomy to them for decision-making about internationalization (Sharma, Chrisman, & Chua, 1997). This leads to our third hypothesis.

Hypothesis (H3). *CEOs who are part of the family owning the firm are associated with a lower extent and boldness of the international footprint.*

4.4 | Age of CEO

Older executives may be more experienced and hence capable of managing more complex operations. For example, Berry, Bizjak, Lemmon, and Naveen (2006) find that, on average, CEOs of more diversified firms are older. At the same time, having less physical and mental stamina (Child, 1974), they may find changing their mental maps harder, which results in lower information processing capability compared to younger executives (Herrmann & Datta, 2005). In contrast, a psychological view of aging suggests that the former relationship is offset by an increase in wisdom (Labouvie-Vief, 1990).

Furthermore, older CEOs tend to avoid risk-taking behaviors that may jeopardize their legacy (Matta & Beamish, 2008), while younger managers are more willing to accept risks associated with their strategic choices (Serfling, 2014), such as international diversification (Herrmann & Datta, 2005; Tihanyi et al., 2000). However, the inexperience and limited track record of younger CEOs make their positions more uncertain and volatile. Additionally, younger CEOs, who still have to build up their reputation and experience, may lack the confidence to stake their future on riskier decisions with uncertain outcomes (Serfling, 2014). The

arguments above lead to conflicting predictions on the association between CEO age, managerial capability and risk-taking propensity. Consequently, we formulate two hypotheses.

Hypothesis (H4a). *Older CEOs are associated with a higher extent of the international footprint, but lower boldness of the international footprint.*

Hypothesis (H4b). *Older CEOs are associated with a lower extent of the international footprint, but higher boldness of the international footprint.*

4.5 | Gender of CEO

Research has convincingly shown that women are generally less prone than men to take risk (Byrnes, Miller, & Schafer, 1999). However, empirical studies of whether gender matters for managerial risk-taking are rare (Lyngsie & Foss, 2017), and especially so for specific strategic decisions such as internationalization, where studies have mainly looked at exporting activities (Welch, Welch, & Hewardine, 2008). A recent study by Faccio, Marchica, and Mura (2016) provides persuasive evidence of the relationship between gender of the CEO and risk-taking, by showing that transitions from male to female CEOs are associated with significant reductions in corporate risk-taking.

Hypothesis (H5). *Female CEOs are associated with lower boldness of the international footprint.*

5 | EMPIRICAL APPROACH: DATA, VARIABLES AND MEASURES

5.1 | The dataset

The empirical analysis for this paper relies on data from a unique dataset of manufacturing firms in seven European countries, the European Firms in the Global Economy (EFIGE) dataset, which includes information on 14,759 European firms, based in Austria (AT), Germany (DE), France (FR), Italy (IT), Hungary (HU), Spain (ES), and the United Kingdom (UK).⁴

We restrict the sample to domestic-owned firms only, since we recognize that the governance of foreign-owned firms may not allow engagement in risky foreign operation portfolios. Foreign-owned firms are typically foreign subsidiaries of multinational enterprises headquartered in another country. To the extent that strategic decisions are taken centrally in the multinational group and not delegated to foreign subsidiaries, it is more likely that managers in foreign-owned firms do not enjoy enough autonomy and delegation of power. As discussed above, in such situations it would be less relevant to focus on the role of managerial characteristics in affecting the extent and boldness of the firm's international footprint. We also need to further limit our sample to firms that have at least one foreign operation, since our measure of boldness of the international footprint of the firm can be defined only for internationalized firms.

TABLE 3 The weights of different markets and internationalization modes

	Count	Weight		
		$r = .5$	$r = 1$	Linear
Markets				
EU15	9,048	1.00	1.00	1.00
Other EU	4,054	1.49	2.23	1.31
Other Europe	4,046	1.50	2.24	1.31
North America	3,108	1.71	2.91	1.48
Central and South America	1,815	2.23	4.99	2.00
China and India	2,956	1.75	3.06	1.52
Other Asia	2,453	1.92	3.69	1.67
Others	2,334	1.97	3.88	1.72
Modes				
Export of goods	7,882	1.00	1.00	1.00
Import of goods	5,927	1.15	1.33	1.03
FDI	739	3.27	10.67	1.81
Contracts	609	3.60	12.94	2.00

Note: This table shows the weight of different markets and modes under different weighting schemes.

5.2 | Measuring extent and boldness of international footprint

The survey distinguishes between eight global regions that will be our markets (see Table 3): (a) Western Europe (EU15); (b) Central and Eastern Europe; (c) Non-EU Europe (e.g., Turkey, Russia); (d) India and China; (e) Other Asia (e.g., Indonesia, Japan); (f) North America (United States, Canada, Mexico); (g) Central and South America; and (h) Africa and others. This aggregation of markets imposes some limitations to the analysis, as we cannot ascertain whether firms actually serve the same market with different modes, but it also aligns with some of the literature arguing that cultural blocs and supranational regions capture important competitive conditions (Ronen & Shenkar, 1985). The data distinguishes between four different modes of foreign operations: (a) import of intermediate goods; (b) export (directly to customers); (c) FDI; and (d) outsourcing.

The extent of the internationalization footprint (number of operations). The simplest measure of the extent of the internationalization footprint is the count of the number of foreign operations in which a firm is engaged. This measure can range from 0 (no international exposure) to 32 (the firm is active in all eight regions of the world and in each region uses all four modes of operation). Figures A.1, A.2, and A.3 (in Appendix S1) show the frequency of modes, markets, and number of operations.

One issue with this simple measure of the extent of the footprint is that it handles all operations symmetrically, implicitly assuming that they pose similar challenges for the firm. However, some markets and/or modes are clearly harder to manage than others. Therefore, we weight the number of operations in our preferred measure of extent of the footprint. Specifically, we measure the extent as the (weighted) number of operations:

$$\text{Extent}_i = \sum_{l=1}^4 \sum_{j=1}^8 D_{i,lj} \times \omega_l \times \omega_j \quad (1)$$

where l denotes internationalization modes, j denotes regions, D is a binary indicator that identifies an international operation of the firm and takes the value 1 if firm i is engaged in mode l in region j . For the weighted version, ω_l and ω_j are the weights of internationalization modes and regions, respectively. Our main assumption when constructing weights is that the larger the number of firms choosing to operate abroad with a certain mode or in a certain region, the less demanding the operation. In particular, we define $\omega_l = \left(\frac{\max N_l}{N_l}\right)^r$, where N_l is the total number of firms that engage in mode l , and $\max N_l$ is the maximum number of firms choosing that mode. Parameter r reflects the degree to which less frequent operations should be considered harder to manage than the relatively more frequent ones. In the unweighted measure $r = 0$, therefore $\omega_l = 1$, thus all operations are considered symmetric. At the other extreme, one could assume $r = 1$ and this would give very large weight to very infrequent operations. Our preferred specification is with $r = 1/2$, where the weighting factor becomes $\omega_l = \sqrt{\frac{\max N_l}{N_l}}$. We define the weight of the different markets, ω_j , analogously.

By way of illustration, consider that the most frequent mode is export, which, as can be seen from Table 3, is 12.9 times more frequent than international outsourcing contracts (7,882 vs. 609). When $r = .5$, the weight of export will be 1, while the weight of outsourcing will be $\omega_{\text{outs.}} = \sqrt{12.9} \approx 3.5$. Similarly, about five times as many firms do business in the EU15 (the most frequent market) than with North America (9,048 vs. 1,815), therefore $\omega_{\text{N.America}} = \sqrt{5} \approx 2.2$. The weight of outsourcing into North America is the product of these two weights. As a robustness check, we also use an alternative *linear weighting*, with $\omega_l^{\text{lin}} = 1 + \frac{\max N_l - N_l}{\max N_l - \min N_l}$. In this case, the weight of the most frequent region will be one, while that of the least frequent mode is 2.

Boldness of the international footprint. To develop a measure of boldness, we first define the scope of the international footprint as the weighted product of the number of modes and regions the firm is active in:

$$\text{Scope}_i = \left(\sum_{l=1}^4 D_{i,l} \omega_l\right) \times \left(\sum_{j=1}^8 D_{i,j} \omega_j\right) \quad (2)$$

where $D_{i,l}$ and $D_{i,j}$ are indicators for the regions and modes firm i is active in, respectively, while ω_l and ω_j are region- and mode-specific weights, as before. Our aim is to capture the degree to which a firm's scope is larger or smaller than expected based on its extent.

To start with, Figure 1 shows the relationship between Extent_i (i.e. the number of operations) and Scope_i . The relationship is positive, and very naturally, the number of operations is a lower bound for the scope, represented by the 45° line. While these two variables move together strongly when firms are active in only a few operations, the two diverge for the more internationalized firms, where the scope is often substantially larger than the number of operations. In other words, typically, the matrix spanned by the markets and operations of a more internationalized firm is much sparser than that of less

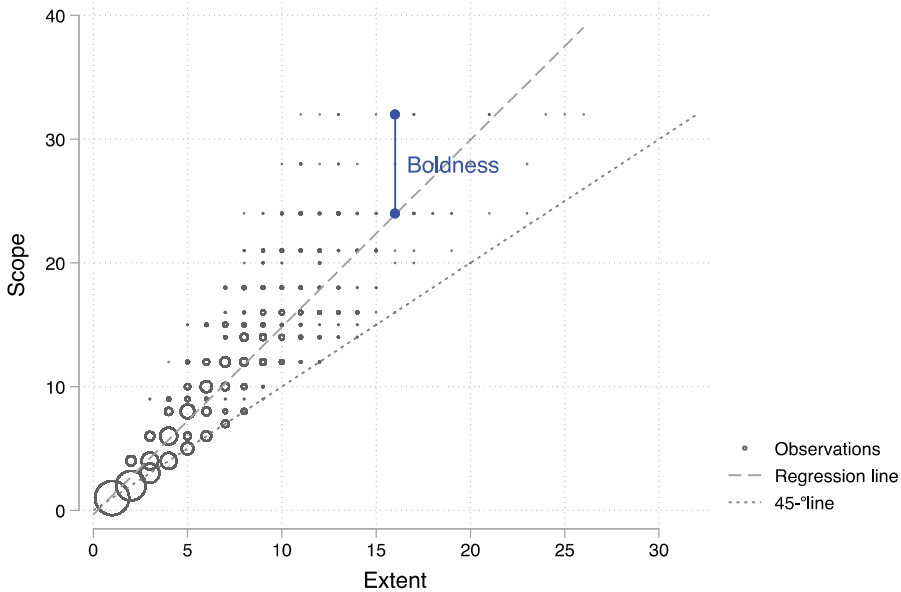


FIGURE 1 The relationship between the extent and scope of the international footprint. *Note:* This figure shows the relationship at the firm level between the extent and the scope of the international footprint of a firm. The area of the circles is proportional to the number of firms choosing each point in this plane. The 45° line provides a minimum for a matrix size conditional on the number of operations, while the regression line, with a slope of around 1.2, shows the mean scope. We define the boldness of the internationalization footprint as the residual between the firm's point and the regression line

internationalized firms. The regression line, which has a slope of around 1.2, captures this scaling property better.

In light of this evidence, our solution is to compare scope with the regression line, or the conditional mean. In other words, we control for the extent of the footprint with regression techniques. This measure compares firm i to a typical firm with the same number of operations, represented by the vertical distance between the point of firm i and the regression line, as shown by Figure 1.⁵ The regression residual is our measure of boldness. Technically, we estimate the following regression:

$$\ln\text{Scope}_i = \alpha + \beta \ln\text{Extent}_i + u_i \quad (3)$$

Then, we use its residual, the log difference between the size of the matrix and the conditional mean of the extent of the footprint, as our preferred measure for boldness:

$$\text{Boldness}_i = \ln\text{Scope}_i - \hat{\alpha} - \hat{\beta} \ln\text{Extent}_i \quad (4)$$

Note that Equation (3) can be estimated with different weighted versions of the matrix size and the footprint, yielding weighted boldness measures as in Equation (4). These measures give a larger weight to the more difficult markets. To ease the interpretation of regression coefficients, when we use these measures of boldness as dependent variables, we standardize them to have a

mean equal to zero and a variance equal to 1 (see Table A.5 in Appendix S1). The intercept is very close to zero in all cases, reflecting the fact that if a firm has only one operation, the scope is also 1. The slope is close to 1.2 in every specification, showing that, in line with their different dimensionality, a 10% higher value of the extent is associated with a 12% larger matrix. The explanatory power of the regressions is also very strong, reinforcing the idea that they remove a mostly mechanical relationship from the boldness measure.

5.3 | Descriptive statistics of the dependent variables

Our dependent variables capturing the extent and boldness of the international footprint of a firm are expressed both as unweighted and weighted measures, as discussed in the previous section. Weighting the boldness measure introduces a substantial amount of variation even for firms with the same unweighted boldness measure. Using a weighted measure allows one to measure boldness in a more nuanced way. Also, while the unweighted measure is fundamentally discrete (it is the log difference of two integers), the weighted measure is more continuous, lending itself more readily to statistical analysis (see Figure A.4 in Appendix S1).

It is worth discussing how our measures of extent and boldness of the international footprint relate empirically to more traditional measures of internationalization, such as the foreign sales ratio of the firm, which in the literature captures the depth of internationalization and the two dimensions that make up the scope of international footprint, the number of markets where the firm operates (which in the literature relates to the spread of internationalization), and the number of modes of international operations. The extent is highly correlated with both the number of markets (0.853) and the number of modes (0.651), and moderately so with share of foreign sales (0.395). Instead, our measure of boldness is only mildly correlated with foreign sales and the number of markets (just above 0.10) and seems to reflect more the fact that it is bolder to engage in many different modes of international operations (see Table A.6 in Appendix S1). Indeed, while operating in several different markets certainly entails risks associated with operating into less familiar environment, it also allows some opportunities for risk diversification.

In Appendix S1, we discuss some examples of real firms taken from our data to illustrate the extent and boldness of the international footprint of the firm.

5.4 | Independent variables and estimation

To explain variation in the features of firms' international footprints, we estimate the following linear regressions on our cross-sectional data:

$$\ln(\text{Extent}_i) = \alpha_1 + \beta_1 X_i + \gamma_1 Z_i + u_{1i} \quad (5)$$

$$\text{Boldness}_i = \alpha_2 + \beta_2 X_i + \gamma_2 Z_i + u_{2i} \quad (6)$$

X denotes the set of explanatory variables measuring the characteristics of the management team of the sample firms, in terms of both managerial capabilities and risk-taking attitude, while the vector **Z** includes a large number of firm-level characteristics that are likely to affect the extent and boldness of international footprint. We estimate both regressions (5) and

(6) using OLS and the same set of regressors. We contend that if the estimates of β_1 and β_2 are substantially different, that is evidence that extent and boldness do indeed measure different aspects of the international footprint.

Corresponding to our hypotheses built through the lens of the microfoundations of global strategy, vector **X** includes five variables. First, we test for the role of the size of the management team—as the percentage of all middle and top managers in the overall employment of the organization—to capture the idea that larger teams allow greater information processing capacity and ability of solve complex problems (H1). Second, we include a measure of international experience of the TMT—captured by a dummy that takes the value 1 if any of the executives had worked abroad for at least 1 year (H2). Third, we include a dummy variable that takes the value 1 if the CEO is a member of the family that controls the firm (H3).⁶ Fourth, we investigate the role of CEO age—which is a factor variable ranging between 1 and 7, where 1 indicates a CEO below 25 years of age and higher values as the CEO rises into higher age classes (25–34, 35–44, 45–60, and over 60) (H4). Finally, the gender of the CEO—which is equal to 1 if the CEO—is female (H5).

As concerns vector **Z**, international business theories largely agree that in order to manage the complexity of international operations, firms need capabilities (or firm-specific advantages) (Narula et al., 2019; Tan et al., 2020). We capture these capabilities with a set of variables measuring: (a) if the company carried out product or process innovation in the past 3 years; (b) if the company uses IT systems/solutions for management processes (e.g., SAP/CMS); (c) the quality of human capital, as the share of white collar workers in total employment; (d) firm age, which proxies for firm experience and the accumulation of capabilities over time; and (e) firm turnover⁷ and employment, which jointly account for the role of firm productivity as a synthetic measure absorbing many firm characteristics allowing to overcome the cost of doing business abroad. To address the agency problem caused by diverging incentives between risk-neutral shareholders and risk-averse executives, we consider the role of performance-based financial rewards—measured as a binary indicator capturing if there are regular programs to offer financial benefits to executives and managers tied to their performance. The evidence supporting the effectiveness of such incentives schemes in increasing managerial risk-taking is substantial (Crocì & Petmezas, 2015; Sanders & Carpenter, 1998; Wright, Kroll, Krug, & Pettus, 2007).

Vector **Z** also includes a set of industry \times home country fixed effects (e.g., French textile industry). The correlation table presented in Table A.4 (in Appendix S1) reveals that none of the variables are highly correlated (except the two measures of size). Finally, it needs to be highlighted that, while we can control many possible confounders in vector **Z**, the nature of the data—cross-sectional and observational—prevents us from making strong causal claims.

6 | RESULTS

6.1 | Main results

The main results are presented in Table 4. The dependent variable in column (1) is the unweighted extent of the international footprint (ln of the number of operations) while column (2) models the weighted measure, with our preferred weighting ($r = 1/2$). The dependent variables in columns (3) and (4) are the unweighted and weighted boldness measures, respectively. A general conclusion is that the weighted measures are correlated more strongly with the

TABLE 4 Microfoundations of the extent and boldness of firms' international footprint (baseline econometric results)

Dependent: Weight:	(1) Extent $r = 1$	(2) Extent $r = .5$	(3) Boldness $r = 1$	(4) Boldness $r = .5$
Share of managers	0.366 (0.081)	0.387 (0.097)	0.141 (0.125)	0.098 (0.129)
CEO is family member (dummy)	-0.057 (0.030)	-0.064 (0.036)	-0.048 (0.049)	-0.134 (0.052)
Has executive with international experience (dummy)	0.200 (0.019)	0.247 (0.023)	0.071 (0.030)	0.102 (0.030)
CEO age	0.018 (0.007)	0.016 (0.009)	-0.015 (0.011)	-0.003 (0.010)
CEO female (dummy)	0.031 (0.029)	0.058 (0.035)	0.061 (0.043)	0.010 (0.046)
Financial reward (dummy)	0.042 (0.017)	0.058 (0.021)	0.029 (0.028)	0.044 (0.030)
Family-owned (dummy)	0.021 (0.032)	0.026 (0.039)	0.090 (0.050)	0.135 (0.056)
Share of white-collar workers	0.332 (0.042)	0.469 (0.050)	-0.064 (0.068)	-0.013 (0.060)
Innovation (dummy)	0.178 (0.017)	0.184 (0.021)	-0.011 (0.028)	0.058 (0.026)
IT for information management (dummy)	0.052 (0.017)	0.062 (0.021)	0.047 (0.023)	0.036 (0.024)
Employees (ln)	0.075 (0.013)	0.114 (0.016)	0.017 (0.024)	-0.007 (0.022)
Firm age (ln)	0.080 (0.010)	0.083 (0.012)	-0.054 (0.016)	-0.017 (0.015)
Turnover (mn EUR)	0.098 (0.010)	0.113 (0.012)	0.039 (0.017)	0.049 (0.017)
Observations	7,930	7,930	7,930	7,930
R-squared	0.211	0.216	0.033	0.031

Notes: This table shows the main regression results, with the extent of the international footprint (number of operations) and the boldness of the international footprint (the scope of the internationalization footprint conditional on the number of operations) as dependent variables. Weighted measures use a function ($r = 1/2$) of "toughness of market/modes," proxied by the number of firms serving the market/using a mode (see text). The estimation sample is restricted to domestic-owned firms with at least one international operation. All specifications include country-industry fixed effects. Standard errors are bootstrapped in columns (3) and (4).

independent variables. This is in line with the intuition that weighting provides a finer measurement of both the extent and the boldness of internationalization. Therefore, we will focus on weighted measures when interpreting the results.

First, the managerial intensity of the firm has a high correlation with the extent of the international footprint of the firm. This supports H1 and suggests that the higher extent of the international footprint requires a division of labor among managers to successfully manage the complexity of foreign operations (Sanders & Carpenter, 1998), but it is uncorrelated with the boldness. This is consistent with the notion that there is no obvious expectation that a higher managerial intensity should be associated with more risk-taking.

Second, firms managed by executives with international experience have international footprints characterized by both greater extent and boldness. This is consistent with the arguments, leading to H2, that internationally experienced managers have developed both a higher capability to manage more complex situations a greater propensity to engage in relatively riskier strategies.

Third, family-owned and family-managed firms have fewer international operations (lower extent of the international footprint) and a significantly lower boldness in their international footprint than family-owned, but professionally managed, firms. This is consistent with H3. Hence, this suggests that family managers take less risk than professional managers, conditional on ownership. Results are also consistent with the idea that family CEOs may be less capable of managing the higher complexity stemming from great extent of the international footprint.

Fourth, the age of the CEO is positively associated with the extent of the international footprint of the firms, consistent with the idea that older CEOs may have more experience and capacity to manage a more complex portfolio of international operations, despite possibly having lower information processing capacity, but there is no correlation with boldness, thus providing only partial support for H4a. These results reflect the offsetting channels that lead us to formulate the alternative hypotheses H4a and H4b and the fact that CEO age is measured as a categorical variable, which is probably too coarsely defined to allow precise estimation.

Finally, the gender of the CEOs is positively associated with the extent, but not significantly associated with boldness of the international footprint of the firm. The latter is not consistent with our expectations set out in H5, but it is worth mentioning that there may be selection effects at play here, which we are not able to disentangle with our data. Since firms managed by female CEOs are only 7% of the sample, it is not unlikely that those CEOs have been self-selected among the relatively less risk-averse female managers. Consequently, even if significant average effects can be demonstrated for a population, there might be no discernible difference between genders at the upper echelons of firms (Kanter, 1977). This is also consistent with the fact that firms managed by female CEOs exhibit greater footprint extent, suggesting that only the more capable female managers make it to the top of our sample firms, allowing their firms to engage in more complex international operations.

The variables measuring firm-specific advantages are positively associated with the extent of the international footprint, but less so with boldness. This is a clear indication that the extent is determined especially by firm capabilities. In particular, firms employing a higher share of white-collar workers, conducting innovation, and having an IT infrastructure, as well as larger and older firms, have a larger extent of the international footprint. Though, these variables are weaker predictors of boldness. Interestingly, some of these control variables change sign and/or magnitude in a direction that suggests that our two dependent variables may indeed capture two distinct aspects of the international footprint of the firm.

In particular, firm age is positively associated with the extent of the international footprint, suggesting that as the firm gets older it learns how to manage a more complex portfolio of foreign operations, but it is not significantly associated with the boldness of internationalization.

Firms that provide financial incentives have a more extensive international footprint. The relationship with the footprint boldness is less precisely estimated but providing financial incentives is associated with a 0.044 standard deviation higher boldness, according to the weighted measure.

Finally, while the extent of the international footprint of the firm is correlated with both firm employment and turnover, consistent with a positive association with firm productivity, boldness is positively associated with firm turnover, but not with employment, suggesting that firm productivity is a good predictor of the ability to manage complex international footprints, while firm size is better predictor of risk-taking in international operations.

6.2 | Robustness checks

Table A.7 in Appendix S1 provides results of some robustness checks regarding sample restrictions and functional form. Column (1) re-runs the regressions on the full sample, that is, including non-internationalized firms, for which the number of operations is set to 0. In such a case, a negative binomial regression is a more appropriate estimator than a linear regression. These coefficients should be compared with a negative binomial regression on the main estimation sample (column [2]), and with the linear specification on the main sample, repeated here in column (3). The results are very similar across the three columns, suggesting that neither the sample restriction nor the linear functional form affects the results substantially. Another concern we investigate in Table A.7 is whether the boldness variable can take only one value for firms with one operation.⁸ Therefore, in columns (4)–(7), we re-estimate the specifications from Table 4 on the subsample with more than one operation. The results are very similar to the main results, with some variables (such as financial reward) being more statistically significant in this subsample.

In Table A.8 (in Appendix S1), we investigate how the results are affected by different weighting schemes. Columns (1) and (4) include the results with our preferred weighting ($r = .5$), with columns (2) and (5) using a different parameter ($r = 1$) and columns (3) and (6) using the alternative linear weights. The main conclusion is that the type of weighting matters little. Both the point estimates and their standard error are very similar under the different types of weighting. The qualitative difference is between weighted and non-weighted measures: as soon as the different frequency of different operations is taken into account, the results remain robust.

7 | DISCUSSION AND CONCLUSION

This paper provides a novel conceptualization and measurement of the extent and boldness of firms' international footprints, providing a more nuanced and granular view of such footprints and new ways of thinking about the role of complexity and risk-taking in internationalization.

The literature on the determinants of firms' international expansion is extensive but it generally focuses either on the market or on the mode of internationalization (e.g. Békés & Muraközy, 2016, 2018; Castellani & Zanfei, 2007; Herrmann & Datta, 2005; Nielsen &

Nielsen, 2011). These relatively narrow perspectives do not allow to have a comprehensive view on the overall footprint of firms' international operations. One essential feature of our conceptualization of a firm's international footprint is its *extent*, defined as the number of mode-market combinations, or foreign operations, conducted by a firm. We point out that while the extent of internationalization can be related to risk-taking, it is primarily related to the capability to manage the complexity of the portfolio of foreign operations of a firm. The *scope* is another key characteristic of an international footprint. Measured as the product of the number of modes and regions the firm is active in, it captures the maximum extent the firm can reach with the markets and modes it conducts. Firms with a larger scope relative to their extent may be considered as pursuing a bolder internationalization strategy. Our concept of *boldness* in international operations captures whether the firm conservatively specializes in specific modes/markets (more familiar to the firm) or boldly engages in combinations of modes and markets that are less familiar (more unknown) to the firm. For a given extent of the international footprint, the more risk-taking firms will choose to operate abroad in ways that simultaneously expand both the location and the mode dimensions of their international footprints (greater boldness).

We then provide a contribution to the global strategy literature by looking at our measures of extent and boldness of firms' international footprints with the lens of the microfoundations of global strategy (Contractor et al., 2019). In particular, we build some testable hypotheses on how the characteristics of the CEO and TMT shape both the capacity of the firm to manage higher complexity in international operations and the risk-taking propensity that leads to engage in more unknown combinations of international operations. Using data on over 14,000 firms in seven EU countries, we find that larger management teams and older CEOs tend to be associated with a greater extent of international operations, but not with greater boldness, in line with the idea that these managerial characteristics are associated with greater capabilities, but not necessarily higher risk-taking propensity. Instead, firms whose TMT has more international experience exhibit higher extent and boldness of the international footprint, suggesting both higher capability to manage complex operations and higher risk-taking propensity. Finally, firms managed by a CEO who is part of the family that controls the firm have a tendency to choose an international footprint with more limited extent and boldness, consistent with the view that these firms may have both lower managerial capacity and higher risk-aversion. These results are consistent with our theorization.

Being rather intuitive, our results suggest that our new measures are indeed able to offer a meaningful and accurate description of firms' internationalization. This picture is richer than the simpler characterizations provided by the often one-dimensional measures commonly used in strategy and international business research. Importantly, despite the relative sophistication of our measures, they are easy to grasp and to use in empirical analyzes, as long as adequate data are available. Since the required data are reasonably straightforward to collect, we hope future studies adopt our suggested measures.

These new measures are potentially particularly useful for analyzing the relationship between internationalization and performance (Benito & Welch, 1997). Many studies have tried to estimate the association between internationalization and performance (Yang & Driffield, 2012), but this line of research has been questioned on the grounds of the inadequacy of correlating simple overall measures of internationalization—such as export ratio or foreign sales ratio—with firm performance (Verbeke et al., 2009). Hennart (2011) argues that performance levels ought to be a function of the match between the actual and optimal international footprint; that is, the one that best reflects the capabilities and specific advantages of a firm.

That in turn requires developing suitable measures of international footprints, which inevitably go beyond unidimensional measures of internationalization. In this study, we develop and demonstrate the empirical cogency of such measures. Since performance is at the core of what strategy research may offer to managers and business decision-makers, this study also provides a stepping-stone towards a better and managerially relevant understanding of global strategy decisions.

The logic developed and demonstrated in this study can be applied to other strategic dimensions of firms' activities, where the amount or extent of activities depends both on risk-taking and on capabilities. Examples are product differentiation, diversification, or portfolios of R&D projects. While the number of products or projects (extent) clearly depends on capabilities, the degree to which they are dissimilar along some key dimension points to the riskiness of these portfolios. As long as different dimensions of these activities can be measured, it is possible to quantify the degree to which the elements of the portfolio differ or whether the firm specializes in some of the dimensions.

This paper provides useful insights for IB theory. In particular, it contributes to a call to introduce microfoundations into the process model of internationalization of the firm, the so-called Uppsala model (Johanson & Vahlne, 1977), which explains the gradual commitment of firms to international markets based on the experience firms gain over time. As Vahlne and Johanson (2017) themselves recently put it, they "have mostly treated the milli-micro level as a black box" (Vahlne & Johanson, 2017, p. 5).⁹ Coviello, Kano, and Liesch (2017) have recently suggested that insights on microfoundations of the process model could come from New Internationalization Theory and from International Entrepreneurship research. Our paper adds to this debate by arguing that firms, which may look identical in terms of their observable characteristics (such as innovation, size and age), may display international footprints quite different from one other, in terms of extent and boldness of their international strategies, due to the characteristics of their senior managers. Unfortunately, our study can only provide a snapshot of the international footprint of the firm. A useful extension of this research, in line with the Uppsala model, would be to take a more dynamic perspective and argue to what extent these footprints result from different paths of internationalization (Hashai, 2011), and whether the characteristics of senior executives affect the propensity of firms to engage in radical and path-breaking resource commitments (Santangelo & Meyer, 2017).

Finally, it is worth noting that, while the comprehensive dataset used in this study defines one of its strengths, some of its characteristics also bring limitations to the study. First, a lack of longitudinal data curbs the possibilities to examine the casual structure of relationships rigorously. So, even though we control for a large number of relevant firm characteristics, the findings of this study must be regarded as mostly descriptive. Second, since our data are cross-sectional and collected among existing firms, we cannot investigate the timing of the dynamic evolution of the international footprint (Benito, Pedersen, & Petersen, 2005). Longitudinal data would have allowed us to better understand why some firms move between similar international operations, thus gradually increasing the uncertainty they face, while other firms may be more prone to seek opportunities from foreign operations at any point in time even if this means venturing into more unknown operations. Third, we can neither rule out survivor bias nor make any strong claims about the performance effects associated with the observed patterns. Although we expect firms to design or develop their international footprints in ways that allow them to achieve the highest possible sustainable performance, we cannot determine the link between the extent and boldness of the international footprint and performance, for example in terms of profitability or survival.

Though, as discussed above, exploiting the more granular depiction of key features of internationalization proposed in this study to understand firm performance is certainly a promising line for further investigation.

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ENDNOTES

¹ For instance, Intel CEO Bob Swan recently described Intel's exposure to the COVID-19 crisis in terms of its "global footprint," https://www.foxbusiness.com/technology/coronavirus-intel-semiconductor-production?fbclid=IwAR1zsQU2YFiI_peSnANPtspV3QY11c85OcNkIzEj5UKDhl6YSEn6vhKOx5k.

² Certain markets are inherently riskier than others, and certain operation modes may entail higher risks due to the irreversible nature of some investments.

³ The firm operates with three modes (export, import, and FDI) in two markets (North America and China).

⁴ Detailed information on the EFIGE data and an anonymized, truncated version of the data are available at <http://bruegel.org/publications/datasets/efige/>. We use the "full set" version of the data. The EFIGE dataset has several distinctive features. First, it is a stratified sample built to be representative of the manufacturing structure of the countries covered. In particular, the sampling design follows a stratification by industry, region, and firm size (excluding firms that have fewer than 10 employees). Second, data from the EFIGE dataset are fully comparable across countries, since they are derived from responses to the same questionnaire, administered over the same time span (January to May 2010). Finally, the EFIGE survey includes a wide range of questions that allow us to examine firm characteristics and the nature of foreign operations. Most of the questions refer to 2008, but some ask for information related to 2009 and years prior to 2008, in order to obtain a picture of the effects of the crisis as well as the dynamic evolution of firms' activities.

A significant upside of EFIGE is the comprehensiveness of the dataset and the richness of firm-level variables helping us control for various important confounders. The downside is that it is a cross-sectional dataset; hence, identification from change is not possible.

⁵ The fact that the number of operations (a number) is a lower bound for the scope of internationalization (the size of a matrix) also implies that a potentially simple measure of boldness such as the ratio of scope and extent is mis-specified. The reason is that the numerator is two-dimensional while the denominator is only one-dimensional. The numerator increases faster in "size" than the denominator; hence, the mean ratio is mechanically increasing in the number of operations, even if different-sized firms choose similarly risky strategies. Another way to think about the simple ratio is that each firm's boldness is calculated by dividing the actual size of the matrix by its conditional minimum; the measure compares the firm's matrix to the smallest matrix imaginable given its number of operations. Geometrically, this is the vertical distance between the point of firm i and the 45° line.

⁶ Since this variable is defined only for family-owned firms, we set its value to zero for non-family owned firms and also include a dummy variable that takes value 1 if the firm is controlled by an individual or family.

⁷ The annual turnover of the firm is available as a categorical variable ranging from 1 to 7, with 1 being an annual turnover of less than 1 million euros, and 7 being more than 250 million euros. Due to the lack of

a continuous measure of turnover (or value added), exact measures of productivity cannot be computed, but we submit that by controlling simultaneously for turnover classes and employment levels, we are capturing some essential productivity differentials that may lead to more internationalization and/or more risk-taking.

⁸ Both the size of the matrix and the number of operations are 1, therefore the scope is 1.

⁹ Vahlne and Johanson (2017) refer to the individual at the “milli-micro” level, while the micro-level in their analysis is the firm.

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