

# Information Costs in International Business: Analyzing the Effects of Economies of Scale, Cultural Diversity and Decentralization

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**Abstract** The relationship between internationalization and performance is controversial. Prominent in the theoretical arguments about a performance downturn in internationalization are increasing information, coordination, and management costs—an argument for which empirical insights are lacking. Building on a model of information cost, we test for the development of internal information costs during internationalization. Applying a panel procedure on a data set of top manufacturers observed over a 7-year period, we analyze the effects of economies of scale, multinationality or host market diversity and international organizational decentralization on internal information costs. Although internal information costs decline due to economies of scale in international business, they are especially affected by the degree of host market diversity: a growing cultural diversity increases internal information costs per unit. Finally, we find that after a phase of first organizational adaptation processes, international organizational decentralization (and therewith complexity) rises internal information costs. Information cost development plays a major role in theories referring to a performance downswing in a phase of high or culturally unrelated internationalization involving strong organizational complexity. Our results offer empirical backing for these arguments on internal information costs (incorporated into an information cost model).

**Keywords** Internationalization strategy · Multinationality · Cultural diversity · Organizational decentralization · Information costs

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## 1 Introduction

Over the past decades, the relationship between internationalization and performance has been subject to extensive research; however, this has produced mixed theoretical arguments and empirical results as well as numerous unanswered questions (as outlined by Glaum and Oesterle 2007). Empirical results range from positive and negative links to curvilinear u-shaped, inverted u-shaped, and s-curve relationships between internationalization and performance (see the literature reviews in Yang and Driffield 2012, and Kirca et al. 2011). Recently, scholars have even argued that there is no valid theoretical argument for a universal or generalizable (positive) relationship between internationalization and overall performance (Verbeke et al. 2009; Hennart 2007).

Building on different theoretical streams (most importantly the resource-based view, location and production economics, transaction cost and organizational learning theory), arguments on the overall relationship refer to specific benefits and costs of international growth. From a benefit perspective, studies to a large extent draw on economies of scale: costs are spread over the sales volume in different nations (e.g., Contractor et al. 2003; Delios and Beamish 1999). Furthermore, they draw on organizational learning effects induced by an increase in international business (e.g., Ruigrok and Wagner 2003). Both effects are supposed to lower the costs per unit. From a cost perspective, increased information and/or transaction costs (e.g., communication, coordination, and negotiation) are identified during internationalization, especially development into culturally distant regions (e.g., Boddewyn 1988; Michel and Shaked 1986; Zaheer and Mosakowski 1997; Ruigrok and Wagner 2003; Elango and Prakash Sethi 2007; Pangarkar and Yuan 2009; Tomassen and Benito 2009). When hypothesizing on the interplay of benefits and costs (in inverted u-shaped or s-curve approaches), authors blame escalating information and/or transaction costs in expansion processes into distant regions for the failure to meet overall performance objectives (often observed during a phase of high internationalization) (e.g., Boddewyn 1988; Michel and Shaked 1986; Zaheer and Mosakowski 1997; Ruigrok and Wagner 2003; Elango and Prakash Sethi 2007; Pangarkar and Yuan 2009; Tomassen and Benito 2009).

Hypotheses on the overall performance result of internationalization refer to specific benefits and costs of foreign expansion and to their interplay. In contrast, empirical research concentrates solely on overall performance (e.g., see the overviews in Yang and Driffield 2012; Kirca et al. 2011), i.e., authors empirically evaluate the overall performance development and then draw conclusions that refer back to the specific benefits and costs underlying their hypotheses. Comparing the specificity of arguments on internationalization's impacts on benefits and costs with the empirical research produced, we follow the argument of Hennart (2007, 2011) and Wiersema and Bowen (2011), noting that the overwhelming majority of studies is undertaken at a too high aggregation level. Empirical support is lacking about the single effects that account for the overall performance impact. To improve theory-testing and theory-building, research is needed which shifts the focus from overall performance to individual performance aspects, namely specific benefits and costs arising from (different facets of) internationalization.

In their study, Fisch and Zschoche (2011) propose an information cost model of internationalization that builds on the information cost view (Casson 1999). They explicitly refer to one specific cost position that is often held responsible for decreasing overall performance in international business: internal information costs. Internal information costs comprise the costs of collecting and processing information needed for business decisions. It is assumed that the complexity of collecting and processing information—and thus the resulting costs—rise with a company's degree of multinationality. This paper tests the arguments put forward with regard to the development of internal information costs. The insights provided deepen our understanding of the intricacies of increased or decreased performance and are valuable for managers, because they offer specific decision-making support related to directly addressable variables (as called for by Oesterle and Wolf 2011).

Our results are derived from a sample of manufacturing firms analyzed over a 7-year period. After a brief review of the theoretical frameworks and past findings, we derive hypotheses and present the research methodology. We then present and discuss the results.

## 2 Theory, Previous Research, and Hypotheses

### 2.1 Research on Internationalization's Benefits and Costs

Internationalization's benefits manifest in higher revenues or lower costs. First, and most importantly, authors refer to benefits from scale economies: the firm benefits from extending product lifecycles and from spreading costs over larger or more markets. Strongly connected to the idea of scale economies are organizational learning approaches, which expect lower costs per unit due to learning effects (often going hand in hand with higher volumes) (e.g., Vernon 1966; Caves 1996; Contractor et al. 2003; Ruigrok and Wagner 2003). Second, firms are supposed to benefit from arbitrage benefits: the exploitation of national differences, such as the ability to take advantage of the differences in factor endowments or markets (Bühner 1987), risk diversification or reduction, tax burden reduction (Rugman 1976; Kwok and Reeb 2000), the increase in operational flexibility, knowledge transfer (Kogut 1989), and the increase in bargaining power vis-à-vis suppliers and customers (Thomas and Eden 2004) (see also the overview by Benito and Tomassen 2003).

Concerning the costs of internationalization (for an overview, see Table 1), authors firstly stress the liabilities of newness (Lu and Beamish 2004), which comprise costs associated with installing facilities, staffing, and establishing internal management systems and external business networks. Second, there is the literature on the liabilities of foreignness (Zaheer 1995; Zaheer and Mosakowski 1997), which address costs associated with spatial distance (e.g., travel, transportation, and coordination over distance or time zones), company-specific costs (e.g., owing to unfamiliarity in a foreign environment), host country environment costs (e.g., lack of legitimacy, economic nationalism), and home country environment costs. These show some amount of overlap to concepts that refer to the (internal) costs of governance or the costs of doing business abroad (Casson 1999; Tomassen and

**Table 1** Costs of internationalization

Costs of internationalization	References
<b>Internal costs of governance/costs of doing business abroad</b>	
<i>Information and transaction costs</i>	
<ul style="list-style-type: none"> <li>• <i>Costs of collecting and processing of information</i>: expenses for observation, memory, communication, and processing of information needed for output and investment decisions and other decisions not directly connected with trade</li> </ul>	Zaheer and Mosakowski 1997; Casson 1999
<ul style="list-style-type: none"> <li>• <i>Monitoring costs</i>: expenditures related to controlling the fulfillment of agreements, manifest in time spent on controlling and on accounting issues as well as extra travel expenses</li> </ul>	Buckley and Casson 1976; Jensen and Meckling 1976; Williamson 1985; Michel and Shaked 1986; Boddeyn 1988; Zaheer and Mosakowski 1997; Dahlstrom and Nygaard 1999; Hennart 1991; Tomassen and Benito 2009
<ul style="list-style-type: none"> <li>• <i>Bargaining costs</i>: expenses related to negotiations between parties, including time spent on and resources used in bargaining</li> </ul>	Williamson 1985; Heide and John 1988; Tomassen and Benito 2009
<ul style="list-style-type: none"> <li>• <i>Bonding costs</i>: expenses on activities that promote commitment in relationships, e.g., developing a common identity, incentive systems in the MNE</li> </ul>	
<ul style="list-style-type: none"> <li>• <i>Maladaptation costs</i>: opportunity costs of not being able to respond effectively to changes in the environment that arise due to communication and coordination failures between contracting parties (subsidiary strategy being constrained by the parent MNE's global strategy)</li> </ul>	Dahlstrom and Nygaard 1999; Sethi and Judge 2009; Tomassen and Benito 2009
<b>Liabilities of newness</b>	
Costs associated with installing facilities, staffing, and establishing internal management systems and external business networks	Lu and Beamish 2004
<b>Liability of foreignness</b>	
<i>Costs associated with spatial distance</i> (e.g., travel, transportation, and coordination over distance and time zones)	Zaheer 1995; Zaheer and Mosakowski 1997; Calhoun 2002; Mezias 2002; Sethi and Judge 2009
<i>Company specific costs</i> owing to unfamiliarity with a foreign environment	
<i>Host country environment costs</i> (e.g., lack of legitimacy, economic nationalism)	
<i>Home country environment costs</i>	

Benito 2009; Sethi and Judge 2009). In an intra-company view, there are increased costs for the international firm that stem from higher information-processing demands and transaction costs. These are information collection and processing costs (needed for output and investment decisions), monitoring costs (which are manifest, for instance, in time spent on controlling issues), and bargaining costs (related to negotiations between parties). Bonding costs are also mentioned (i.e., the costs to develop a common identity in an international firm). Finally, concepts address the costs of strategic misfits in foreign environments attributable to communication and coordination failures (these are opportunity costs).

Liabilities of newness are the main argument for a first downturn in overall performance in a u-curve or s-curve approach; the latter have become very popular. The following upturn or positive performance effect of internationalization is justified by benefits, such as organizational learning, but is first traced back to economies of scale. Authors referring to the (most prevalent) inverted u-curve or s-curve ideas suppose that it finally comes to a downturn in performance owing to escalated costs of governance, control, information, and communication caused by more dispersed and more complex international operations (e.g., Daniels and Bracker 1989; Sullivan 1994; Gomes and Ramaswamy 1999; Contractor et al. 2003; Lu and Beamish 2004; Hoskisson et al. 1993) (for an overview, see Table 2).

The overwhelming majority of studies on the development of internationalization's benefits and costs refer to the measurement of the overall performance development (most often in terms of a profitability ratio such as return on sales or assets). Less than 5 % of studies explicitly address theorizing and measuring a specific cost category that often underlies the overall performance hypotheses (as identified in our literature review, Richter 2010). Although essential for drawing validated conclusions on performance, empirical results on the development of the different cost positions during internationalization are rare.

To shed further light on the intricacies of increased or decreased performance during internationalization, we shift the theoretical and empirical focus to the development of one specific cost position: information costs. We pick up conceptual and empirical research on the cost-efficiency implications of multinationality proposed by Fisch and Zschoche (2011), and therewith establish a closer connection between the theoretical costs of internationalization and their measurement (as implied by the criticism raised by Hennart 2007, 2011; Wiersema and Bowen 2011; Li 2007; Ruigrok and Wagner 2004).

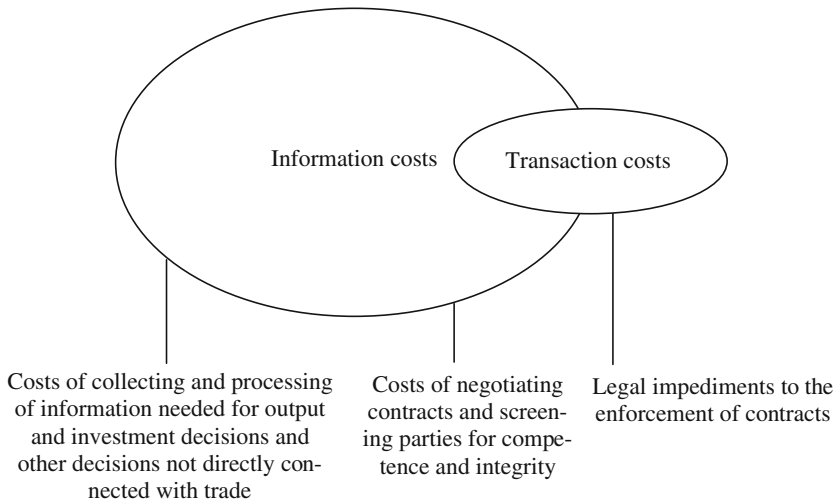
## 2.2 Internationalization and Information Costs

Fisch and Zschoche (2011) propose an information cost model of internationalization that combines prevalent arguments in international business (especially on coordination costs) with the information cost view (Casson 1999). Building on Casson's (1999) differentiation between information and transaction costs (see Fig. 1), Fisch and Zschoche (2011) differentiate between external and internal information costs: external information costs comprise transaction costs associated with screening market partners for competence and integrity as well as negotiating contracts, while internal information costs are all costs related to collecting and

**Table 2** Theoretical frameworks on internationalization's benefits and costs

Basic arguments	Relationship	Representative scholars
<i>Linear internationalization-performance relationship</i>		
<p>Benefits of internationalization:</p> <ul style="list-style-type: none"> <li>▪ economies of scale</li> <li>▪ economies of scope</li> <li>▪ exploitation of national differences</li> </ul>		<p>Rugman 1976; Errunza and Senbet 1981; Kim and Lyn 1986; Benvignati 1987; Bühner 1987; Grant 1987; Kim et al. 1993; Sambharya 1995; Tallman and Li 1996; Ramaswamy et al. 1996; Mishra and Gobeli 1998; Delios and Beamish 1999</p>
<p>Costs/Liabilities of foreignness:</p> <ul style="list-style-type: none"> <li>▪ internal costs (e.g., higher coordination costs)</li> <li>▪ external costs (e.g., financial and political risks)</li> </ul>		<p>Hyermer 1976; Miller and Pras 1980; Siddharthan and Lall 1982; Michel and Shaked 1986; Chang and Thomas 1989; Collins 1990; Zaheer and Mosakowski 1997</p>
<i>Non-linear internationalization-performance relationship</i>		
<p>Location choice:</p> <ul style="list-style-type: none"> <li>▪ net benefits increase during initial expansion to familiar regions</li> <li>▪ net benefits decrease during follow-up expansion to distant locations</li> </ul>		<p>Daniels and Bracker 1989; Geringer et al. 1989; Al-Obaidan and Scully 1995; Hitt et al. 1997; Gomes and Ramaswamy 1999; Elango and Prakash Sethi 2007</p>
<p>Organizational learning:</p> <ul style="list-style-type: none"> <li>▪ net benefits decline initially due to liabilities of foreignness/newness</li> <li>▪ learning processes lead to increasing net benefits in the future</li> </ul>		<p>Lu and Beamish 2001; Capar and Kotabe 2003; Ruigrok and Wagner 2003; Ruigrok and Wagner 2005</p>
<p>S-curve theory:</p> <ul style="list-style-type: none"> <li>▪ net benefits decline initially owing to liabilities of foreignness/newness</li> <li>▪ net benefits increase in mid-stage owing to learning and enhanced ability to arbitrage national differences</li> <li>▪ net benefits decrease beyond optimal level owing to rising coordination costs</li> </ul>		<p>Hitt et al. 1994; Sullivan 1994; Riahi-Belkaoui 1998; Contractor et al. 2003; Lu and Beamish 2004; Richter 2007; Ruigrok et al. 2007</p>

Source: own table, based on Sukpanich 2007



Source: Casson 1999

**Fig. 1** Relationship between information and transaction costs

processing information for output and investment decisions and other decisions not directly connected with trade (Casson 1999; Fisch and Zschoche 2011).

We formalize internal information costs as the costs of collecting and processing information, including monitoring costs (which manifest for instance in time spent on controlling issues). It is assumed that the complexity of these processes, and thus the resulting internal information costs, depend on the degree and organization of a company's multinationality (Buckley and Casson 1976). Multinationality is considered the spread of foreign direct investment around the globe, while organization refers to the way international activities are integrated with headquarters (e.g., international, multinational, global, and transnational structures, as conceptualized by Bartlett and Ghoshal 1989). Finally, it is assumed that the resulting costs depend on the volume of foreign operations and the related scale effect. We review their arguments and derive hypotheses on the development of internal information costs in relation to these three determinants.

### 2.2.1 Volume of International Operations and Information Costs

Arguments deriving from a focus on internationalization's benefits refer to companies' economies of scale. It is assumed that an increase in the volume of international operations decreases internal information costs per unit of output, since it reduces the fixed costs per activity (e.g., Contractor et al. 2003; Lu and Beamish 2004). Processes or tasks such as accounting and controlling procedures or IT—which seek to collect and analyze information—grow, but not to the same extent as international operations do. Relatively fewer personnel are required, and administrative procedures might be merged for several international locations. Since multinationality is related to but does not directly determine the volume of

international operations (this also largely depends on the size of the markets entered), we follow Fisch and Zschoche (2011) and expect a separate and negative effect of the volume of international operations on the internal information costs per unit. This scale effect is not unlimited, and we expect a slowdown of the decrease in internal information costs per unit in a phase of high foreign sales volumes.

*Hypothesis 1a: An increase in a firm's international sales volume decreases (i.e., has a negative effect on) its information costs per unit.*

*Hypothesis 1b: The decrease in information costs per unit slows down with higher international sales volumes.*

## 2.2.2 Multinationality and Information Costs

Fisch and Zschoche (2011) assume that internal information costs will generally rise as the spread of international investment increases, owing to the decision costs and coordination problems inside the firm. This is in line with arguments in most international business studies (e.g., Hoskisson et al. 1993; Contractor et al. 2003; Lu and Beamish 2004): “Transaction and coordination costs increase with the degree of geographic diversification” (Jones and Hill 1988); “increasing cultural distance between the MNE's home country and its foreign locations influences cross-border administration costs negatively” (Gomes and Ramaswamy 1999); Geringer et al. (1989) follow the same line and refer to interviews with managers of MNEs, noting that “as their firms encompassed increasingly broader geographic markets, the costs associated with geographic dispersion began escalating, sometimes quite rapidly, thus eroding profit margins” (Geringer et al. 1989).

This effect is often hypothesized to depend on cultural dispersion instead of geographical dispersion. As summarized in Calhoun (2002), governance structures, laws, and practices as well as the business conduct of contracting parties are manifestations of culture and rules for international firms to which they should adhere to if they want to be successful. We argue that multinationality induces higher internal information costs per unit of output (i.e., costs of collecting and processing information involving monitoring costs). The extent of these costs strongly depends on a company's familiarity with the foreign markets entered; they will be higher in a situation of low familiarity with a foreign market or strong cultural differences. We therefore hypothesize that the internal information costs per unit will generally rise as the spread of international investment increases, especially into culturally distant countries. Furthermore, we hypothesize that this increase in information costs per unit will grow with a rise in the spread of international investment into culturally distant locations (see also Fisch and Zschoche 2011).

*Hypothesis 2a: An increase in a firm's multinationality, especially in terms of cultural diversity, increases (i.e., has a positive effect on) its internal information costs per unit.*

*Hypothesis 2b: This increase in international information costs per unit will grow with an increase in a firm's multinationality in terms of cultural diversity.*



### 2.2.3 Organizational Structure and Information Costs

Finally, the complexity of collecting and processing information for output and investment decisions depends on the organization of a firm's international business. During initial internationalization, firms tend to hesitate to redesign the organization and to efficiently integrate the new international business into the hitherto existing structures (e.g., Egelhoff 1988; Habib and Victor 1991; Wolf and Egelhoff 2002). An increasing international expansion implies that processes' complexity, and the resulting bulk of information flows, are augmented (Bartlett and Ghoshal 1989; Habib and Victor 1991; Westney and Zaheer 2003). This often triggers a reorganization to incorporate the international business into the national functions or divisions, which is supposed to decrease internal information costs (e.g., Fisch and Zschoche 2011). The way processes are structured, thereafter, is a result of adapting to industry or country pressures for localization or integration; for instance, to better adapt to local customer needs via decentralized structures (adaptation advantage) vs. achieving global scale efficiency via centralized structures (coordination advantage) (Bartlett and Ghoshal 1989; Alonso et al. 2008).

Here, Casson (1999) follows his information cost logic and argues on the influence of central and peripheral communication costs on organizational structures. He argues that, in practice, the costs for communicating either local or peripheral information are not uniformly high or low. In the case that local information is tacit (and its communication therewith costly) and central information is explicit, it is advantageous to follow a decentralized structure. He acknowledges that this involves further challenges, namely to harmonize local decisions with each other (e.g., by publishing information on local procedures adequately, setting-up decision-making rules and uniform business procedures) (Casson 1999). In the opposite case that local information is (in contrast to central information) relatively explicit and easy to communicate, it is advised to centralize information processing, i.e., information and directives are supplied directly by the headquarters' management after receiving information from local managers (he refers to the term consultative hierarchy). According to Casson (1999) this structure type then reduces information costs.

Hence, either when adapting to environmental factors for meeting market requirements, or to the costs attributed to central and peripheral information, the decision on either form of organizational structure affects information costs.

Casson's (1999) arguments imply that a centralized structure which involves consultation with local managers reduces information costs (as long as it is chosen according to the character of local and peripheral information). This is in line with the traditional thinking, that centralization is assumed to facilitate coordination and integration and therewith increases efficiency while decentralization is assumed to be associated with fragmentation and therewith inefficiency (e.g., Stank et al. 1994). The overall efficiency of a centrally organized administration of foreign operations is supposed to be higher than in a decentralized structure: Since administrative functions involving for instance information processing and monitoring practices are duplicated in decentralized structures, "decentralization does not come cost-free [...] and implies more time and effort in coordination and control" (Galbraith

1973). The company's internal information costs are supposed to be higher in decentralized international organizational structures, since organizational complexity is costly and difficult to manage (e.g., Ghoshal and Nohria 1993). We follow this line of argument and outline the following hypothesis:

*Hypothesis 3: After finalizing initial reorganization processes (in the transition from early-stage to mid-stage internationalization), the pursuit of decentralization increases (i.e., positively impacts) internal information cost per unit of output.*

### 3 Research Methodology

We now present the sample and discuss the measurement approach and estimation technique used to gain results concerning the above hypotheses.

#### 3.1 Sample

The analysis was carried out on a sample of the largest (German) industrial firms. They were identified using company rankings of the top industrial firms published in the German media (the largest 100 industrial firms in the *FAZ*, and Germany's top manufacturers in terms of size reported in *Die Welt's* ranking). These firms' financial reports were gathered and data was collected from their income statements and subsidiary lists. Owing to data unavailability issues, the sample consists of 107 firms (comprising DAX-listed manufacturers, and firms such as Bosch, Oetker Group, Bilfinger, and Aurubis). The information collected covers the period 2000–2006, and takes the form of a panel data set comprising 749 observations.

Our sample firms are all large manufacturers and are mainly from the machinery and equipment, computer, electronic, and optical products, chemicals, and automotive industries (see Table 3).

The average MNE in this sample can be classified as a mid-stage to high internationalizer (with 56 % of foreign assets, employees, and sales, and on average 34 foreign markets in which they are active); no firm is in an early or initial phase of international expansion. While the sample is inappropriate to testing the three-stage internationalization theory, our sample firms show sufficient variation in terms of the research variables to deliver findings on the mid-stage and high internationalization phases of manufacturers from industrialized countries.

#### 3.2 Measurement

Our *dependent* research construct *internal information costs per unit (INFOCOSTS/UNIT)* is operationalized via the administration costs provided in income statement figures in annual reports. These cover the commercial management costs (i.e., personnel costs of directors, and personnel costs of general managers that cannot directly be assigned to production, sales, or R&D and span different functional organizational areas), costs of accounting, controlling, and planning (see e.g., Coenenberg 1997, and accounting standards § 255 (2) HGB, IAS 1.99, 1.104,

**Table 3** Sample descriptives

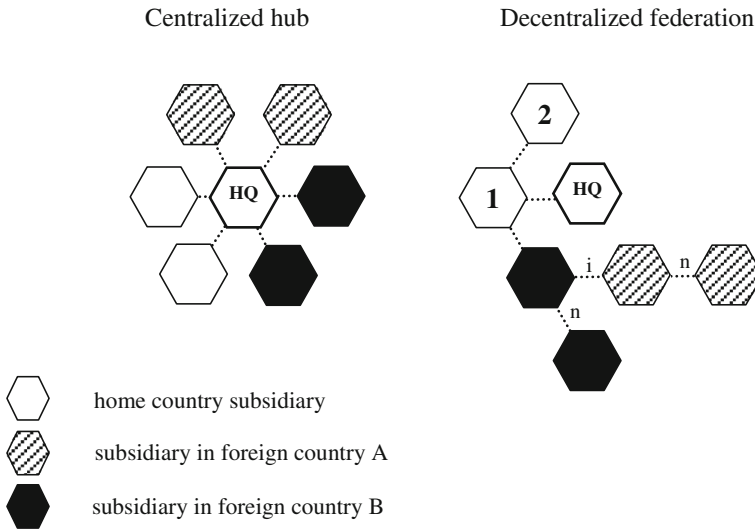
Section	% of firms	Internal information costs/sales
Mining and quarrying	0.9	0.03
Manufacturing	92.4	
Food, beverages, and tobacco	3.7	0.02
Textiles, leather, and related products	3.7	0.09
Wood, paper, paper products, and printing	3.7	0.08
Chemicals	13.1	0.05
Pharmaceuticals	4.7	0.09
Non-metallic mineral products	4.7	0.07
Rubber and plastic	3.7	0.04
Metals	5.6	0.03
Computer, electronic, and optical products	13.1	0.08
Machinery and equipment	24.3	0.05
Motor vehicles and parts	11.2	0.05
Furniture	0.9	0.07
Electricity, gas, steam, airconditioning	2.8	0.02
Construction	3.7	n.a.

$N = 107$

16.19). As highlighted in MNEs' income statements, this position comprises costs of finance and accounting, controlling, IT, services, HR and risk management costs, costs attributed to reporting lines and decision-making procedures as well as group management costs (e.g., CEO salaries) (see the financial reports of for instance Beiersdorf, DIS, Henkel, Infineon, and Medigene). Therewith, it comprises the key aspects highlighted in the theoretical underpinning of a performance decrease during international expansion. It comprises a large portion of the costs of collecting and processing information (needed for output and investment decisions and other decisions not directly connected with trade) and for monitoring (e.g., controlling and accounting) (as highlighted by for instance Buckley and Casson 1976; Williamson 1985; Michel and Shaked 1986; Zaheer and Mosakowski 1997; Casson 1999; Hennart 1991; Fisch and Zschoche 2011). Since the total costs strongly depend on the company size, we operationalize it to an intensity figure: we divide the total administration costs by total sales. This results in an operationalization of internal information costs per unit (see Hahn and Wilkens 2000).

To measure the economies of scale effect, we follow the recommendation in Hennart (2007) and refrain from using a foreign to total ratio, and refer to the size of foreign activities by the *volume of foreign sales* (*FRGNSALES*). For later estimation purposes, we use the natural logarithm of the foreign sales volume (as sales distribution is strongly skewed) (following Fisch and Zschoche 2011, among others). This must be kept in mind when interpreting results later.

Our research hypothesis 2 refers to an increase in a firm's multinationality, especially in terms of cultural diversity. Multinationality, understood as the spread of activities (e.g., of foreign direct investment), is often operationalized via the



**Fig. 2** Measuring international organizational structure/decentralization

number of countries in which a firm has subsidiaries (e.g., Delios and Beamish 1999). Furthermore, entropy indices ( $\sum [P_i \ln(1/P_i)]$ , where  $P_i$  denotes for instance the sales percentage in a geographic segment  $i$ ) are common; these combine the information on how many geographical regions are served by information on the extent to which activities are concentrated in a few of them (e.g., Kim 1989; Chang and Wang 2007). In addition to operationalizing multinationality, measuring *host market or cultural environment diversity* (HMD) seems to be crucial for capturing the cost impact arising from coordination processes in diverse intercultural locations (as pointed out for instance by Hennart 2011). Depending on the geographical regions chosen, the entropy index can be adapted in order to approximate the cultural environment diversity: Goerzen and Beamish (2003) apply an entropy measure that refers to Hofstede's (1980) cultural clusters (i.e., homogeneous groups of countries), which serve as segments when calculating the index (a similar approach is found in Zahra et al. 2000). We follow the idea of Goerzen and Beamish (2003) and therewith the recommendation by Hennart (2011), who concludes that their host market diversity measure can be used to test for internal costs of foreignness. Hence, we apply the following entropy measure:  $\sum [S_c \ln(1/S_c)]$ , where  $S_c$  denotes the share of subsidiaries<sup>1</sup> in a cultural cluster  $c$  (based on the replicated cultural clustering in the context of the GLOBE project, see Gupta and Hanges 2004). Information on the subsidiary portions were retrieved from the OSIRIS database Bureau van Dijk for the 2006 business year.

<sup>1</sup> It would be more precise to include information on the size of subsidiaries than simply to refer to the number of subsidiaries; however, this information was not sufficiently available from our sources. To capture the whole range of 160 nations in which subsidiaries are found, foreign countries not included in the original clustering are assigned to the 10 zones by means of the information provided by Hofstede and Hofstede 2005 as well as according to language, geographical location, and religion.

*International (de)centralization (DEC)* of organizations is measured by means of a concept proposed by Fortanier et al. (2007) (and applied by for instance Garbe and Richter 2009). Here, three measures represent the degree of a foreign subsidiary's autonomy or independence in an international network. The first is the average hierarchical level of subsidiaries (AVLEV): subsidiaries directly owned by headquarters are first-level subsidiaries, second-level subsidiaries are owned by first-level subsidiaries, etc. Many hierarchical levels imply that, on average, decision-making power is located at a lower level, which points to decentralization. Second, the number of overseas subsidiaries whose immediate parent is not located in the MNE's home country is divided by the total number of foreign subsidiaries (NONHOME). The third measure is the number of overseas subsidiaries whose immediate parent is located in another (other than their own) foreign country in relation to the total number of foreign subsidiaries (INTER). If foreign subsidiaries coordinate the operations of other subsidiaries, either in their country or in another foreign country (as measured via the NONHOME and INTER variables), decentralized sub-organizations are created (Schollhammer 1971; Fortanier et al. 2007).

For a better understanding of these measures, the element on the right in Fig. 2 illustrates these variables: NONHOME subsidiary relationships are characterized by a lower case (n), and INTER via a lower case (i). The AVLEV, NONHOME, and INTER values were collected from subsidiary lists again.<sup>2</sup> We construct our decentralization index using factor scores (with a mean of 0 and a standard deviation of 1) gained in a factor analysis (the analysis results in an alpha of 0.77 and in one factor explaining 73 % of the total variance in the three indicators). A company with a high positive value is strongly decentralized, whereas high negative factor values point to centralization.

Our model is supplemented by industry as a control variable: *Industry (IND)* groups are differentiated according to the German classification of economic activities (<http://www.destatis.de>). Industry membership is usually captured using dummy variables. As our estimation procedure is affected by time-constant variables, it is measured in terms of the average industry administration cost figures (as done in Rugman et al. 2007; Goerzen and Beamish 2003).<sup>3</sup>

The final correlations between our measurement constructs appear in Table 4. The variance inflation factors (VIF) are around 1, indicating no significant multicollinearity problems.

### 3.3 Estimation

To estimate the relationship between internationalization and performance, procedures that—appropriately—make use of panel data structures are called for

<sup>2</sup> Subsidiary lists are retrieved from the OSIRIS database Bureau van Dijk for the 2006 business year. Therein, the subsidiaries of each firm including the subsidiaries of each subsidiary (i.e., also covering indirect ownership) are provided in electronic form offering the opportunity for further information processing. The database covers 10 hierarchical subsidiary levels (subsidiaries directly owned by headquarters are first-level subsidiaries, second-level subsidiaries are again owned by first-level subsidiaries, etc.).

<sup>3</sup> We refrain from further incorporating company size as control variable due to a fairly high correlation with our foreign sales volume measure.

**Table 4** Correlations

	Mean (SD)	1	2	3	4	5	VIF
1. INFOCOST/UNIT	0.06 (0.04)	1.000					
2. IND	0.06 (0.02)	0.457*	1.000				1.122
3. FRGNSALES	6,490 (16459)	-0.144*	-0.080**	1.000			1.516
4. HMD	1.29 (0.45)	0.412*	0.145**	0.149*	1.000		1.267
5. DEC	0.04 (0.98)	0.141*	-0.146*	0.489*	0.392*	1.000	1.687

\*  $p < 0.01$ \*\*  $p < 0.05$ \*\*\*  $p < 0.1$ 

(Bowen 2007): the analysis technique should make use of the cross-section and time-series information involved in our data. Panel data analyses are adequate procedures for this purpose and we will use one of them: a random-effects (RE) estimation.<sup>4</sup> The statistical adequacy of choosing RE estimation over fixed-effects (FE) estimation or ordinary least squares (OLS) procedures can be evaluated by means of different test statistics. Results of the Breusch–Pagan test are used to evaluate whether an RE estimation is more suitable than an OLS estimation on the pooled data (it essentially tests whether any firm-specific effects are randomly distributed by defining the null hypothesis that there is no variation in the firm-specific effects; a significant value then points to the superiority of RE estimation over OLS, see Breusch and Pagan 1980). The Hausman test offers support for the decision whether to use RE or FE models (see Hausman 1978). The test refers to the null hypothesis that the firm-specific effects are not correlated with all other explanatory variables in the model, which if this were not the case, would point to FE estimation. However, since our model involves time-constant variables (namely the host country or cultural diversity and organizational decentralization measures), we cannot conduct the test for our full model<sup>5</sup> and must rely on RE estimation in each case. Any potential bias from correlations between firm-specific effects with our explanatory variables can, however, be evaluated by looking at the theta values provided. The bias will be low if theta is close to 1 (see Brüderl 2005; Wooldridge 2006).

$$\text{INFOCOST/UNIT}_{it} = a + b_1\text{IND}_{it} + b_2\text{FRGNSALES}_{it} + b_3\text{FRGNSALES}_{it}^2 + b_4\text{HMD}_i + b_5\text{HMD}_i^2 + b_6\text{DEC}_i + u_{it}$$

Testing all the effects hypothesized yields the abovementioned model. We will first estimate the base model (involving the industry control variable only), and will

<sup>4</sup> RE estimation procedures are preferred to fixed-effects (FE) estimation procedures, since, in contrast to RE, FE models are unable to estimate the effects of two of our variables which are time-constant: host market or cultural diversity and organizational decentralization.

<sup>5</sup> The Hausman test on the model involving only the industry and foreign sales terms yields a significant result ( $p < 0.01$ ), pointing to FE's statistical superiority. We will therefore report the FE results for these variables, too. As indicated by the additional FE estimation results and the high theta values reported later, we will see that the bias from using RE is negligible.

then join each research variable one step at a time. Quadratic functions are built by simply squaring indices, which is the standard procedure in international business studies (e.g., Rugman et al. 2007; Ruigrok et al. 2007; Lu and Beamish 2004). The interpretation of results will be based solely on statistically significant effects.

## 4 Results

Table 5 displays the panel regression results of all models estimated by means of the RE procedure.<sup>6</sup> The significant values of the Breusch–Pagan tests (as provided in the last row of Table 5) statistically support the superiority of our panel procedure, chosen over a traditional pooled OLS estimation. Furthermore, the theta values are close to 1 (between 0.85 and 0.87) for all models, which indicates that any potential bias from using RE estimation instead of FE estimation is very low.<sup>7</sup>

Model 1 is the basis or control model accounting solely for the industry effect. Models 2 and 7 show that foreign sales volume is significantly and negatively related to internal information costs per unit, which supports research hypothesis 1a. Hence, firms benefit from economies of scale, and internal information costs per unit decrease with an increase in foreign sales volume. Testing for the squared term (in Model 3) does not yield significant results, i.e., a slowdown in the decrease of internal information costs per unit (as assumed in hypothesis 1b) cannot be fully supported and is only visible during the transition from very low to average foreign sales volumes (due to logarithming the variable beforehand, see Fig. 3). In Models 4 and 5, we analyzed the effect of host market or cultural diversity on internal information costs. Results confirm a rise in internal information costs per unit with a rising degree of host market or cultural diversity, confirming hypothesis 2a. Testing for the squared term does not support the nonlinear effect hypothesized (2b). In Model 6, we introduce the organizational decentralization variable, which in the individual model remains insignificant. After probing for the individual effects, Model 7 summarizes all effects; here, also the organizational structure variable becomes significant, providing some support for the idea that internal information costs per unit increase with stronger decentralization of organizational structures. Hence, we can partly confirm research hypothesis 3.

Figure 3 depicts the unquestionably significant results (on foreign sales volume and host market diversity). What we learn from Fig. 3 is that the scale effect of further increasing foreign sales volumes seems to be fairly small compared to the effect arising from increasing the host market diversity.

<sup>6</sup> In order to run all analyses on the same sample, we deleted cases for which either of the research variables was not available (missing values) in all models. This yields a final sample of then 355 observations. This does not systematically change results compared to running the analyses on all available observations for each model.

<sup>7</sup> This is further supported by contrasting RE and FE estimation results for the models for which we were able to use FE procedures (namely Models 1, 2, and 3). The coefficients gained by means of FE estimation on Models 1 (IND: 0.391 a), 2 (IND: 0.371 a, FRGNSALES: -0.014 a), and 3 (IND: 0.372 a, FRGNSALES: -0.022 c, FRGNSALES<sup>2</sup>: 0.001) are very close to our RE estimation results and point to the same relationships between our research variables.

Table 5 Estimation results, dependent variable: internal information costs per unit

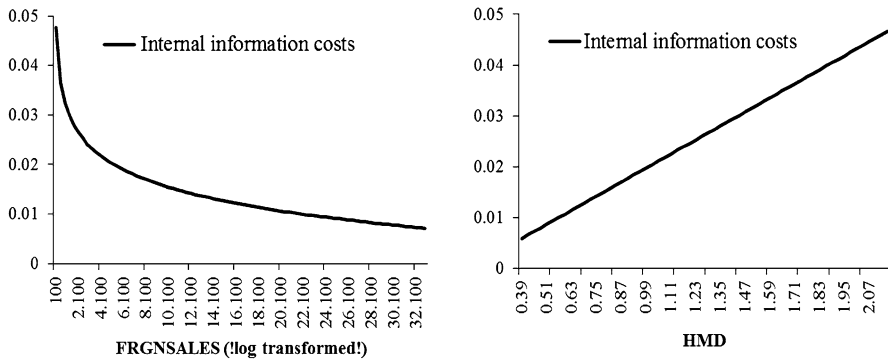
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
FRGSALES		-0.007*	-0.018***				-0.008*
FRGSALES <sup>2</sup>			0.001	0.023*	0.008		0.023*
HMD					0.006		
HMD <sup>2</sup>						0.002	0.008**
DEC						0.447*	0.349*
IND	0.447*	0.401*	0.406*	0.405*	0.406*	0.024*	0.065*
Constant	0.024*	0.080*	0.121*	-0.003	0.004	0.064	0.157
R <sup>2</sup>	0.064	0.117	0.122	0.090	0.090	0.064	0.155
Adj. R <sup>2</sup>	0.064	0.116	0.121	0.089	0.089	0.064	0.155
Theta	0.855	0.866	0.867	0.844	0.846	0.856	0.855
F	24.140*	23.412*	16.312*	17.425*	11.552*	12.109*	16.349*
Observations	355	355	355	355	355	355	355
X <sup>2</sup> (1)-Breusch/Pagan: H <sub>0</sub> : $\sigma_v^2 = 0$	1,230.189*	1,253.653*	1,252.472*	1,279.039*	1,283.068*	1,232.063*	1,368.87*

\* p &lt; 0.01

\*\* p &lt; 0.05

\*\*\* p &lt; 0.1





**Fig. 3** Effects on internal information costs per unit

The overall model fit is (with an  $R^2$  of 16 % in Model 7) generally modest. The additional share of variance explained by the research constructs (over the control model with an  $R^2$  of 6 %) is also fairly small in absolute terms, but elevated compared to past studies (e.g., Fisch and Zschoche 2011). Still, we must conclude that the major part of internal information costs is explained by other factors than foreign sales volume, multinationality or host market diversity, and decentralization of organizational structure (as measured herein), which is somewhat unsurprising when following empirical studies in international business research.

## 5 Discussion of Results

### 5.1 Implications for Theory

This paper sought to test the arguments on internal information costs proposed by Fisch and Zschoche (2011). They developed an information cost model of internationalization that provides a theoretical framework to commonly applied arguments on *coordination costs*.

Regarding internationalization benefits, we focused on the economies of scale argument: it is assumed that an increase in international operations volume decreases internal information costs per unit of output since it reduces the fixed costs per activity (see Fisch and Zschoche 2011; Contractor et al. 2003; Lu and Beamish 2004). Our results show that economies of scale decrease the average internal information costs in international business. Processes or tasks such as accounting and controlling procedures or IT—which seek to collect and analyze information—grow, but not to the same extent as international operations do. Relatively fewer personnel are required, and administrative procedures might be merged for several international locations. Our results point to a linear scale effect, which is in line with the thinking of Fisch and Zschoche (2011). Nonetheless, a slowdown in the decrease in internal information costs per unit with growing foreign sales volumes remains theoretically convincing and can at least be observed during the phase of transition from low to average foreign sales volumes.

By means of their model, importantly, Fisch and Zschoche (2011) provide a theoretical framework around the argument of coordination problems during international expansion, which substantiates the (second) downturn of performance in inverted u-shaped or s-curve approaches. Their notion is that coordination problems cause internal information costs; internal information costs will generally rise as the spread of international investment increases owing to the costs of decision and coordination inside the firm. Since it is hypothesized that this effect depends on cultural dispersion instead of geographical dispersion, we tested for the impact of host market environmental diversity on internal information costs. Our results provide empirical evidence for the theoretical argument that internal information costs per unit increase with an increase in host markets' cultural diversity. Again, this effect remains linear in empirical testing, although a nonlinear relationship is theoretically more convincing. Nonetheless, there is empirical support for both classical international business arguments (e.g., as outlined by Hoskisson et al. 1993; Contractor et al. 2003; Lu and Beamish 2004) as well as for the relationship between internal information cost and multinationality as developed in the information cost model of Fisch and Zschoche (2011). We thereby provide, for the first time, empirical support for a commonly applied theoretical argument, as past studies researched internationalization effects on a much more aggregated level of overall profitability (e.g., Daniels and Bracker 1989; Hoskisson et al. 1993; Sullivan 1994; Gomes and Ramaswamy 1999; Contractor et al. 2003; Lu and Beamish 2004), allowing for implicit conclusions only.

Finally, we outlined that cultural diversity is only one aspect of complexity when collecting and processing information. We derived the argument that a decentralization of organizational structures increases internal information costs per unit, since administrative functions involving information processing and monitoring practices are duplicated in decentralized structures. We find empirical support for this argument and can support the statement by Galbraith (1973) that "decentralization implies more time and effort in coordination and control." Therefore, our approach is a step forward in providing insights into the impact of MNEs' organizational structure decisions on one facet of performance (an area characterized by a lack of investigation, see Lu and Beamish 2004 as well as Fortanier et al. 2007).

The statistical evidence generated for the above internationalization facets helps one understand the intricacies of increased or decreased overall performance during internationalization: authors are right in referring to increased *coordination costs* in culturally unrelated expansion and in complex international organizational structures. Hence, these arguments are valid when deriving hypotheses on overall performance development and when explaining downswings in overall performance during high internationalization. Furthermore, they are valuable for international managers, because they offer specific decision-making support related to variables that can more easily be addressed by practitioners; we discuss this in the following.

## 5.2 Managerial Implications

Managers might want to take advantage of the (for the average MNE, fairly small) economies of scale effects when engaging in international operations. However,

management must be aware of the negative effects of expanding into culturally very distant locations, which is often envisaged in a phase of high internationalization. Dispersed internationalization strategies increase internal information costs—an insight managers already understand to some extent. In a management survey, the consultancy Proudfoot identified internal and external communication problems as among the primary barriers to productivity (recognized by up to 25 % of managers) (see Global Productivity Report 2008). Hence, management should first contrast scale advantages and increase in internal information when making location choices. Second, managers should think about possible actions, such as evaluating investments in IT, undertaking cultural change initiatives, and the outsourcing of administrative procedures, to address the increasing internal information needs beforehand.

Furthermore, managers should evaluate their international organizational structures in light of the impact on information costs: independent of their internationalization stage, MNEs adopting centralized structures profit from company economies of scale and avoid rising information costs per unit of output. In particular, MNEs in industries that are not pressured by localization requirements (such as the computer segment), and thus do not face specific advantages of decentralized structures (e.g., being responsive to local market needs) should avoid decentralization in the context of reducing internal information costs per unit. Especially in information cost-intensive industries, the above actions can be interpreted as management's options for actively shaping the overall internationalization-performance relationship.

### 5.3 Limitations and Future Research

We see this study as a foundation for future research that will further investigate internationalization's impact on efficiency measures, since this will increase our understanding of the intricacies of leveraged or reduced overall performance. Further research can also address the impact of other moderating variables explicitly linked to the internationalization process, for instance, MNEs' internationalization strategies or specific managerial actions taken during the internationalization process.

While we hold that the research reported in this paper offers a sound platform for further studies, some limitations should be addressed; these create opportunities for further research projects: first, regarding the data structure, researching a longer time period and setting up a truly longitudinal study involving several decades would be desirable. Second, concerning the measurement of internationalization facets, more finegrained concepts are always desirable (although often not realizable when referring to financial accounting data), for instance, data on subsidiary sales. Finally, the measurement and incorporation of organizational structure types, such as centralization or decentralization (e.g., referring to the typology of Bartlett and Ghoshal 1989) is still in its infancy, and further concepts—including ones involving strategy and process issues—would be fruitful.

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