

Modeling firm specific internationalization risk: An application to banks' risk assessment in lending to firms that do international business¹

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Abstract

Drawing on internationalization process theory, we develop a new model for firm-specific internationalization risk assessment. The model shows that firm-specific internationalization risks can be determined from a firm's experiences and from current business activities in a firm's network. Experiential risks are categorized as international, country market, network, or relationship experience risks. Risk assessment in current network activities can be determined from a firm's dependency on a network and from the network's performance and evolution. We apply our model to credit risk assessment by banks and other credit institutions. This article adds to research on financial institutions' credit risk assessment by focusing on firm-specific internationalization risk assessment, an area that has previously received little attention in the literature. In addition, this article provides a better understanding of risk assessment in the internationalization process, shedding light not only on the risks involved in firms' commitment to internationalization but also on the risks that banks and other institutions take when they commit by lending to internationalizing firms.

Keywords: Risk assessment, internationalization, process, network, experience, bank

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1. Introduction

In response to turbulent financial markets, new regulations require banks to collect more fine-grained information for their credit risk assessment of corporate clients. The bank's objective is to perform an accurate assessment of the risk that a firm will default on its repayment obligations. If the bank's corporate client is a firm that conducts international business, then the bank needs to assess the risk of that international business. So far, banks have assessed such risk by estimating the risk of conducting business in a specific country. For instance, they estimate the instability and lack of legitimacy of political institutions and the rate and pattern of economic growth in the country (Sommerville & Taffler, 1995). The risk of conducting business in a specific country has been considered a common market risk factor – namely, a risk factor that affects all firms as opposed to a firm-specific risk factor that affects only an individual firm (Caouette et al., 2008). The international business literature – and, specifically, internationalization process (IP) theory – has, however, recognized that the risk of conducting international business is highly firm-specific (Johanson & Vahlne, 1977, 2009; Figueira-de-Lemos et al., 2011). In this paper, we therefore argue that credit risks stemming from a firm's international operations should also be assessed as firm-specific risks.

Credit regulators' increased focus on firm-specific factors invites the application of IP theory in the analysis of risk assessment. According to IP theory, internationalization is carried out through resource commitments in international businesses, which are embedded in networks. More specifically, IP theory uses a firm's *experiences* of international operations and current business activities in *networks* of potential and actual business partners as central units of analysis, for they affect the outcome of international operations (Blomstermo et al., 2004; Eriksson et al., 1997; Johanson & Vahlne, 2009). Because differences exist in the processes of internationalization that firms undergo – for example, with regard to geographical location, speed (Autio et al., 2000), and mode of establishment (Barkema & Vermeulen, 1998) – different experiences result. Based on experiences and current business activities in the network, the firm identifies opportunities and uncertainties and uses this information in making decisions concerning resource commitments in the foreign market (Delios & Beamish, 2001; Eriksson et al., 1997). Because experiences and the network are specific to each firm, the decision to commit resources and the risks involved are firm-specific.

To the best of our knowledge, there are no credit risk models that account for the firm-specific risk variables recognized in IP theory. Consequently, the purpose of our study is to develop a model of *firm-specific internationalization risk assessment*. We use the term *firm-specific internationalization risk* to denote the credit risk stemming from a firm's internationalization. In this way, the model complements other credit risk models.

Although the model is based on IP theory, we do not focus on the process per se but rather on how it can be used for creditors' firm-specific risk assessment. Hence, we analyse the risk in the context of a firm's internationalization and use experiences and current business activities in the firm's network as analytical tools for determining firm-specific internationalization risk. Firms with limited international experience find international business development to be cumbersome and less profitable – or even elusive in some cases (Chetty et al., 2006; Delios & Beamish, 2001; Lu & Beamish, 2004) – thereby elevating the risk associated with internationalization, which in turn increases the risk that these firms will default on their credit obligations. Furthermore, as a firm invests in the development of its foreign network, the profit of that investment becomes reliant on the current business activities in that network in terms of the dependencies involved (Das & Teng, 1996, 2001) and the performance (Hallikas et al., 2002, 2004) and evolution (Lindstrand et al., 2011) of the network. Hence, we argue that in their assessment of firm-specific internationalization risk, credit institutions should consider the experiences of internationalizing firms and the current business activities in the networks of these firms.

We contribute to the research on how credit institutions can assess risk in their corporate clients' international business in turbulent financial markets. Our research can be used in making global standards for the reserves that banks should keep depending on the amount they lend (the Basel Capital Accord). These standards have changed over time, from standards that are similar for all banks to those that allow banks on an individual basis to negotiate the reserves they need in accordance with their risk profile (Altman et al., 2002). For banks, the change in standards warrants a corresponding change in credit risk assessment, from a shift in emphasis on market-risk factors to firm-specific risk factors. A bank that can maintain that its credit takers constitute a relatively low risk is in a position to make a strong argument as to why it should hold relatively low amounts of capital reserves. This is a major competitive advantage, as banks increase their profits by lending more per each amount they have in capital reserves. We also contribute to internationalization process theory by focusing on the effect of experiences and current network activities on internationalization risk.

The article begins with a review of research on credit risk, followed by a review of IP research and firm-specific risk. We then put forward a model of firm-specific internationalization risk assessment. Our conclusions and a discussion of the implications of the model for credit institutions are presented in the final sections of this paper.

2. Review of models of firm risk assessment

Banks' exposure to risk from lending to corporate clients is mainly assessed by analysing factors that explain firms' poor performance, causing firms to default on loans and prompting them to restructure their business or declare bankruptcy. Such risks are assessed using models that identify certain key factors of a firm that determine the probability of default and that combine or weight the factors into a quantitative risk score (Altman & Saunders, 1997). In broad terms, these models are based on either accounting data or capital market data.

2.1. Firm risk assessment models based on accounting data

One of the first firm risk models is *Altman's Z-score model* (Altman, 1968). This model assesses risk from a five-variable discriminant analysis model that includes accounting data (e.g., cash flow indicators such as sales, earnings before interest and taxes [EBIT], and retained earnings) and the market value of the firm's equity as one variable. The model later underwent further development to include seven variables and became known as the Zeta model (Altman et al., 1977). Similar to Altman's models, *logit analysis* uses a set of accounting variables to predict the probability of borrower default, assuming that the probability of default is logistically distributed; that is, the cumulative probability of default adopts a logistic functional form (e.g., Platt & Platt, 1991; Smith & Lawrence, 1995). Altman's models and the logit models are examples of multivariate accounting-based credit risk assessment models. They have been shown to perform quite well over many different time periods and across many different countries (Scott, 1981).

2.2. Firm risk assessment models based on market data

In addition to accounting-based models, there are firm-risk models based on capital market data. An example is bankruptcy prediction models, which predict that a firm will go bankrupt when the market value of its assets falls below its debt obligations to outside creditors (see e.g., Santomero & Vinso, 1977; Scott, 1981; Wilcox, 1973). These bankruptcy prediction

models are, in many respects, similar to the option pricing models of Black & Scholes (1973), Merton (1974), and Hull & White (1995), which have gained more credence in the field of commerce, for example, through the Kealhofer, McQuown, & Vasicek (KMV) model. In these models, the probability of a firm going bankrupt depends on the starting period market value of assets relative to outside debts, as well as the volatility of the market value of assets. The market value of assets reflects the equity market's expectations of future cash flow. However, this cash flow is not directly observable but is inferred from the market value of equity and the book liability, using option pricing theory. In contrast to accounting data, market values include expectations of future performance.

A second class of capital market models seeks to impute an implied probability of default from the term structure of yield – the relationship between the investment term (e.g., years) and the interest rate – spread between default-free and risky corporate securities (Iben & Litterman, 1989; Jonkart, 1979). Other classes of models seek to derive the probability of default from past data on bond defaults, as influenced by credit rating and years to maturity (Altman, 1988; Asquith et al., 1989). These models, however, have been difficult to use because the database of loan defaults needs to be sufficient in size (McAllister & Mingo, 1994).

In addition to multivariate models based on accounting data and capital market-based models, there are reduced-form models (e.g., Hull & White, 2001). These models use debt prices and yields to estimate the probability of a firm's default.

2.3 Review of assessment of country risk

Studies have suggested ways in which banks should assess firms' credit risk with regard to the country in which the firms operate (e.g., Sommerville & Taffler, 1995). In the finance literature, the term *country risk* is defined as the risk that timely loan payments may be affected by country-specific factors, such as the general economic environment, and by factors that are impacted by government actions, such as taxes and regulations. The term *transfer risk* is applied to a related risk component that arises when credit obligations are extended across national borders, involving different currencies, different legal systems, and different sovereign governments. The term *sovereign risk* refers to the risk that a country may delay in fulfilling its obligations. Country, transfer, and sovereign risks often tend to operate together and are accepted variables for assessing the risk of conducting business in a foreign country. The focus has mainly been on sovereign credit risk (e.g., Cantor & Packer, 1996;

Diaz Weigel & Gemmill, 2006). The major rating agencies have developed sovereign credit risk assessment into a defined set of approaches so as to derive sovereign ratings. Their methodology examines two types of risk: country risk (as determined by political economic policy, economic structure, and liquidity) and specific investment risk. The specific investment risk is broken down into currency risk, sovereign debt risk, and banking sector risk. These are common risks because they affect all firms in any one country.

2.4. The limitation of credit risk models in estimating firm-specific internationalization risk

Firm risk assessment models based on accounting data have limitations. Because they are based on historical data, the nature of the data provides little information about future firm development. These models reflect the outcome of a firm's past operations but not specifically its current operations. The models have also been criticized for being empirically based models that lack theoretical explanations (Saunders & Allan, 2010).

The main criticism of market-based models is that the proxies used do not necessarily reflect the real risk in the credit-taking firms (Lopez & Saidenberg, 2000). For instance, stock prices of firms that are publicly listed are used as proxies for asset values, which are later used in risk assessment (Eom et al., 2004). Another example is that the asset values of non-publicly traded firms are estimated from similar publicly traded firms, typically from the same industry. The use of proxies in market models is limited because the proxies may not reflect reality. For instance, a credit-taking firm that is not publicly traded may have very different risks than the group of publicly traded firms used as its proxy.

Neither models based on accounting data nor those based on market data explicitly account for the international context of firm operations. In a credit risk assessment of an internationalizing firm, these models are complemented by assessments of the risk of the country/countries in which the firm has operations. Country risk also includes transfer risk and sovereign risk, and all are regarded as common risks (i.e., risks that affect all firms). Therefore, the currently used country risk models are not firm specific; for this reason, they do not assess firm-specific internationalization risk.

3. Internationalization process theory and firm-specific internationalization risk assessment: a model for analysing the credit risk of internationalizing financial service firms

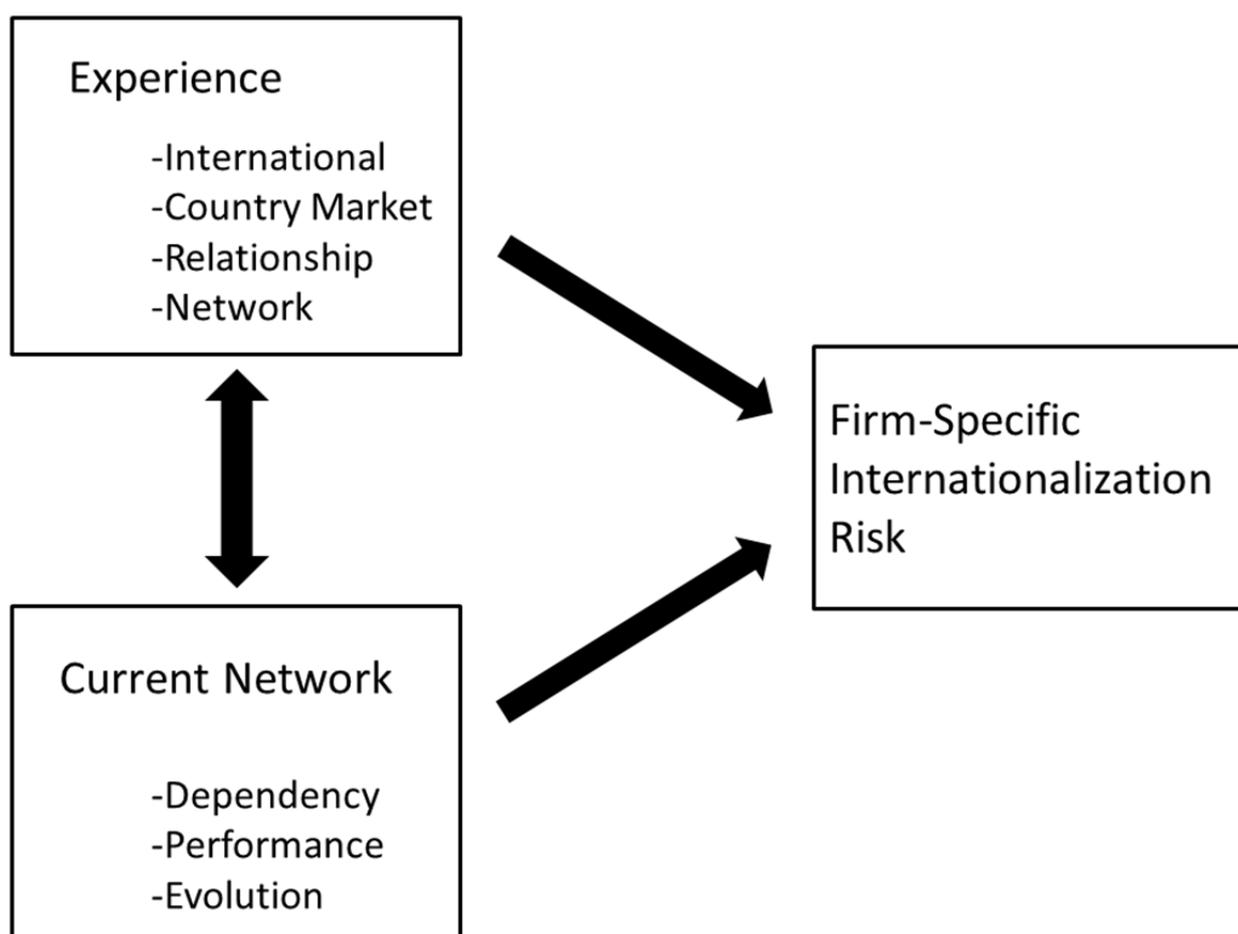
When banks and other credit institutions assess risk related to international business, they assess whether or not the corporate client generates cash sufficient for payment of interest and principal. The risks associated with international business are related to the firm's ability to perform in foreign markets. According to IP theory, internationalization develops on the decisions that firms make to commit, or not to commit, resources in light of the opportunities and risks they perceive in their current activities in the network (Johanson & Mattsson, 1988; Lindstrand, 2003; Coviello, 2006; Johanson & Vahlne, 2009). The perceived opportunities and uncertainties, as well as a firm's decision to commit to current activities in the international network, are guided by previous experiences in international business. For the banks' risk assessment of internationalizing firms, this idea implies that a firm needs to have accumulated certain experiences before certain commitment decisions may prove successful (Eriksson et al., 1997). An internationalizing firm's experiences can be differentiated into (a) international experience (Ghoshal, 1987), (b) a specific country market experience (Davidson, 1980; Luo & Peng, 1999), (c) business relationship experience (Blankenburg Holm & Eriksson, 2000), and (d) network experience (Lindstrand et al., 2009). Whether these experiences are needed for successful internationalization depends on the commitment decision in the network. The assessment of the risk involved can therefore be analysed based on whether the firm has the requisite experience. For instance, to determine whether a firm that wants to commit to a network in a foreign country has the requisite experience to do so, the following questions need to be answered: Does it have experience relating to that country, relationship, or network? Is it experienced in expanding internationally?

In IP theory, the outcome of an individual firm's international business and the associated risks are also determined by its current activities in the network (Blomstermo et al., 2004; Johanson & Vahlne, 2009; Lindstrand et al., 2011). International operations are conducted in networks, thereby making the firm dependent on the network as it does business, and exposing the firm to the risk of opportunistic behaviour and the lock-in effect of a poorly performing network (Deakins & Philpott, 1995; Chopra & Sodhi, 2004; Lo Nigro & Abbate, 2011). Network risks can thus be assessed in terms of (e) dependencies (Das & Teng, 2001;

Johanson & Vahlne, 2009), (f) performance (Chetty & Blankenburg Holm, 2000; Hallikas et al., 2002, 2004) and (g) evolution (Mattsson & Johanson, 1992; Lindstrand et al., 2011) of the network.

The factors discussed in previous sections are all of importance when banks and credit institutions consider the risk involved in the business of their international corporate customers. The factors constitute the variables that have an effect on firm-specific internationalization risk assessment, as depicted in Figure 1. The firm-specific internationalization risk is determined by the firm's (a) international, (b) country market, (c) relationship, and (d) network experiences, together with the firm's current network (e) dependency, (f) performance and (g) evolution of the network.

Figure 1. A model for analysing the risks for banks of internationalizing firms.



The model distinguishes experience and current network activities as different factors. When we use the IP model for firm-specific risk assessment, we consider firm experiences and

current network activities concurrently. The factors are related. For example, a firm may be assessed as a relatively high risk because of its low level of experience. This high risk may however be compensated by low risk in the network.

4. Firm experience and firm-specific internationalization risk

Country-to-country differences represent an uncertainty that increases the risks of international business (North, 1990; Globerman & Shapiro, 1999). Whereas some of these differences may be easily observable, such as regulations, others may be more fragmented and complex and less obvious to a foreigner, such as norms and values (Kostova, 1999). Hence, the risks of international business are complex because the process of decreasing uncertainty is multi-layered, owing to the levels of differing detectability of these different regulations, norms, and values.

Being knowledgeable about such differences and learning how to manage them are therefore of importance for internationalizing firms, a finding that has been verified empirically in a number of studies. For instance, a lack of knowledge regarding a foreign market (e.g., regulations and norms) can increase the cost of internationalizing (Eriksson et al., 1997), create managerial problems (Fenwick et al., 2003), and lead to market withdrawal (O'Grady & Lane, 1996), whereas firms that manage to develop such knowledge increase their profitability (Lu & Beamish, 2001, 2004) and their survival (Barkema et al., 1996). Recent research on bank lending to internationalizing firms shows how the assessment procedure neglects the fact that knowledge regarding foreign markets differs between firms (Giannetti & Yafeh, 2012). This finding is in contrast to research on the firm's internationalization in which learning is cited as an essential factor in explaining firm behaviour (cf. Barkema & Vermeulen, 1998; Zahra et al., 2000; Delios & Henisz, 2003).

Four kinds of experience can be distinguished in the internationalization literature (Chetty et al., 2006; Eriksson et al., 1997; Johanson & Vahlne, 2009; Lindstrand, 2003): (a) internationalization experience (i.e., experience gained from foreign country markets), (b) country market experience (i.e., experience gained from business within a particular country), (c) relationship experience (i.e., experience gained from business in an individual business relationship), and (d) network experience (i.e., experience gained through interaction within the network). In the following sections, we discuss these four kinds of experience and their relevance for risk assessment of a firm's international business.

4.1 Internationalization experience

Acquiring international experience from several countries allows firms to develop a rich stock of knowledge (Ghoshal, 1987; Barkema & Vermeulen, 1998; Johanson & Vahlne, 2009). By conducting business abroad, firms learn how to handle a variety of issues and develop what can be referred to as a *procedural knowledge* of how to internationalize (Eriksson et al., 1997, 2000). This type of knowledge is the result of diverse international experience. However, it is more than the sum of each foreign market because it generates a general internationalization experience that is useful in all foreign markets. Gaining experience from a diversity of situations leads to better performance in the tasks at hand (Levinthal & March, 1993). Thus, firms with experience from commitments in several diverse markets develop the resources and capabilities to engage in international business (Eriksson et al., 2000 (a); Eriksson & Chetty, 2003). The “distance” between countries regarding issues, such as institutions, plays an important role in firms’ knowledge development (Henisz & Delios, 2002). For instance, the number of countries in which a firm is active may very well be high, but these countries may belong to the same cultural cluster (Shenkar, 2001), with similar institutions. Hence, this firm may, in fact, have less diverse experience of international commitment than a firm that is active in fewer countries, but where those are in different cultural clusters.

Research has found, in particular, a number of aspects that affect how a firm learns from international experience. These aspects include the number of countries in which the firm has business (e.g., Barkema et al., 1996; Tallman & Li, 1996; Zahra et al., 2000) and the diversity of those countries (Erramilli, 1991; Shenkar, 2001; Chetty et al., 2006). International experience has also been measured as duration, that is, the amount of time a firm has conducted business internationally (Erramilli, 1991; Eriksson et al., 2001; Delios & Henisz, 2003). However, duration needs to be considered in the context of the specific firm, because firms may develop knowledge differently. For instance, firms that are entrepreneurial, or start internationalizing at inception, may have time-compressed knowledge development (Autio et al., 2000), while other firms may follow knowledge development trajectories in a path dependent way (Eriksson et al., 2000 (b)).

We therefore propose a risk model that takes into account the firm’s internationalization experience and recognizes the importance of procedural knowledge for performance. In other words, a firm with little internationalization experience may lack the procedural knowledge necessary to manage its international commitments even though the

country in question may be classified as “low risk” in a traditional risk model. Similarly, a firm with extensive internationalization experience may have developed skills to manage a diversified set of commitments; thus, it has garnered more experience, which in turn helps to reduce uncertainty and detect opportunities in a particular country.

Research has indicated that the relationship between international experience and performance may be an inverted U-shape (Barkema & Vermeulen, 1998). This proposed description of the relationship seems to apply to firms that exhibit the following pattern: firms learn a great deal from their initial experiences, their learning subsequently levels off, primarily because they become overwhelmed by coordination problems that arise because they have difficulty learning to handle operations in many countries (Hitt et al., 1997). The learning pattern could also be different for different establishment modes, such that learning how to manage agents or subsidiaries differs.

To summarize, an internationalizing firm’s diversity and duration of international experience, and their organization of international operations, should be considered in the assessment of firm-specific internationalization risk. This implies that the level of risk for a firm should be assessed as how adequate the firm’s internationalization experience is in relation to its other experiences and the network.

4.2. Country market experience

Country market experience refers to the knowledge developed through experience gained from commitments in a particular foreign country market. Country experience is specific to a country, meaning the specific business (Kwon & Konopa, 1993), cultural (Chen & Hu, 2002), and institutional (Kostova, 1999) context of that country. In their study on the cost of experiential learning in internationalization, Eriksson et al. (1997) found that learning is needed at a country level. Learning about the country market’s institutions (e.g., regulations, norms, language) was found to be costly. Learning at a relationship and network level in the foreign country market was also found to be costly. Foreign country market experience has also been found to have an effect on environmental-, industry-, and firm-specific risks (Miller, 1992; Das & Teng, 1996).

A number of studies have demonstrated the importance of market-specific experience for a firm’s continued commitment in a particular country market. For instance, the survival of cooperation increases with country market experience (Barkema et al., 1996). Subsidiary survival is also improved if a firm has experience in the host country (Delios & Beamish,

2001). Others have shown that a firm's increased performance in a market results from the firm's experience in that specific market (Davidson, 1980; Luo & Peng, 1999). Typical measures of country experience include duration in terms of number of years (Delios & Beamish, 2001; Delios & Henisz, 2003; Gaur & Lu, 2007) and number of establishments in different establishment modes in the country (Barkema et al., 1996).

The internationalizing firm's organization of international operations can determine its performance in country markets. The reason is that coordination and control of business in many different country markets may be difficult to accomplish. The establishment mode and level of autonomy given to the operations in a country market may be a determining factor for the firm's performance in that market (Birkinshaw et al., 2005). However, whether autonomy affects performance depends on the specific experience and context of the firm (Slangen & Hennart, 2008).

The relationship between country market experience and risk in internationalization may not be linear. For instance, if a firm has experience in exporting to a country market and then decides to set up a subsidiary in that market, the firm will need to develop knowledge about institutional and business factors concerning the launch of a subsidiary in the country. Shifting establishment mode may make the firm's past experiences less relevant to performance, because these experiences may no longer be as applicable as they used to be. The banker assessing firm-specific country market risk for the internationalizing firm will thus need to consider the specific situation of the firm.

4.3. Relationship experience

The importance of a firm's knowledge with respect to its international business relationships for internationalization performance has been discussed theoretically and empirically in the literature (cf. Johanson & Vahlne, 2003; Blankenburg Holm et al., 1996, 1999; Lindstrand et al., 2009, 2012; Jonsson & Lindbergh, 2010). A common thread of these discussions has been that firms learn from their partners and adjust their business accordingly. The internationalizing firm and the customer often work together for a long period, during which time they develop knowledge about the other's business that results in a unique adaptation and a commitment to develop the business that they carry out together (Johanson & Mattsson, 1988; Johanson & Vahlne, 2003). Business relationships are strikingly common (Ford, 1990), and the characteristics of relationships vary with the type of business and phase of development. For instance, very young entrepreneurial firms in rapidly changing markets

form business relationships in compressed time periods (Autio et al., 2000). By contrast, for example, mature manufacturing business relationships take a much longer time to change (Chetty & Eriksson, 2002).

Studies have also found that experience-based learning is involved in international business relationships and that such learning takes time and effort to develop (Makino & Delios, 1996). In addition, research has found that experiential learning is more intense in the early stages of relationship development, as routines and practices have to be established to activate the business aspect of the relationship. The hazard rate is the highest during these early and formative stages in relationship development, and then it levels off (Levinthal & Fichman, 1988; Eriksson et al., 2001). Once uncertainty about the relationship decreases, then the risk of relationship termination decreases. To a certain extent, this is attributable to the fact that relationship adaptation and commitment decisions in networks result in a unique resource constellation, which cannot be easily copied by competitors (Blankenburg Holm et al., 1999; Griffith & Myers, 2005). The unique or idiosyncratic nature of the relationship commitments that are needed to develop an international business relationship thus “locks in” the firm with the customer, such that they both depend on the success of the relationship (Blankenburg Holm & Eriksson, 2000).

Within a business relationship, experiences are gained in many forms. In addition to service and/or production exchange, information and knowledge exchange form part of the interactive activities carried out in the relationship (Wilson & Mummalaneni, 1986). Because information and knowledge exchange with a foreign counterpart is an important source of knowledge about local conditions for an internationalizing firm (Coviello & Munro, 1997; Gripsrud et al., 2006), relationship experiences of that sort can be perceived as a risk-minimizing mechanism of commitments in business relationships (Cunningham & Homse, 1986).

The development of relationship experience – that is, learning about the other actor’s business – can thus be considered both time consuming and resource demanding. This development also reflects how the firm and its partner value a relational exchange, thanks to its positive impact on firm performance. A general measure of relationship experience is the duration of the relationship (Chetty et al., 2006). However, a relationship can take many forms. One other measure of experience is the number of previous exchange activities within the relationship (Anderson, 1995). Relationship experience can also be measured by the levels of adaptation and development of product/and or production within a relationship (Eriksson et

al., 2006), as well as the level of information and knowledge shared in the relationship in terms of frequency (Jonsson & Lindbergh, 2010) and types of knowledge (Simonin, 1997; Uzzi, 1997). For instance, the shared knowledge can range from general information that is sporadic to firm-specific knowledge sharing between partners.

The implications of the importance of international business relationship experience for banks is that the relationship is more hazardous in the early stages of relationship formation, with little information and knowledge being exchanged, and becomes less so as the relationship progresses and the exchange of information and knowledge deepens. For the bank, risk assessment can be based on the presumption that the risk in an international business relationship is high at the beginning of the relationship.

4.4. Network experience

The business relationships of an internationalizing firm are connected in networks (Cook & Emerson, 1984; Johanson & Mattsson, 1988). Global supply chains and multinational networks are well-known phenomena in both academia and industry. In contrast to direct exchanges that occur in business relationships, not all firms in a network have direct exchanges with each other (Anderson et al., 1994). For example, a customer, supplier, and sub-supplier of car parts form a network, but the sub-supplier does not have a direct exchange with the customer. Because all these firms are needed to produce cars, they become dependent on each other for this production and for their own business performance. A firm's international network can span several foreign markets with different regulatory, normative, and cognitive requirements (Chen & Chen, 1998; Crick & Jones, 2000; Moen et al., 2004; Coviello, 2006).

A firm accumulates experiential knowledge on international markets during its interactions with direct counterparts and dealings with indirect business counterparts in the business network (Lindstrand, 2003; Eriksson & Chetty, 2003; Coviello & Munro, 1997). Consequently, the experiential knowledge needed for uncertainty reduction, opportunity recognition, and development of the firm's international business can be found in the network (Blomstermo et al., 2004; Johanson & Vahlne, 2009).

For an international firm, the connectedness and dependency in the international network can have a substantial impact on the firm's cash flow (Cossin & Schellhorn, 2007). The risk lies in the fact that the network is difficult to control and that it contains the variability of the environment (Das & Teng, 2002). An individual firm's level of risk depends

on the firm's experience of business activities and business interaction within networks. Business networks can be viewed as formations in which firms learn, through social exchange processes over time, to cooperate and, thereby, coordinate their activities. The amount of time for learning of networks will be compressed in new venture internationalization and born global firms, but network experience may still be an important factor (Sharma & Blomstermo, 2003; Coviello, 2006). The level of experience that firms gain from these processes will affect the level of risk that the individual firm has. A firm's capability, based on experience, to interact with network partners and manage the business processes in the network produces positive effects on company growth (Lorenzoni & Lipparini, 1999; Lindstrand et al., 2011). Hence, a firm's accumulated knowledge from past and present experience of international networks can be used to develop present business in foreign markets and lower the risks connected to internationalization (Banerji & Sambharya, 1998; Lindstrand et al., 2009, 2012). Learning from interaction in networks has a positive effect on the internationalizing firm's performance in foreign markets (Blomstermo et al., 2004; Lindstrand et al., 2011).

Firms may have previous experience of domestic networks but not of international networks, and if this is the case, the risk of initiating international operations is high. Consequently, firms' level of experience in international networks is a good predictor for banks in their risk assessment of firms that conduct international business. The risk associated with experience of interaction in international networks can be measured in terms of the level of experience in local, regional, or fully international networks, with the diversity of country markets, cultures, and institutional contexts complicating coordination and control of networks (Griffith & Myers, 2005). The less experience a firm has of interacting with and managing various network partners (e.g., international customers, customers' customers, suppliers, and institutional actors), the greater the level of risk. A lack of experience in managing the connection to international network partners and in joining international networks affects the performance of a firm (Johanson & Vahlne, 2009; Lindstrand et al., 2011) and is, therefore, a valid measurement of risk. Given the complexity of network dependencies and changes in network activities and partners, a firm's experience of such dependency and change will certainly be a factor that influences risk in foreign operations (Lindstrand, 2003; Lindstrand et al., 2011). Network experience is therefore specific to each firm.

5. Current network activities and firm-specific internationalization risk

Doing business in networks is associated with a number of elevated risks. One of the main risks lies in the connection to a network. When a firm links its business, resources, and strategic behaviour to other firms, it creates a dependency on these firms, thereby exposing the focal firm to the risk of opportunistic behaviour and outcome uncertainty (Deakins & Philpott, 1995; Chopra & Sodhi, 2004; Lo Nigro & Abbate, 2011). Because the connection to networks is a prerequisite for uncertainty reduction and opportunity recognition through experience accumulation in current activities, the firm has, however, no choice but to expose itself and its activities to these risks during internationalization (Lindstrand, 2003; Johanson & Vahlne, 2009). The outcome of a firm's current business activities in the network is one of the main influencing factors during internationalization because it affects the firm's performance and competitive advantage. The risks inherent in the outcomes lie in the dependency in the network, the network's performance in terms of resource access through chosen partners, and a firm's network's evolution. An investment in international operations can lead to changes in all three; these changes can either increase or decrease the risks involved for the firm. Based on the arguments of networks and risk during internationalization, these risks can be more precisely discussed and assessed as (e) a firm's dependency on the network, (f) the performance of the network, and (g) the evolution of the network.

5.1. Current network dependency

Network dependency and its associated risks stem from the specialization of tasks and resources in networks (Hallikas et al., 2004; Link & Marxt, 2004). As a result, dependency exposes a firm to risks inherent in other companies' activities (Treleven & Schweikhart, 1988; Das & Teng, 1996, 2001; Hallikas et al., 2002, 2004). As a prerequisite for competitive advantage in foreign markets, dependency can be not only beneficial but also detrimental, depending on the attributes of the dependency. For instance, dependency on a long-term network partner with whom efficient knowledge exchange has led, and will continue to lead, to increased sales is beneficiary. However, dependency can also lead to lock-in effects that are detrimental and create risks if the network is inefficient in its supply of resources; that is, it fails to provide the needed resources or even provides the wrong resources (Chiles & McMackin, 1996; Lindstrand, 2003; Ojala & Hallikas, 2006). The relative size and power of network partners also affect network dependency. Asymmetry in reciprocal network

relationships needs to be assessed for it can constitute a risk if a firm is dependent on larger, more resourceful and powerful counterparts, without balanced exchange (Jarrow & Yu, 2001; Hallikas et al., 2002). Risks connected to dependency are furthermore interrelated to distribution of control in the network (Das & Teng, 1996, 2001; Dyer, 1997; Harland et al., 2003). This distribution of control may be measured in terms of mode of collaboration: the lower the control of resources (such as in alliances, collaborative agreements, and short-term contracts), the higher the risk (Das & Teng, 1996, 2001). For banks and other credit institutions, all these factors – and a firm’s ability to manage them – can be of importance in the assessment of firm-specific risks because they shape the internationalizing firm’s future cash flow and performance in foreign markets. Network dependency needs to be assessed for each firm specifically.

5.2. Current network performance

The performance of the network connected to an internationalizing firm is of great importance when evaluating the future risks of international operations. Numerous studies have shown that the network’s ability to perform and provide expected deliveries of products, technology, information, and knowledge, when and where they are needed, affects the risks connected to international operations (Treleven & Schweikhart, 1988; Zsidisin, 2003). Network partners might be committed to the internationalizing firm, but the risk lies in their ability to perform the given tasks and to play their part in the network activities (Das & Teng, 1996, 2001). In light of these risks, the selection of partners in foreign networks is an important choice (Lu & Beamish, 2001). Thus, assessing a firm’s choice of partners – in terms of how well the partners “fit” with the firm and how well the partners have performed tasks in the past – is of importance to the credit institutions. If the partners in the network do not perform, the risks connected to international operations are elevated. The risk of failure in network performance lies mainly in the loss of control over the costs involved (Hallikas et al., 2002, 2004). The size and growth of the network may thus be of importance for banks and credit institutions in their assessment of the risk involved in international business. Growth and size can be measured in terms of the total number of network partners but more specifically of the number of tiers of suppliers and the number of customers: the higher the number of tiers of suppliers, the higher the risk for malfunction in terms of disruption in deliveries, price differentiation, quality, and inventory management (Treleven & Schweikhart, 1988; Hallikas et al., 2002). In addition, the larger the number of countries and markets

involved in the network, the lower the performance, as operations become more multifarious (Giesecke & Weber, 2004; Griffith & Myers, 2005). However, in other contexts, such as in telecoms and social networking, network size may be necessary for good performance (Katz & Shapiro, 1985). The risk assessment of network performance therefore needs to be made for each internationalizing firm specifically.

5.3. Current network evolution

The network surrounding the internationalizing firm frequently changes. Firms initiate and invest in new relationships and divest and terminate old ones through the commitment decisions they make during internationalization (Mattsson & Johanson, 1992; Low, 1997; Lindstrand, 2003; Lindstrand et al., 2009). At a certain point in time, a firm's position in the network can be evaluated in terms of the firm's place in the value chain, access to resources, and performance. When the network changes, the position of the firm in the network also changes and, thus, the risks and opportunity connected to it (Chopra & Sodhi, 2004). Lo Nigro & Abbate (2011) noted that network evolution needs to be taken into account in risk assessment but that this seldom happens (p. 236):

Usually to evaluate networking convenience a static perspective is assumed: economic theories are based on cost-based considerations neglecting the evolutionary side of networking or its long term consequences (immaterial factors that can cause financial losses in the long run hard to convert into monetary value).

The risk involved in international operations is dependent on the evolution of the network and is a factor worth considering by a bank in its risk assessment of international business firms. A firm's position in the network is its foundation for knowledge acquisition, uncertainty avoidance, and opportunity recognition (Bridgewater, 1999; Johanson & Vahlne, 2009). For instance, a change in a firm's network position might change its possibility of acquiring knowledge about business opportunities, which in turn affects outcome and cash flow (Sharma & Johanson, 1987). Changes in relationships to counterparts stem from the withdrawal or expansion of business (Hallikas et al., 2002). These changes in turn could lead to changes in risk exposure. Initiating a new business venture within a new relationship might be riskier than expanding existing business with a well-known counterpart. The risks involved in network evolution can be measured as the actual change of position to a more positive or negative position in terms of the following: (a) resource access, (b) the growth trend for the

network based on business volume (i.e., the higher the business volume, the lower the risk), and (c) the growth of network size (i.e., the larger the network becomes, the more difficult it is to control its effects on performance) (Hallikas et al., 2002, 2004). An additional risk consideration is that networks may overlap with systems, or standards, which may compete with each other, and the evolution of the system, or standard, can therefore inform the risk in the network (Katz and Shapiro, 1994). Changes in dependencies among the firms in the network can also affect future performance and risks (Blankenburg Holm & Eriksson 2000; Ojala & Hallikas, 2006). The risk analysis of the network evolution for internationalizing firms needs to be done specifically for each firm.

6. Risk scoring formula of firm-specific internationalization risk

In this section we discuss how the framework for assessing firm-specific internationalization risk could be developed into a risk-scoring formula, illustrating how the variables interrelate. In a linear notation, the formula reads as follows:

$$FIR = \alpha + \beta_1 FIEXP + \beta_2 FMEXP + \beta_3 FREXP + \beta_4 FNEXP + \beta_5 FCNDEP + \beta_6 FCNPERF + \beta_7 FCNEVO + \varepsilon \quad (1)$$

Where:

FIR = Firm international risk

FIEXP = Firm international experience

FMEXP = Firm country market experience

FREXP = Firm relationship experience

FNEXP = Firm network experience

FCNDEP = Firm current network dependence

FCNPERF = Firm current network performance

FCNEVO = Firm current network evolution

ε = error term

and where α is the intercept, and β values are parameters that reflect the extent to which the relative factors of the model contribute to the change in the dependent variable FIR.

These parameters vary depending on the kind of risk analysis needed. For some purposes, an analysis of particular industries may be of interest. The scores may reflect properties of the industry environment. For instance, in an analysis of the risk of biotech firms, the parameters for the network variables (FNEXP, FCNDEP, FCNPERF, FCNEVO) may be higher than those for other firms because of the biotech industry's strong reliance on

network cooperation for innovations. Because these forms of repeated exchange commonly result in social attachments, status, and reputations, they are much more than a series of bilateral relationships (Owen-Smith & Powell, 2004). Furthermore, organizations in the fashion industry have long eschewed formal organizational arrangements, opting instead for more flexible relationships (Uzzi, 1996). Consequently, FREXP (relationship experience) may be weighted relatively higher for firms in the fashion industry than for firms in other industries. The fact that operations differ according to industry was established early on by Woodward (1965).

Equation 1 is a straight linear expression of how the identified variables affect firm-specific internationalization risk. The equation can be seen as the baseline model for more advanced analysis. The equation can be useful also if selected variables are transformed in a curvilinear way. The curvilinearity can be based on assumptions of U-shaped and logarithmically declining learning in internationalisation, which is discussed in section 7 below. The U-shaped learning is achieved by transforming the variable by its square, and the logarithmic transformation is a standard log transformation function. Also, as indicated in Figure 1, the independent variables may co-vary, meaning that interaction effects may exist between the variables, and that the model may be non-linear. One way to address such non-linearity is through Neural Network (NN) analysis. NN analysis would drop the assumption that variables in risk scoring formula are linearly and independently related. Such a model could explore correlations among the independent variables which are included as additional explanatory variables in a non-linear prediction function of credit risk.

Previous research on banks' and other lenders' exposure to risk from lending to firms has resulted in a number of models that aim to estimate the probability of firms' default on loan payments, as determined primarily by either accounting variables (e.g., Z-score models) or market data (e.g. Merton-type models). In accounting-based models, estimations are based on data measured in discrete intervals. In market data-based models, the ability to meet loan obligations is not measured directly but rather is inferred from market data on stock prices and volatility. Moreover, in cases where the company is not public, publicly traded companies are used as proxies in these models. The risk model proposed in this paper suggests a number of variables that can predict a firm's performance based on international business experience. The model thereby complements those models based on accounting and market data. In addition, it complements those models that assess country risk because it addresses the firm's specific qualifications for conducting business in a certain country.

7. Measurement development of risk assessment for internationalizing firms

In this section we develop the measures of the variables in the firm-specific internationalizing risk framework.

7.1. International experience

International experience can be investigated by studying (1) the number of countries in which a firm has established operations, (2) the diversity of those countries, (3) establishment modes, (4) the time period of the expansions, and (5) the firm's organization of international business. Any assessment of the risk involved has to be made in relation to the firm and its business situation. An established manufacturing firm that enters a new country may have accumulated, over a long period of time, a great deal of experience in entering similar countries. This experience reduces the risk associated with entering a new country. By contrast, a high risk is associated with the endeavours of a "born global" entrepreneurial high-tech firm (i.e., with no domestic market and no previous international experience) that establishes operations in several different markets at the same time. In both cases, the firms' international experience is relevant to the risk assessments performed by the bank or other credit institution. International experience may also have an exponential effect, or even a U-shaped effect, on firm performance such that the risks are higher for inexperienced firms but level off rapidly. Risks may increase because of the complexity in organizing the international business in the firm.

7.2. Country market experience

Country market experience can be estimated from measures such as (1) duration in a particular country market, (2) number of prior establishment modes in this market, and in some cases also (3) the level of autonomy given by the firm to its business in a foreign market. Firms that have been selling to a country market for a long time, and perhaps also have agents there, may face increased risks as they set up a subsidiary in the country market. For instance, this situation may demand that the firm learns how to handle additional institutional factors related to the country. Country risk, cultural, and 'psychic' distance can also be informative here, as a greater distance may make experience more important for reducing country market risks.

7.3. Relationship experience

Relationship experience can be estimated from (1) the duration of the business with a customer, (2) the intensity in terms of number of contracts, (3) the commitment in terms of investments, or (3) the mode of establishment in the relationship. Research suggests that the risks involved in business relationships increase sharply in the beginning and then decrease sharply in an exponential pattern. However, such a general pattern of riskiness is not likely to be correct for all firms, especially not entrepreneurial firms. Therefore, a need exists to assess the firm's relationship risks in a specific situation.

7.4. Network experience

Network experience can be estimated based on a firm's experience in (1) local, (2) regional, and (3) global networks; (4) collaboration within the network; and (5) coordination of the network. As such, this is also a proxy for the firm's ability to join new networks in new markets. At a glance, a large manufacturing firm may seem more experienced in handling networks of suppliers, customers, alliance partners, and so on. In reality, such a firm may have inadequate experience because it has worked in networks with a limited number of suppliers and customers in a small number of markets for a long period of time. Such networks do not provide much new knowledge in terms of diverse network collaboration and coordination, thus limiting the firm's network experience and elevating the firm's risk of failure to enter new networks in foreign markets. From the outset, a small high-tech firm is forced, because of its lack of resources, to collaborate and coordinate its activities and resources with a diverse set of counterparts and markets. As a consequence, they acquire superior network experience, which is useful in establishing positions in new networks in new markets.

7.5. Network dependency

Network dependency can be estimated in terms of the concentration of sales to (1) one, (2) a few, or (3) a set of firms in the network. By conducting business with many similar customers in different markets, a manufacturing firm does not become particularly dependent on any of them. This reduced dependency in turn lowers the risks for the bank and other credit institutions of doing business with this firm. In addition, this firm might be more experienced in handling dependency and, therefore, decides to disperse its risks in the network. By

contrast, a high-tech firm that has a long-term contract with a large global distributor becomes very dependent on this counterpart because the firm has given the distributor a lot of power over its international operations. The risks are not dispersed; instead, they are concentrated on one counterpart. This situation elevates the risks for the bank and other credit institutions of doing business with this firm.

7.6. Network performance

Network performance can be estimated from the performance of (1) a number of network partners, (2) tiers of network partners, and (3) network externalities. A firm with many network partners and many tiers of these partners puts itself and its operations at risk of various kinds of disruptions in the network. For example, a customer's customer may have complaints about the quality of a product. Because the firm, its customer, and the customer's customer are located in different countries, communication is hampered, and a long time passes before the issue is resolved, thereby incurring additional costs. This situation elevates the risks for the internationalizing firm. However, if the firm is experienced, it might have dealt with such issues before, thus lowering the risks involved. In cases where there is a dominant actor (e.g., Apple, Volkswagen) in the network, the performance of that actor can be of particular importance. Scale economies in the network, or network externalities may be important to consider in contexts when the scale and scope of the network determines the firm's performance.

7.7. Network evolution

Network evolution can be assessed from a firm's place in the value chain and/or its position in the network, and whether this position has changed or is going to change. A change for the worse – withdrawal from a country and the network there, a loss of important suppliers or customers, or a move from first- to second-tier supplier/customer – will affect the performance of the firm and, thus, the risks connected to its internationalization. Positive changes (such as in the form of entry into a new country network, collaboration with a vital new partner, and larger volumes in customer relationships) increase the level of performance in foreign markets and, thus, lower the risks involved. It is important for credit providers to assess such changes.

All types of experience including current network experience need to be considered in the context of the firm. The banker(s) or others assessing the risk of international firms need to assess each firm individually so as to determine whether that firm's network and experience is of relevance to its current international business. For instance, a born global high tech firm may lack experience, but that may be compensated by a low risk in the firm's network's performance, evolution and dependency. Another example could be that a firm that is highly experienced internationally may face high risks in a country market where they have no experience, and where the network is performing badly. Yet another example could be that a firm may have accumulated a great deal of international experience and established agents or cooperative agreements in many countries, but it may not have the experience necessary to set up a subsidiary in a country. In this situation, the firm's lack of experience presents a big risk.

Bankers usually write a credit evaluation memo in which they present the credit application of their client to the bank's credit evaluation committee. The memo is a standard form that includes historical and current accounting data, a budget, and a description of the firm's business and intended use of the credit applied for. A score sheet on which the banker rates the application for credit on subjective scales is also usually included. The model presented in this article can be added to the credit application in the form of subjective scales as presented in the Appendix.

8. Discussion and conclusion

Much effort has been put into the development of credit risk models that use accounting or market data as input variables (Altman & Rijken, 2004). Despite the fact that international business is growing as a share of the gross domestic product (GDP) in most countries, little effort has been expended on the development of firm-specific risk models that can be used by banks and other lenders for assessing international firms' risk.

Existing models of internationalization risk assessment focus on common risk factors (i.e., risk factors affecting all firms). Some examples include country risk, transfer risk, and sovereign risk. This article contributes to research on risk models by developing a firm-specific model for internationalization risk assessment. The model focuses on the firm's experiences and current network activities as analytical dimensions for risk assessment. Risks emanating from the firm's experiences can be ascertained from international, country market, network, and relationship experiences. The risks in the current network activities are analysed

in terms of the firm's network dependency and the network's performance and evolution. The risks associated with these experiences and current network activities are analysed in terms of their adequacy in meeting the international business commitments of the internationalizing firm or the commitments it wants to make by taking more loans.

The firm-specific internationalization risk assessment model is far from conclusive. For instance, the variables in the model overlap to a certain extent. Further studies could refine both the theoretical arguments and conduct empirical studies that help discriminate between variables. Empirical research could study the model in different industries, clusters, groups, or kinds of firms. We suggest that one interesting empirical study would be to compare the model in born global, or new international ventures, and firms that have been international for a while. Perhaps such a study could also add to the debate on the difference between born global and firms that have been international for a while. Empirical studies could also elaborate on whether linearity, curve linearity, or even discontinuous linearity is appropriate when studying experience, networks and firm-specific risk assessment.

This article contributes to internationalization process theory by modelling firm internationalization risk assessment. First, it shows how an institution, like a bank, can use IP theory as an analytical tool to better understand firms' internationalization risks. Future research could further develop the role of institutions in IP theory. Second, it shows how internationalizing firms may assess their own risk. They can use the risk assessment model as a tool to understand better the risks they face internationally. Future research could develop the role of risk assessment in the internationalization process of firms. A potential theoretical development could be to consider internationalization risk as a unifying construct for uncertainty avoidance and opportunity seeking.

The model developed in this paper opens the way for studies of the role of institutions in internationalization process research. We study how banks can use the IP theory for firm-specific risk assessment. In a similar way, models for how other institutions can use the internationalization process for their purposes could be developed. For instance, if government wants to promote FDI, then they can use the IP model for assessment of business development, rather than risk assessment. More broadly, this paper is a step towards a more explicit inclusion of institutions in internationalization process theory.

9. Implications for banks' risk assessment of internationalizing firms

Just as each firm's internationalization process is specific to each firm, so are the risks. A bank may want to assess the firm-specific internationalization risk in each of its corporate client firms. When carrying out this assessment, the bank reviews the commitments of the firm in two typical situations: (a) when the internationalizing firm applies for bank funding to make an investment in international business development and/or (b) as part of a review of the risk assessment of the entire firm. In the first situation, the bank's credit to the firm is used to fund part of the firm's commitment decision in the network. Before making a credit decision the bank analyses if the firm will be able to fulfil its credit obligations. The credit risk for the bank stems from whether or not investments generate cash sufficient for payment of interest and principal. The firm-specific internationalization risk assessment model proposed in this article can be applied in credit reviews. Such reviews are typically done at least once a year by bankers. When a firm has a high leverage ratio, or is delinquent, the reviews occur more frequently. A banker who wants to analyse the risk in an internationalizing firm can study the firm's experiences and the commitment decisions in networks. For instance, current network activities or experiences may have developed in such a way that the credit risk has increased.

The focus on cash flow in credit decisions is emphasized in the Basel III Accord, which is a global standard for lending. According to the Basel III Accord, banks need to make sure that the cash flow of the firms to which they lend is of such a nature that it can support repayment of the loan to the banks. Banks rely primarily on financial statements and/or market data to assess cash flow. However, conditions beyond those detected by analysing the financial statement could develop, and may raise questions about whether the financial statements are predictive of whether clients can fulfil their obligations to their banks. For banks that lend to internationalizing firms, the Basel III Accord requires an analysis of the viability of the cash flow in the international business relationships of their customers. To perform such an analysis, banks need to have knowledge of firm-specific risks in international business.

The model presented in this paper suggests that bankers should pay attention to a number of factors relating to firms that conduct international business. These factors include a firm's internationalization experience, country market experience, network experience, relationship experience, and network dependency, as well as the network's performance and

evolution. In this article, we also developed an evaluation sheet that bankers can use in evaluating firm-specific internationalization risk.

Firm-specific internationalization risk assessment demands a rather deep knowledge of the IP theory of bankers. Possessing this level of knowledge is necessary if bankers are to perform a stringent analysis of the cash flow of a specific firm. Banks therefore need to invest in educating their credit officers in firm-specific internationalization risk assessment. Experienced bankers probably already possess experience-based knowledge of the risks for internationalizing firms. The research presented here may help this group of bankers become more explicit about their knowledge. For less experienced bankers, the research presented here may help them to analyse firm-specific internationalization risk more accurately.

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Appendix

Proposed questions for inclusion in the credit evaluation form for internationalizing firms.

To what extent is the firm's internationalization experience sufficient for its international business investment?

Totally insufficient 1-----2-----3-----4-----5-----6-----7 Totally sufficient

To what extent is the firm's country market experience sufficient for its international business investment?

Totally insufficient 1-----2-----3-----4-----5-----6-----7 Totally sufficient

To what extent is the firm's relationship experience sufficient for its international business investment?

Totally insufficient 1-----2-----3-----4-----5-----6-----7 Totally sufficient

To what extent is the firm's network experience sufficient for its international business investment?

Totally insufficient 1-----2-----3-----4-----5-----6-----7 Totally sufficient

To what extent is the firm's network dependency sufficient for its international business investment?

Totally insufficient 1-----2-----3-----4-----5-----6-----7 Totally sufficient

To what extent is the firm's network's performance sufficient for its international business investment?

Totally insufficient 1-----2-----3-----4-----5-----6-----7 Totally sufficient

To what extent is the firm's network's evolution sufficient for its international business investment?

Totally insufficient 1-----2-----3-----4-----5-----6-----7 Totally sufficient