

Impact of Competitive Strategy and Information Technology Maturity on Firms' Strategic Response to Globalization

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ABSTRACT: Recently the globalization of competition has caused many firms in the financial services industry to integrate their information systems. Based on a selective review of literature from strategic and information management disciplines, a model

Acknowledgment: The authors wish to acknowledge the constructive comments provided by the reviewers and the Editor-in-Chief on previous versions of this paper.

is developed to study the firms' strategic response to Europe 1992 and Canada-U.S. Free Trade Agreements. According to a survey of 213 managers, this study finds that competitive strategy, information technology (IT) maturity and size influence firms' perceived increase in IT investment. Further, this study finds that the degree of IT integration within firms is a primary determinant of firms' willingness to use IT as part of their strategic response to globalization. It suggests that the new competitive strategies will be increasingly technology-based global initiatives that are affected by the firms' IT maturity.

KEY WORDS AND PHRASES: globalization, Europe 1992, Canada-U.S. Free Trade Agreements, firms' strategic response to globalization, information technology investment, competitive strategy, information technology maturity.

RECENT TRENDS IN THE INTENSITY OF GLOBAL COMPETITION have resulted in the creation of a number of regional trade and economic blocs in North America, Western Europe and Asia. Together, these blocs represent about 23 percent of the world's population and produce about 70 percent of its output [81]. Concomitantly, firms in respective trading blocks are reexamining their investment plans in trading bloc member countries. A recent survey of 455 senior U.S. executives, for example, reported that, as a consequence of the North American Free Trade Agreement (NAFTA), about one-quarter of their firms are likely to make a capital investment in Canada in the next few years. In the case of Mexico, however, that percentage is significantly lower [107]. Although globalization is proceeding at a varied pace in different industries [13], these trade agreements are expected to have significant potential gains for U.S. firms. Fieleke [42], for example, reported that European Union (EU) affiliates of U.S. multinational firms account for nearly half of the sales of all foreign affiliates of U.S. companies. In the case of the financial services industry, American companies will be able to operate throughout EU with only one license, one supervisory authority, and one set of capital requirements. They will be able to offer products across frontiers without having to establish or meet regulatory standards outside their home country. Consumers will be free to invest and borrow wherever they want. Moreover, with the liberalization of telecommunications and data-processing services, the cost of the telecommunication services is likely to decline and quality to go up, which, in turn, will benefit the financial services industry [42]. In a recent report on the impact of Europe 1992 on multinational banks (MNBs) [91], the importance of the information technology (IT) as part of the MNBs' overall global business strategies was emphasized. As stated by the chief information office (CIO) of the Barclays Bank Group PLC, the bank envisions becoming an "integrated worldwide entity that provides top-quality service to multinational customers." Barclays' plan for the 1993 unification of Europe is to invest in information technology to manage uncertainty created by trade agreements. As stated by the bank's CIO, this plan is "a subset of the financial firm's overall strategy to position itself as one of the leading players in the world financial market." He continued to state that "we are in

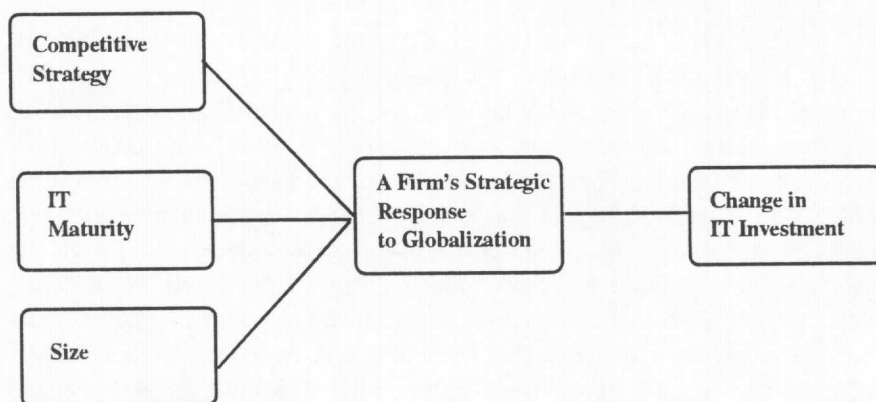


Figure 1. Impact of Competitive Strategy, IT Maturity, and Size on a Firm's Strategic Response to Globalization

the process of building a \$245 million global banking system and electronic mail network for 3,800 users . . . the system will provide certain standard applications and electronic mail facilities to country branch offices." In this paper, we investigate the perceived impact of the elimination of trade barriers in Europe (Europe 1992),¹ and the free trade agreement between the United States and Canada (U.S.–Canada FTA),² on the financial services industry. Based on a selective review of literature from strategic and information management disciplines, a model is developed and tested empirically to study the perceived impact. The model measures the impact of firms' competitive strategy, IT maturity, and size on the firms' strategic response to the new trade agreements. It is assumed that this response manifests itself in the change in IT investment (as discussed later). Figure 1 illustrates this model. The proposed model is based on the contingency approach derived from the resource dependency theory. The contingency theory allows us to determine which contingency factors most significantly affect the firms' response to trade agreements [106, p. 385]. The resource dependence theory [84] emphasizes adaptation in the face of dependencies on external organizations, but has been more explicit about manager's exercise of strategic choice within the context of constraints.

The important theoretical issue discussed in this paper is the extent to which a firm's competitive strategy, IT maturity, or size predicts its strategic response to the new trade agreements. Based on the responses from 213 IT managers, the results of this study indicate that competitive strategy, IT maturity, and size influence firms' willingness to use IT as part of their strategic response to globalization. In addition, this study finds that IT maturity variables have more predicting power to forecast firms' perceived increase in IT investment than competitive strategy or size. For these firms, new competitive strategies are technology-based global initiatives that are increasingly affected by IT. The next section presents the components of our model, along with the background and literature review of factors affecting each of the components. The research hypotheses are then presented, followed by the study.

Research Model Components

THE TRADE AGREEMENTS ARE LIKELY TO HAVE A SIGNIFICANT IMPACT on strategies of firms since they add complexity and turbulence to the business environment and a corresponding shift in public expectations of business [40]. Firms' responses include changing competitive strategies and the needed structure to support the new strategies [13, 56]. Researchers in strategic management literature have reported that the structure of industry, competitive strategy, and size are important mediators that affect a firm's strategic response to new market environment [49, 50, 70, 83, 94]. Several scholars have suggested that how decision makers interpret external events account for differences in firms' responses [36]. They have offered conceptual models that might account for variability in responses, but have not empirically tested those models [89]. This research is a step in that direction.

Firms' Strategic Response

As firms in the financial services industry stretch and tailor their services to meet the challenges in catering to the needs of U.S.-based multinational firms, they must make fundamental changes in the way they address the needs of their customers based in other countries. Our justification is based on the fact that trade agreements result in an increased level of uncertainty in a firm's environment. According to Shannon and Weaver [96], higher levels of uncertainty create a greater need for information in order for the decision maker to evaluate the many applicable possibilities so that the best decision can be made. The value of the additional information provided by IT, however, is based on the impact of the decision on a firm's objectives. For example, consider a firm that has differentiation of products, markets, and services as its competitive strategy, and it may have to deal with an increased number of suppliers due to its decision to operate in the global environment. Furthermore, assume that these suppliers have different prices, lead times, and product quality, and services. In such situations, the firm would have to compile the large quantities of data related to products and services in order to arrive at the best purchase decision. The investment in IT to implement a purchasing information system can be justified if it significantly improves the firms' value chain and results in substantial cost savings or improves quality [115].

In addition, evidence in the information management literature suggests that economic and technological potential alone does not adequately explain an increase in IT investment [48, 49]. Research on investment in IT and business performance has not demonstrated a consistent relationship [11, 14, 31, 43, 63, 112]. Floyd and Wooldridge [43] blame, to some extent, the lack of consideration of competitive strategy in previous research for these inconsistent findings. Several studies have reported that returns on IT investment depend on alignment between competitive strategy and IT management strategy [85, 109, 114]. Previous experience with IT has been shown to moderate the relationship between strategic IT investment and business performance [54, 90, 111]. A firm's previous experience with IT is often described in terms of the IT maturity concept [108].

Competitive Strategy

Firms with different competitive strategies are likely to react differently to the new trade agreements [71]. Multinational banks (MNBs), for example, can choose a strategy of “direct expansion,” which requires large outlays of capital, personnel, management, and new aggressive international marketing. These traditional routes to globalization have been shown to be inappropriate for service industries that must preserve local responsiveness (through a local presence and use of local expertise) [72]. Large institutions with existing market power prior to the integration of the EC and Canada–U.S. FTA are likely to enter both retail and wholesale markets, and are likely to establish all-service all-product branches throughout the EC and Canada [19, 75].³ Only a few major MNBs are able to afford this approach. Alternatively, MNBs can acquire existing banks operating in the host country. This offensive strategy usually requires less capital than direct expansion, but incurs substantial “agency costs.” For example, it requires heavy investment in management time and personnel in order to monitor and communicate with the acquired operations effectively. They can also form strategic alliances with existing institutions (and their clients) in new host country markets.⁴ This is a more defensive strategy and requires that the collection of firms coordinate their international operations along geographic or product lines, and at the same time, are implicitly assuring each of their own domestic markets [19, 73].

IT Maturity

The concept of maturity was first mentioned in a study by Churchill et al. [20] to determine how managers used computer-based IS. The maturity construct was subsequently developed by Nolan [75, 76, 77, 78] using the stage hypothesis model. According to this model, IS expenditures followed a path on an “S curve” over time. This path is described by four stages: initiation, contagion, control, and maturity. Other works by Nolan [79] modified the stage hypothesis to encompass six stages: initiation, contagion, control, integration, data administration, and maturity. Using Nolan’s stage hypothesis and a number of other independent research studies, Benbasat et al. [9, 10] developed a nine-item instrument for measuring IT maturity to classify firms into “more mature” and “less mature” groups.⁵ In a critique of the stage hypothesis model, Benbasat et al. [10] found problems associated with measuring “maturity” and suggested that “more work needs to be done to address the obvious measurement problems thus far encountered.” Their observation was consonant with commonly documented measurement problems associated with single-item factors and factors with a small number of items [39, 67]. This instrument has also been used to study the impact of decision processes for developing strategic applications of IS [92]. Although they found inadequate support for Nolan’s stage hypothesis model, they did find support for the hypothesis concerning progression toward increasingly formalized management of the IS function (p. 484).

IT maturity was reconceptualized in the form of the technology assimilation model [68]. This model describes the overall IT diffusion process, and how the IT manage-



ment strategies evolve as firms move toward IT maturity [68, 88]. Based on this model, the IT diffusion process is segmented into four phases: (1) technology identification and investment, (2) technology learning and adaptation, (3) rationalization/management control, and (4) maturity/widespread technology transfer. This model suggests that (1) the challenge and goals of assimilating technology change through four stages; (2) different management approaches are required according to the stage of adoption of the technology; and (3) the growth processes (learning) evolve as responsibilities among specialists, users, and management change. In the maturity phase, for example, (1) benefits and experience of the new technology are disseminated to other units within the firm; (2) learning is relatively complete; (3) long-term analysis and planning are emphasized; and (4) the technology base is installed and integrated. New technologies continue to emerge that offer the firm the opportunity either to move into new applications areas or to restructure the old ones. In the maturity phase, a firm is faced increasingly with a challenge to adapt and to adopt new technologies [16, 37].

Size

Size has been the most frequently examined structural characteristic in studies by economists, organizational theorists, and IS researchers [38, 50, 116]. Based on the transaction cost theory [113] and resource dependence theory [84], size is one of the most important organizational factors that affect firms' behavior in response to new market environments. A recent 1992 survey on world business published in the *Wall Street Journal* [107] also confirms the effects of size on the international behavior of firms: 95 percent of companies with \$1 billion or more in sales endorse NAFTA, while in companies with fewer than 500 employees, only 70 percent of executives were in favor of NAFTA. As the scale of production grows, the underlying technology of production is increasingly cost-effective, which results in economies of scale.

Research Hypotheses

Competitive Strategy and Firms' Strategic Response

SEVERAL APPROPRIATE TYPOLOGIES OF FIRMS, RELATED TO THEIR STRATEGIC orientation in an industry, have been set forth in the strategic management and organizational behavior literature [1, 17, 71, 95]. The Miles and Snow [71] typology, however, is unique in that it views a firm as a complete and integrated system in dynamic interaction with its environment. This typology is especially appropriate for this study since (1) it focuses on firms' behavior at the level of the total system, rather than at the level of subunits; and (2) it is built around the concept of "distinctive competence," or what the firm does best.⁶ It has also been used in IS literature to distinguish strategies for the purpose of describing the fit between competitive strategy and IS structure [103].

Briefly, Miles and Snow postulate that competing firms within an industry exhibit patterns of behavior representative of four basic competitive strategy types: (1) defenders, (2) prospectors, (3) analyzers, and (4) reactors (see appendix A for a description of each type). The key dimension underlying this typology is the firm's response to changing environmental conditions, that is, the rate at which a firm changes its products or markets to maintain alignment with its environment.

Using Miles and Snow's typology, a *prospector* firm, for example, tends to pursue an aggressive competitive strategy pioneering products and markets. This type of firm operates in an environment characterized by rapid and unpredictable changes. This strategy would require firms' leaders to spend more time scanning their firms' environment, which includes developing an understanding of changes and innovation in the industry, as well as the uncertainty or unpredictability of the actions of competitors and customers [35]. Sales forecasting, research and development, and search for investment opportunities are some examples of uncertainty-reduction devices. Galbraith [46] suggests that the implementation of the above-mentioned devices implies a greater need for a firm to process information because managers must identify opportunities and detect and interpret problem areas [32, 105]. Moreover, uncertain environments place intense pressures on firms to process information more rapidly [12]. The processing of information is generally sought through the use of information systems [58].

Analyzers, however, need to keep a balance in locating new market opportunities and in maintaining their customer base. They are a "unique combination of Prospector and Defender types" [71, p. 68]. Their concerns are how to minimize risk, while maximizing the opportunities for profit, by imitating most successful product or market innovations. Analyzers adopt some characteristics of prospectors and some characteristics of defenders, seeking effectiveness through both efficiency and new product and markets. Analyzers are expected to make choices typical of prospectors in their newer and more dynamic endeavors (such as spending time to scan their environment), while adopting a strategy typical to defenders in their traditional and stable lines of business.

The *defender* is a less dynamic form of firm operating in an environment that is more stable and predictable than that of the prospector. Defenders are more concerned about how to "seal off" a portion of the total market to create a stable set of products and customers. Defenders are expected (1) to depend on single core technology for cost reduction, (2) to favor IT developed internally, (3) to form a limited alliances with external sources for their technology, and (4) to overlook new market development in IT.

Reactors are firms with no distinct competitive strategic orientation. In a reactor firm, decisions are made in a reactive rather than a proactive mode. Therefore, the need for environmental scanning, long-range forecasting, and planning is minimal because the environment will favorably support almost anything the firm does or does not do [34]. As a result, there is no reason to believe that reactors will follow a specific strategy to secure IT resources.

This discussion implies that a firm's competitive strategy should dictate its information needs, which, in turn, should dictate the investment in IT (strategic response). This leads us to our first hypothesis:

H1: A firm's competitive strategy will be related to the role it gives to information technology investment as part of its strategic response to trade agreements.

IT Maturity and Firms' Strategic Response

The IT infrastructure—a firm's core competence or capability relative to IT—can enhance or limit a firm's strategic moves by providing fast response, interorganizational coordination, and organizational flexibility, which are considered extremely important under uncertain environmental conditions [33]. IT's role in supporting interorganizational coordination has long been recognized [48]. Coordination among independent firms, however, introduces new challenges for IT infrastructure. In an international travel agency, for example, coordination through IT was achievable by a host of activities including (1) sharing of customer profiles, company policy, and travel itineraries, (2) consolidation of travel data for rate negotiation, and (3) transfer of account management software from the company to its members [72]. Previous research has reported that the progressive use of IT is facilitated by environmental factors [57, 61, 92] and has shifted firms to global competition in a number of classical service businesses [72, 82]. Recently, the fusion of IT and telecommunications have affected the firms' competitive strategies by creating new industries and by restructuring of existing industries [13].

In financial services and retail banking, many applications of IT are considered strategic necessities [5, 21, 26, 51]. This has enabled the industry to vastly expand the level and extent of its services [28, 88]. In this industry, the differentiation of service quality and introduction of new services through IT investment have become important competitive tools [13]. Specifically, IT is suggested to have a strategic role because it is the means of delivery of goods and services and the infrastructure of the business is often IT itself [37, 68, 69]. Recent studies, for example, suggest that the increasing use of IT in securities exchanges has given rise to alternative trading channels and has shifted significant trading away from the principle markets. This, in turn, may ultimately reduce market quality and increase transactions costs [29, 110].

H2: A firm's IT maturity will be related to the role it gives to information technology investment as part of its strategic response to trade agreements.

Size and Firms' Strategic Response

The firm's structure is affected by the degree of outsourcing and governance structure that minimizes the total cost (the sum of the production cost and transaction cost) of producing its economic activities [24]. Numerous authors have examined the ways that IT has affected this total cost and resulted in (1) an increase or decrease in either the vertical or horizontal dimension of firm size [48],⁷ (2) more efficient market mechanisms (such as the creation of value-added partnerships [54, 55, 64]), and (3) changes in the incentives of buyers and suppliers to commit to noncontractible investments [7, 23].⁸

Recently, Harris and Katz [49, 50] reported that large and small insurance companies significantly differ in their relative investments in IT. In addition, in multinational banking, larger banks tend to have a dominant position in almost all aspects of ownership advantage by (1) more extensive domestic deposit bases, (2) wider multinational banking networks, and (3) more experience in, and more of the technology of, multinational banking [19]. Size is also reported to have effects on the nature of the IS function in the financial service industry [93].

H3: A firm's size will be related to the role it gives to information technology investment as part of its strategic response to trade agreements.

In summary, it is reasonable to suggest that a firm's strategic response to new trade agreements is dependent on its competitive strategy, IT maturity, and size. In addition, since IT has an increasing impact on the structure of firms and industries, and especially since IT has a strategic role in the financial services industry, it is also reasonable to suggest that such a response is related to change in IT investment. It is not at all clear, however, which factor has more power to predict the nature of a firm's response to the new trade agreements.

Measurement of Research Variables

Competitive Strategy

AS SET FORTH BY SNOW AND HAMBRICK [99], AT LEAST FOUR alternative approaches are available for identifying and measuring strategy variables: (1) investigator inference, (2) self-typing, (3) external assessment, and (4) objective indicators. This study used the self-typing approach, whereby IT managers assessed the strategies of their own firms using descriptions of the four strategies in the Miles and Snow typology [71]. The descriptions have since been used in a number of other studies in this area [66, 100, 101]. The terms, "defender," "prospector," "analyzer," and "reactor," were not used in this questionnaire. Rather, each description was prefaced by a categorization of "type 1," "type 2," "type 3," and "type 4," each corresponding to the appropriate strategic type.

IT Maturity

IT maturity is used here to characterize firms in terms of their evolution in planning, organization, control, and integration aspects of their IS function. A higher level of IT maturity would imply a significant formalization of planning, control, organization, and integration of IT activities. This, in turn, would suggest that the IS function in a firm with a higher level of IT maturity would have evolved from the data-processing orientation into the strategic IS orientation [68, 92, 108].

Previous research on IT maturity suggests using managerial practices regarding planning, organization, and control aspects of IS function as benchmark variables for

measuring progression of firms to maturity. In addition, based on the technology assimilation model [68], in the maturity phase the technology base is installed and integrated. As mentioned before, firms vary substantially in the extent to which IT has been integrated into their business strategies. The integrated firms display a more proactive orientation toward IT, and tight integration between business strategy and IT is cited as a key to firms' success [54].

Based on the feedback received from IS managers in the pretesting of the instrument, it was clear that factors affecting IT maturity include more than the nine items previously used by Benbasat et al. [10]. We used four criteria represented by a total of twenty items to measure the progress of firms toward maturity. These are IT planning mode, IT control mode, IT organization, and IT integration (see appendix B for a list of the items used to measure IT maturity). Below, the reasons for the selection of each of the criteria are discussed.

IT Planning Mode

As the IS function within a firm continues to mature, the nature of the IS planning changes from a computing plan oriented toward technology management to a long-range strategic plan involving data resource management [31, 78]. The primary objectives of IT planning in the maturity stage are to align IT plans with a firm's business plans [117], and to extend the infusion and diffusion of IT within a firm [101]. As a firm moves toward maturity, new concerns are: What information systems do the firm's competitive strategies demand? What strategic opportunities are presented by IT? And how should IT project priorities be set?.

IT Control Mode

Control of IT activities in a firm has changed drastically during the past two decades from a loose/informal, project, and technical orientation to a more tight/refined, managerial orientation [15]. New methods of controls are based on benefits, priorities (selective charge-out) and technical standards [4] and the organizational goals rather than cost. As firms progress toward maturity, they are as confident in managing computing as in managing other resources, the applications development pursues economic benefit, and IT managers seek to manage the balance between short-term delivery and investment for the future [37]. New concerns are: How much should they spend on IT? How should IT proposals be evaluated? And how should the responsibility and authority for IT direction, development, and operation be set?

IT Organization

In the early stages of IT, a firm could organize IT activities autonomously because early applications were limited to transaction-oriented functions requiring only limited user awareness and involvement. In the IT era, however, the growth of end-user computing continues to spread rapidly and users' ideas need to be given special

attention in the planning and implementation of applications [3, 18]. New concerns in the maturity era include: How will IT affect a firm's organizational structure? Should IT have a director? If so, what are his/her roles and responsibilities?

IT Integration

Traditional management strategy for automation has been a bottom-up approach, in which various functional areas were automated on an application-by-application basis, without consideration for integration and optimization at the firm level. As a result, firms discovered that these application systems were becoming increasingly incompatible, redundant, and in many cases incomprehensible [52]. As a firm moves toward maturity, (1) there is a top-down planning process for linking IS strategy to business needs, (2) the technology is transferred to a wider spectrum of applications, and (3) there is a high degree of technology integration leading to an effective exploitation of IT within the firm [15, 86]. Integrated firms use IT to create new products and services, to alter linkages with suppliers and customers, and ultimately to establish new standards of performance in their industries [54].

Size

Size was measured using two variables: number of employees and annual sales. Common operationalizations of firm size include gross sales or gross value of assets [57]. In this study we categorize small firms as those with 500 or fewer total employees and/or annual sales of \$1 billion or less; large firms are those with more than 500 total employees and/or annual sales over \$1 billion. The operational split used in this study was adopted from a 1992 *Wall Street Journal* survey [107] that indicated that firms with less than \$1 billion and/or fewer than 500 employees were less supportive of NAFTA.

The Sample

A FIELD STUDY USING A QUESTIONNAIRE WAS DEEMED APPROPRIATE TO COLLECT the necessary data from the IT managers. A five-point Likert-type scale response format, which ranged from 1 (strongly disagree) to 5 (strongly agree), was provided. The questionnaire was pretested and several changes recommended by a number of academics and practitioners were incorporated into the final instrument. Pretesting to identify construction defects was an integral component in the design of our questionnaire. Pilot tests of the questionnaire were conducted using financial services firms, drawn from the actual survey population, who were not included in the sample. They were asked to carefully scrutinize the survey and report any defects or inadequacies to the researchers conducting the study. In addition, the colleagues in our respective departments, who understood the study's purpose and hypotheses to be tested, thoroughly examined the questionnaire in terms of whether it would achieve the objectives of the study. Finally, additional insight was provided by several IT practitioners from

Table 1. Characteristics of the Sample: General Information about Firms and Personal Information about Respondents, $n = 213$.

General information:	
A. Firm type	
Finance company	4.7%
Banking	42.3%
Insurance	40.4%
Brokerage firm	2.3%
Others	10.3%
B. Number of employees	
Under 50	1.4%
51 to 100	5.2%
101 to 250	16.2%
251 to 500	21.9%
501 to 1,000	16.2%
1,001 to 5,000	29.5%
5,000 to 10,000	2.4%
Over 10,000	7.1%
C. Annual sales	
Less than \$25 million	10.9%
25mm to 50mm	7.3%
51mm to 100mm	12.4%
101mm to 250mm	18.1%
251mm to 500mm	18.7%
501mm to 1,000mm	12.4%
Over 1,000mm	20.2%
Mean number of years information systems planning has been carried out in organization	13.18
Mean number of levels the IT functional head is below the CEO	2
Mean number of employees solely or primarily involved in IT department or function	129
Mean size of IT budget per year	17.88 million
Mean number of years respondents have been with the current company	13.64
Mean number of years since respondents graduated with highest diploma	17.83
Mean number of years respondents have been in their current position	6.71

local firms who were solicited to help pretest the questionnaire. They were asked to give their general impression of the questionnaire, to comment on the adequacy of individual questions, and to identify problems that might otherwise be overlooked. The questionnaire (with an explanatory cover letter) was sent to 1,035 randomly selected IT managers in the financial services industry in eleven states: NY, NJ, OH, MI, PA, FL, CA, WI, MN, IL, and TX. Of those mailed, 34 were postmarked undeliverable and 213 were completed and returned, yielding a response rate of 21.3 percent. This is a typical response rate for studies of this kind [62, 88, 104]. We performed two tests to check for nonrespondent bias. No statistically significant differences were found between responding and nonresponding firms using the

Table 1. *Continued*

Personal information:	
D. Educational level of respondents	
Undergraduate degree	62.1%
Master's degree	27.5%
Doctorate	1.9%
E. Title of respondents	
Chairman, CEO, SR V.P., V.P., SR V.P. of IS, Dir of IS, V.P. of CIS, V.P./MIS Dir, V.P. of DP, IT V.P., Dir of EDP, Dir of MIS, Dir of System Development, V.P. of Systems/operations	50.2%
CIO, Managing partner of IS, Div chief for IS, Regional mgr for IS, Regional MIS director, DP dir, Mgr of IS & automation, V.P. system analyst	39.5%
MIS dir of development, V.P. of IS, Dir of data communication, Strategic systems mgr	10.3%
Mean number of years respondents have been with the current company	13.64
Mean number of years since respondents graduated with highest diploma	17.83
Mean number of years respondents have been in their current position	6.71

categorical firm type or number of employees (chi square = 10.77 and 9.21, respectively, $p > 0.05$). There was little reason to suspect that IT managers who did not respond to the questionnaire perceived their firms very differently from those managers who did respond, since the mix of the respondents included all sectors within the financial services industry.

The survey provides the data on the sectors within the financial service industry representing their annual sales, the rank of the CIO, the number of employees primarily involved in IT, the size of the IT budget per year, and personal information about the respondents. Table 1 presents general information about the firms and personal information about the respondents. Most (82 percent) of the firms were banking and insurance firms. About 55 percent of the firms had more than 500 employees. Half of these firms had sales of more than \$2.5 billion, and have, on average, an annual IT budget of \$17.8 million. For these firms, the mean number of employees involved in the IT department or function was 129. More than half of the respondents reported that they had an undergraduate degree. Typically, these respondents have been with their company 14 years and in their current position about 7 years.

From the 213 financial institutions responding to the survey, the self-typing approach in identifying the competitive strategy of organizations yielded the following breakdown of strategic types: 60 defenders, 30 prospectors, 100 analyzers, 16 reactors, and 7 unclassified. Table 2 and figure 2 present sample characteristics by strategic and firm type. The table indicates that the relationship between strategy type and number of employees is significant ($p < 0.0014$). This result is consistent with those obtained



Table 2. Sample Characteristics by Strategy Types

Strategy type	No. of employees		IT budget		Sales		Strategic planning median no. of yrs.	Median no. of employees in IT dept.
	<= 500> n (%)	> 500 n (%)	(in millions) \$4 <=\$4> n (%)	(in millions) > \$4 n (%)	(in millions) <+ \$250> n (%)	(in millions) > \$250 n (%)		
Defenders	30 (53%) (47%)	27 (47%)	35 (58%) (42%)	25 (42%)	23 (41%) (59%)	33 (59%)	10	30
Prospectors	4 (13%) (87%)	26 (87%)	17 (57%) (43%)	13 (43%)	10 (37%) (63%)	17 (63%)	15	50
Analyzers	51 (51%) (49%)	49 (49%)	49 (49%) (51%)	51 (51%)	52 (55%) (45%)	42 (45%)	10	29
Reactors	9 (56%) (44%)	7 (44%)	12 (75%) (25%)	4 (25%)	9 (64%) (36%)	5 (36%)	4	22

1. Although there are 213 firms in the sample, there are missing observations in all the categories.
2. The relationship between strategic type and sales is not significant (chi square = 5.76151; d.f. = 3; significance = 0.12381; $n = 191$).
3. The relationship between strategic type and number of employees is significant (chi square = 15.55781; d.f. = 3; significance = 0.00140; $n = 203$).
4. The relationship between strategic type and IT budget is not significant (chi square = 4.33915; d.f. = 3; significance = 0.22709; $n = 206$).
5. Means for number of years strategic planning has been carried out in organizations are significantly different among four strategic types (F -ratio = 2.8452; F -prob = 0.0389; significant at $p < 0.05$).
6. Means for number of employees solely or primarily involved in IT department are not significantly different among four strategic types (F -ratio = 1.6004; F -prob = 0.1907; not significant at $p < 0.05$).

by Smith, Guthrie, and Chen [98], who found that the effectiveness of different categories of competitive strategy is contingent on firm size. The table suggests that all four strategies are pursued in the financial service industry with defenders, prospectors, and analyzers far outnumbering reactors. This is due to the fact that a reactor strategy is not a viable one for a firm to choose simply because it would be unable to sustain itself in a highly competitive market place for very long. Since, in general, reactors do not use IT in a strategic manner, as expected, they have smaller IT departments than organizations with defender, prospector, or analyzer competitive strategies.

Figure 2 shows that type of firm (i.e., banking versus insurance) is significantly related to the competitive strategy pursued ($p < 0.00027$). It shows that among the insurance firms, most are defenders (40 percent), while among the banking firms most (61 percent) are analyzer firms. Until recently, banks were heavily regulated (for example, several states only allowed single-branch banking); on the other hand,

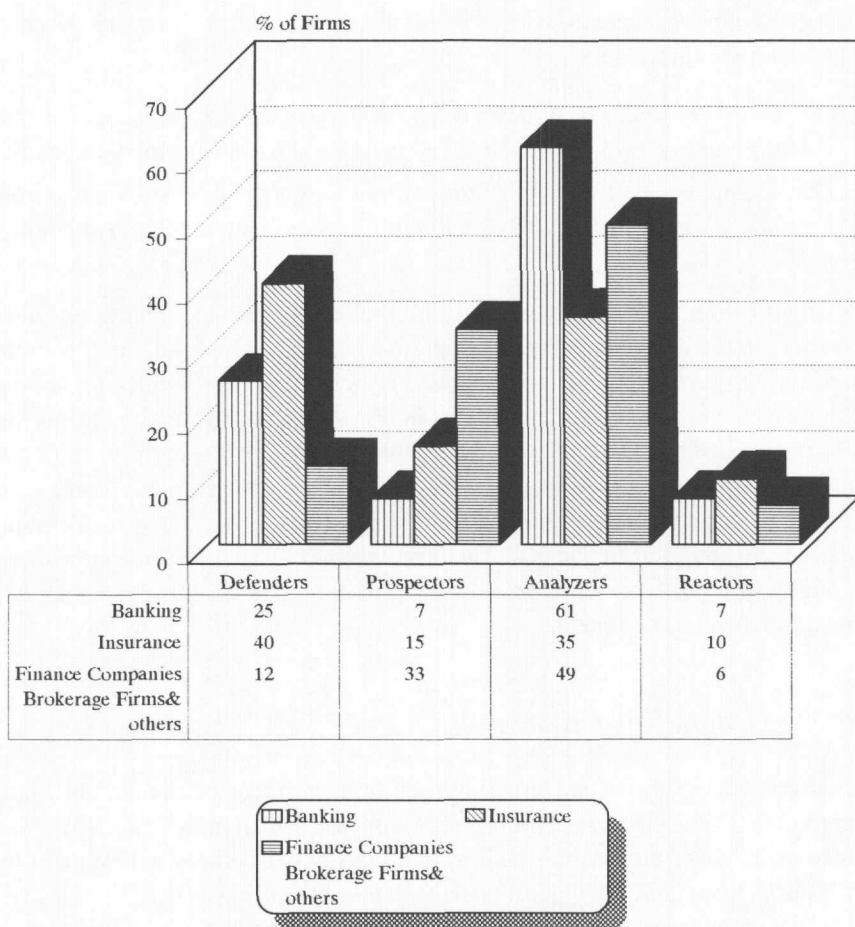


Figure 2. Sample Characteristics by Firm Types

(The relationship between strategy and firm type is significant (chi square = 25.52880; d.f. = 6; significance = 0.00027; $n = 206$)

insurance companies and brokerage firms are now intruding in the traditional markets of banks, such as credit cards, ATM facilities, and personal loans [91]. With the deregulation and globalization of financial markets, banks are expected to assume an increasingly aggressive posture.

Results and Discussion

THE DEPENDENT VARIABLE WAS CHANGE IN IT INVESTMENT. The principal question addressed by this study is:

Q1. Can competitive strategy, IT maturity, and size discriminate a firm's change in IT investment in response to trade agreements?

The questionnaire contained two questions that measured firms' strategic response to the new trade agreements:

Q1. Due to potential increase in competition caused by the Canada–U.S. free trade agreement, my firm will be forced to invest more in IT in the near future.

Q2. Due to potential increase in competition caused by the elimination of trade barriers in Europe in 1992, my firm will be forced to invest more in IT in the near future.

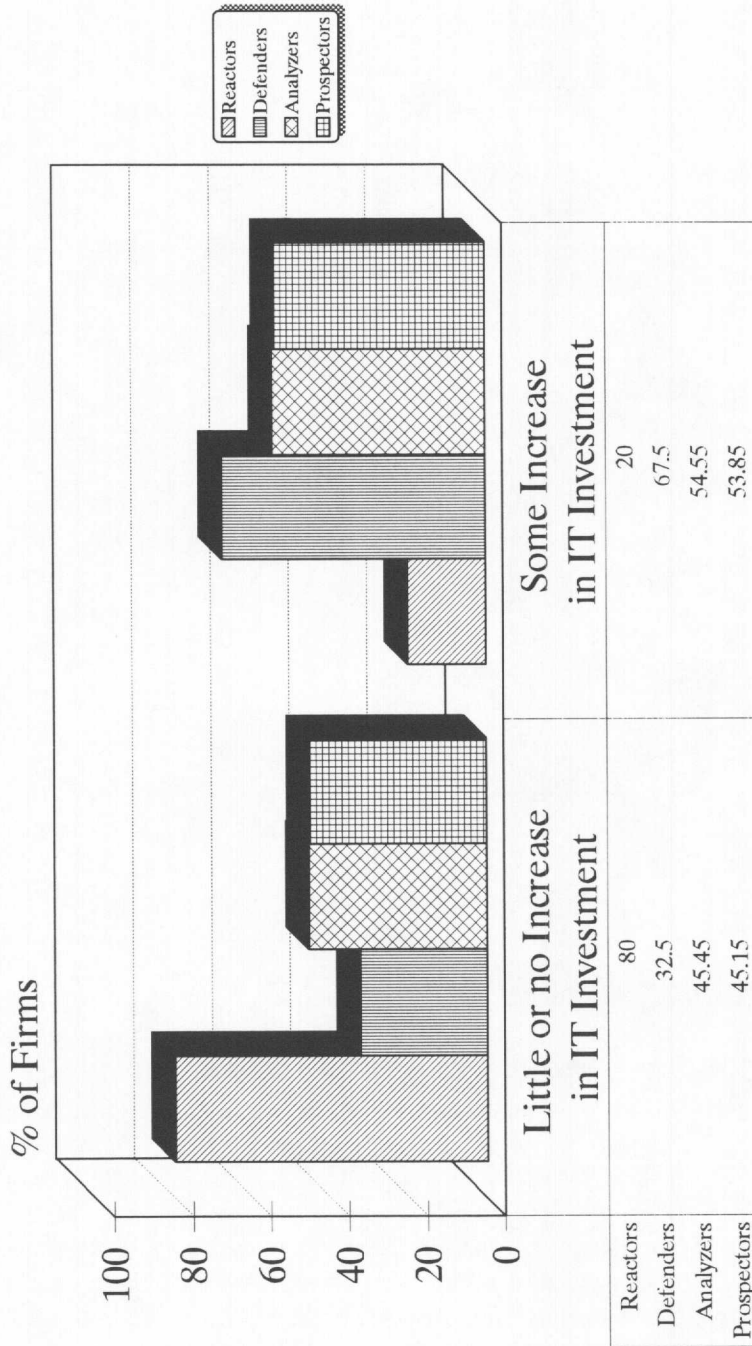
Although the sample consisted of 213 firms, the best opportunity to study the effects of the new trade agreements involved splitting the total sample of firms into two distinct groups based on perceived changes in IT investment. The two groups of firms are those who perceive little or no increase in IT investment (G1), and some increase in IT investment (G2). To accomplish these split-group comparisons, firms' responses to the two questions (Q1 and Q2) were first rank-ordered, then the upper and lower one-third of these responses constituted the firms used in this analysis. This split produced two groups of similar size. Those firms removed from further analysis were essentially firms with a neutral opinion about the effect of the trade pacts on their firms' change in IT investment.

Impact of Competitive Strategy

The differences among the two groups of firms in terms of competitive strategy were examined first. The chi-square tests of independence, reported in figure 3, provide significant evidence that a firm's competitive strategy, which is an indication of the firm's desire to enter and compete in new markets, influences the firm's willingness to use IT investment as part of its strategic response to globalization. Most noticeable in figure 3 is the difference in responses between reactor and defender firms. Although the majority (67.5 percent) of defender firms planned some increase in IT investment, the majority (80 percent) of reactor firms planned little or no increase in investment. Therefore, as expected, defenders and reactors firms were dissimilar in their responses to the Europe 1992. Analyzer and prospector firms, however, were very similar in their responses. For example, 54.5 percent of analyzer firms planned some increase in IT investment and a similar number (53.8 percent) of prospector firms planned to do the same.

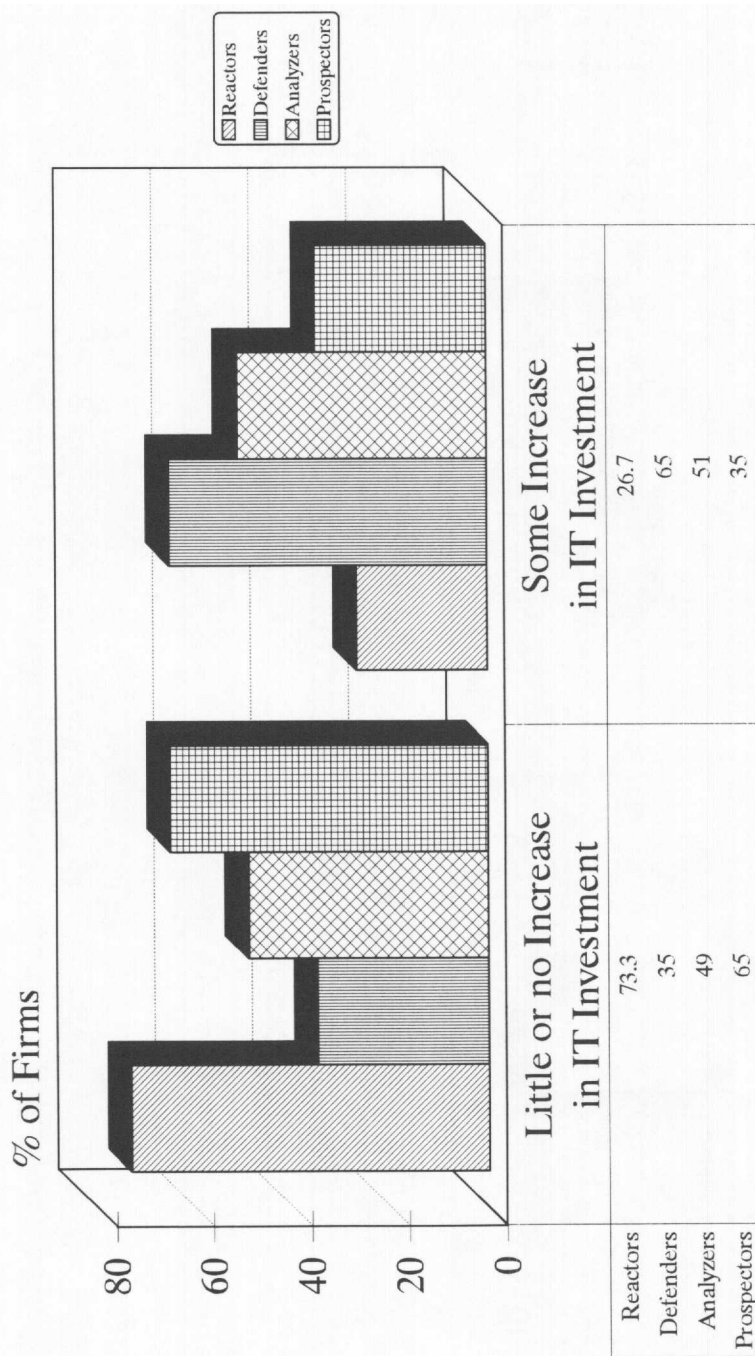
In figure 4, a significant relationship ($p < 0.05$) was found between a change in IT investment in response to the Canada–U.S. FTA and competitive strategy. The majority (65 percent and 73 percent, respectively) of prospector and reactor firms planned little or no increase in IT investment in contrast to 65 percent of the defender and 51 percent of the analyzer firms who planned some increase in IT investment.

Thus, in terms of firms perceiving some increase in IT investment, both Europe 1992 and Canada–U.S. FTA had the most influence on defender firms (67.5 percent and 65 percent respectively) and the least influence on reactor firms. One explanation for these results may be that reactors do not consider IT critical to their competitive advantage. An alternative explanation, albeit a weak one, is that neither Europe 1992



Note: There is a significant relationship between change in IT investment and competitive strategy in response to Europe-1992 (Chi square = 9.9268, d.f. = 3, significance = .01919, n = 136).

Figure 3. The Effects of the Elimination of Trade Barriers (Europe 1992) by Strategy Type



Note: There is a significant relationship between the change in IT investment and competitive strategy in response to Canada-U.S. FTA (Chi Square = 9.3189; d.f. = 3; Significance = .02533; n = 136).

Figure 4. The Effects of the Canada-U.S. FTA by Strategy Types

nor Canada–U.S. FTA has as yet created a competitive environment to which reactors have found it necessary to react; that is, reactors may use IT at a later time, when the needs are more clear and more pressing. Defender and analyzer firms, however, plan some increase in their IT investment because they foresee more competition as a result of the Europe 1992 and Canada–U.S. FTA. The increase in competition would require these firms to develop strategies to protect their market share and, hence, they are inclined to increase their investment in IT.

Impact of IT Maturity

Respondents were first asked to measure the level of IT maturity in their organization. Factor analysis, a powerful method of construct validation, allows examination of the underlying structure of IT maturity. It was used to determine if the twenty items measuring each of the four constructs of IT maturity cluster together and load onto the anticipated factor. A four-factor solution was obtained for IT maturity using the eigenvalue greater than one criterion, as usually recommended when deriving principal component factors [80] (appendix B contains the four-factor solution for measuring IT maturity). The varimax rotation of the solution suggested that four factors, represented by high factor loadings, confirmed that the set of items measuring the underlying four constructs initially envisaged for IT maturity were established. The factors explained 67 percent of the variance.

Table 3 shows the mean values for firms' perceived response to change in IT investment based on Europe 1992. They reflect the important differences found between the two groups with respect to the four IT maturity variables. Although not all comparisons were statistically significant, they reflect the important differences that exist among the two groups with respect to the four IT maturity variables. Firms planning some increase in IT investment versus those planning little or no increase in investment differ significantly ($p < 0.05$) for all IT maturity variables, except IT planning mode ($p < 0.10$). Overall, those firms planning some increase in IT investment tend to have achieved a higher degree of IT integration, organization, and control.

In Table 4, the only significant difference in IT maturity found between the two groups' perceived response to change in IT investment was for IT control mode. The two groups did not differ significantly at the 0.05 level for IT integration and organization, as they did in response to the Europe 1992.

Thus, the data provide evidence to indicate a difference in firms' mean response to change in IT investment for the following IT maturity variables: IT integration, IT organization, and IT control mode. Further, significant differences in mean response are more prevalent when the strategic response involves Europe 1992 in contrast to the Canada–U.S. FTA.

Impact of Size

Based on chi-square tests of association, the results presented in figures 5 and 6 show a significant relationship between a firm's change in IT investment and size. The

Table 3. A Comparison of Sample Mean Differences for IT Maturity Variables by Firms' Strategic Response to Europe 1992

IT maturity	Little or no increase in investment ($n = 67$)	Some increase in investment ($n = 71$)	t -value (2-tail) (prob.)
	Mean/(S.D.)	Mean/(S.D.)	
IT integration	3.4772 (0.547)	3.8611 (0.533)	[3.11] (0.002)
IT planning mode	3.2857 (0.705)	3.6295 (0.742)	[1.80] ^{***} (0.074)
IT organization	3.0046 (0.637)	3.3814 (0.517)	[2.05] ^{**} (0.044)
IT control mode	3.3214 (0.540)	3.6000 (0.501)	[2.00] ^{**} (0.048)

* $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$.
Negative values are in brackets.

Table 4. A Comparison of Sample Mean Differences for IT Maturity Variables by Firms' Strategic Response to the Canada-U.S. FTA

IT maturity	Little or no increase in investment ($n = 68$)	Some increase in investment ($n = 71$)	t -value (2-tail) (prob.)
	Mean/(S.D.)	Mean/(S.D.)	
IT integration	3.1224 (0.539)	3.3039 (0.575)	[1.89] ^{***} (0.060)
IT planning mode	3.635 (0.731)	3.8156 (0.539)	[1.57] (0.118)
IT organization	3.1867 (0.714)	3.6244 (0.744)	[1.78] ^{***} (0.078)
IT control mode	3.4781 (0.698)	3.7933 (0.599)	[2.56] ^{**} (0.010)

* $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$.
Negative values are in brackets.

majority of small firms tended to report little or no increase in their IT investment, whereas the majority of large firms tended to report some increase in IT investment for both trade pacts. Thus, a firm's size, which influences the funds available for investment in the firm's infrastructure, directly influences the firm's willingness to use IT investment as part of its response to globalization.

Multiple Discriminant Analysis

Next, multiple discriminant analysis (MDA) is used to isolate the dimensions (discriminant functions) accounting for the differences between firms, with respect to their strategic responses to the new trade agreements. The number of discriminant functions needed to explain the differences between these groups, and the nature of the variables defining them, can increase our understanding of the role that firms' competitive strategy, IT maturity, or size play in changes in IT investment in response to the new trade agreements.

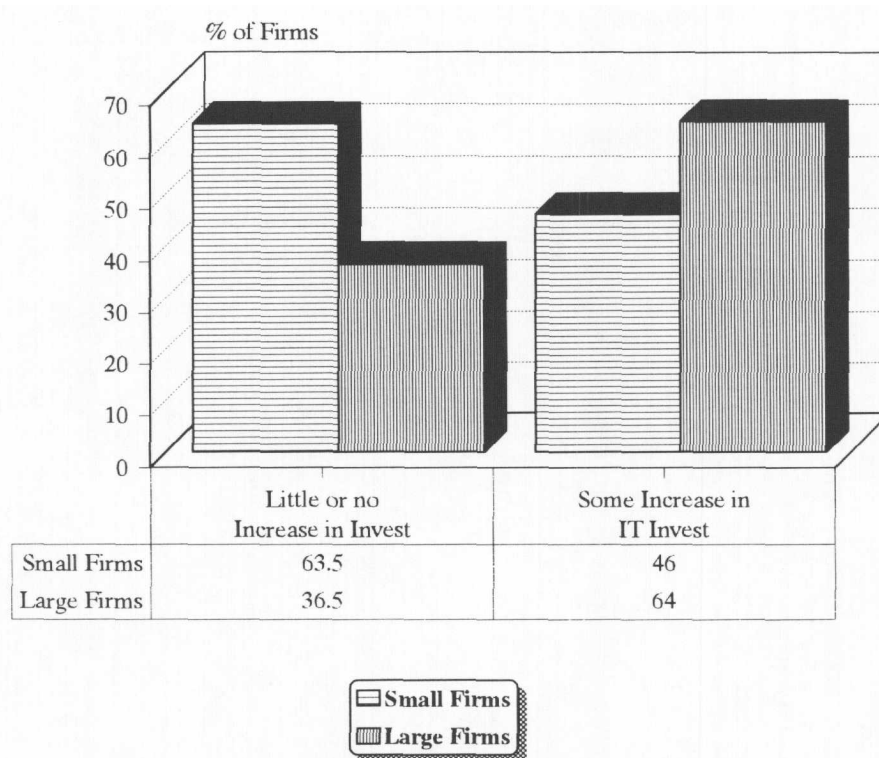


Figure 5. The Effects of Europe 1992, by Size

1. Small firms are firms with ≤ 500 employees and/or $\leq \$1$ billion sales.
2. Large firms are firms with > 500 employees and/or $> \$1$ billion sales.
3. There is a significant relationship between the change in IT investment and size in response to Europe 1992 (chi square value = 4.2168; d.f. = 1; significance = 0.0400; $n = 139$)

A discriminant function analysis was conducted to discriminate between those firms who made increased investments in IT from those who did not in response to the new trade agreements.⁹ Structure correlations show predictor importance. They are merely product-moment correlations that relate the discriminant scores of the function with the predictors [30, 59]. The significance of how well the discriminant function distinguishes between the groups was determined by a chi-square test [8]. The canonical correlation is quite important to a discriminant analysis, since it tells us the strength of the relation between the predictors and group membership.¹⁰ Large canonical correlations indicate a high correlation between the variables and the groups.

Tables 5 and 6 summarize the results of stepwise discriminant analysis of changes in the firms' IT investment in response to Europe 1992 and the Canada-U.S. FTA, respectively. The first function, which was statistically significant beyond the 0.01 level in both tables, produced a very high degree of separation between the two groups, as indicated by the respective canonical correlations of 0.611 and 0.600.

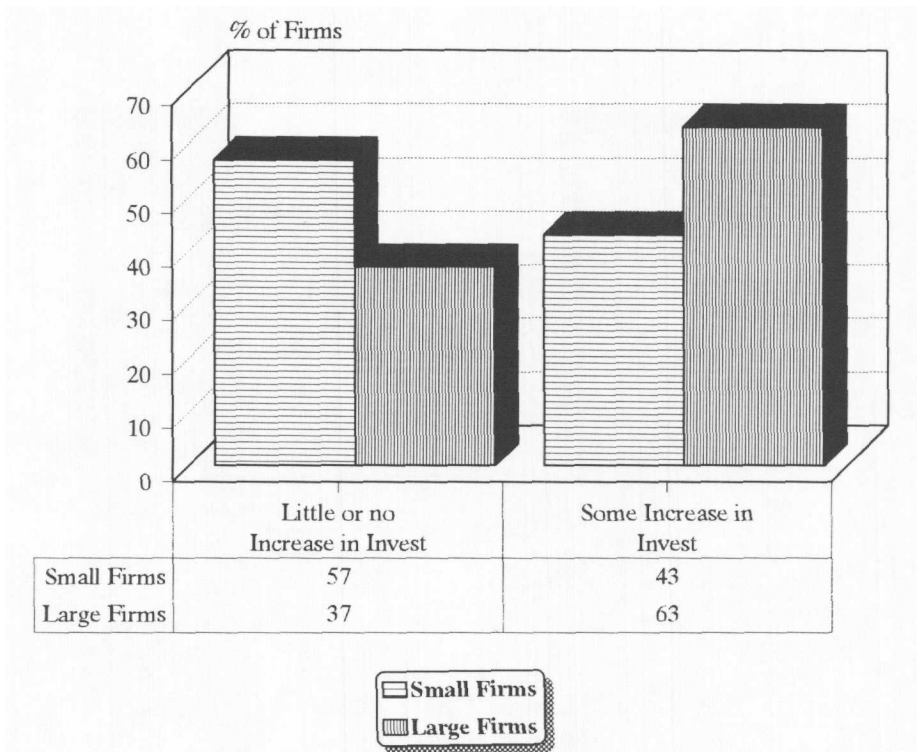


Figure 6. Impact of Canada–U.S. FTA, by Size

1. Small firms are firms with ≤ 500 employees and/or $\leq \$1$ billion sales.
2. Large firms are firms with > 500 employees and/or $> \$1$ billion sales.
3. There is a significant relationship between the change in IT investment and size in response to the Canada–U.S. FTA (chi square value = 5.4810; d.f. = 1; significance = 0.0192; $n = 139$)

From the structure coefficients reported in Table 5, the first function suggests that from the original list of six variables, five variables are selected as doing the best overall job together in predicting changes in IT investment in response to Europe 1992. The best set of predictor variables are IT integration, IT organization, IT control mode, competitive strategy, and size. The first function is dominated by IT integration and IT organization. Competitive strategy and size have a much smaller impact. IT planning has no impact. Using this combination of variables, 82.6 percent of the sample was correctly classified. The results in Table 5 confirm that three IT maturity variables are strong predictors of firms' investment decisions in IT.

Table 6 shows the results of the discriminant analysis for determining the effects of the Canada–U.S. FTA. Based on this table, the best discrimination between the analysis groups is obtained when four of the original six variables are used in the function. The large contributors to group separation of the discriminant function are IT integration, competitive strategy, IT planning, and size. IT integration contributes the most and size contributes the least in group discrimination. Using this combination of variables, the model demonstrated a classification accuracy of 84.17 percent.

Table 5. Results of Discriminant Analysis and Prediction of Group Classification for Firms' Strategic Response to Europe 1992

<i>Stepwise discriminant results:</i>					
Variable	Discriminant function 1				
IT integration	0.64014				
IT organization	0.62331				
IT control	0.60847				
Competitive strategy	0.56376				
Size	0.55788				
Canonical correlation	0.6112				
Chi square	30.276				
d.f.	5				
Significance	(0.000)				
<i>Lachenbruch classification results:</i>					
Actual group	No. of cases	Predicted group membership			
		Little or no inc. in invest.		Some inc. in invest.	
		No.	%	No.	%
Little or no inc. in invest.	67	56	84	11	16
Some inc. in invest.	71	13	18	58	82
Percentage of grouped cases correctly classified: 82.60%.					
Misclassification rate: 17.39%.					

The results of applying the Lachenbruch procedure¹¹ [60] are also reported in Tables 5 and 6. Comparison of these tables indicates that the percentage correctly classified ranged from 82.6 percent to 84.17 percent. The Lachenbruch misclassification rates ranged from a low of 15.83 percent to a high of 17.39 percent. These classification results are quite encouraging by indicating the strength of the preceding analysis in terms of the models' superior predictive power.

Therefore, in support of hypothesis 1, competitive strategy emerged as a significant predictor of change in IT investment for both Europe 1992 and the Canada-U.S. FTA. Overall, however, the primary determinant of firms' willingness to use IT investment as part of their response to globalization was IT integration. An alternative explanation, though a weak one, is that the IT integration was measured as the degree to which top management perceived future exploitation of IT as strategically important and as the degree to which the CIO was involved in IT changes throughout the firm. In the absence of IT integration, the firm may still be using IT strategically without top management and CIO aware of the opportunities offered by Europe 1992 or the Canada-U.S. FTA. Thus, it would not have been reported by the CIO.

Table 6. Results of Discriminant Analysis and Prediction of Group Classification for Firms' Strategic Response to the Canada–U.S. FTA

<i>Stepwise discriminant results:</i>					
Variable		Discriminant function 1			
IT integration		0.6054			
Competitive strategy		0.57134			
IT planning mode		0.49312			
Size		0.45854			
Canonical correlation		0.6001			
Chi square		28.469			
d.f.		4			
Significance		(0.000)			

<i>Lachenbruch classification results:</i>					
Actual group	No. of cases	Predicted group membership			
		Little or no inc. in invest.		Some inc. in invest.	
		No.	%	No.	%
Little or no inc. in invest.	68	61	90	7	10
Some inc. in invest.	71	15	21	56	79

Percentage of grouped cases correctly classified: 84.17%.

Misclassification rate: 15.83%.

IT planning mode exhibited no discriminating ability for Europe 1992. In contrast, only two (IT integration and planning mode) of the four IT maturity variables could discriminate change in IT investment in response to the Canada–U.S. FTA. IT control mode and organization failed to play a contributing role in distinguishing between the two groups in response to the Canada–U.S. FTA. These results, nonetheless, provide substantial support for hypothesis 2. Size was an important predictor of change in IT investment for Europe 1992 and the Canada–U.S. FTA, thereby providing support for hypothesis 3. However, of all the variables that emerged as significant predictors of change in IT investment, size tended to be the least important.

Summary and Conclusions

IN THIS STUDY, BASED ON A SELECTIVE REVIEW OF LITERATURE from strategic and information management disciplines, a model is developed and tested empirically. This model measures the impact of competitive strategy, IT maturity, and size on firms' strategic response to Europe 1992 and the Canada–U.S. Free Trade Agreements. This response is measured by the perceived change in IT investment. These relationships are validated empirically. This study also proposed and validated a new instrument for measuring IT maturity within firms.

This study finds that a firm's competitive strategy has an impact on the firm's willingness to use IT investment as part of its strategic response to globalization. Among the four strategic types, the majority of defender firms, by attempting to locate and maintain a secure niche in a new market environment, have planned some increase in their IT investment. In comparison, more of the prospector firms, as firms that value being "first in" in new product and market areas, have planned to increase their investment in IT in response to Europe 1992 than to the Canada-U.S. FTA. The majority of reactor firms made little or no increase in IT investment. In contrast, the majority of defender firms planned some increase in their IT investment. This is expected, since reactors do not consider IT critical to their competitive advantage and the trade pacts therefore were not perceived to be significant enough to cause an increase in their IT investment. The results also indicate that the change in IT investment could account for some clear differences in IT maturity variables. The study indicates that the ability to use IT as an integrated force within a firm is a primary determinant of the firm's willingness to use IT as part of its strategic response to globalization. Firms reporting some increase in IT investment tend to have a higher degree of IT integration. In addition, this study finds that a firm's willingness to use IT investment as part of its strategic response to globalization tends to be indirectly related to its size for both trade pacts.

Implications

THIS STUDY HAS SEVERAL IMPLICATIONS FOR IT MANAGERS, researchers, and academicians. For IT managers, Tables 5 and 6 show that a firm's competitive strategy significantly affects the change in its IT investment. IT managers in firms with prospector, analyzer, and defender strategies who plan to seek additional resources from senior executives must therefore actively participate in the development of firms' competitive strategies. For a reactor firm, however, pushing for IT-intensive strategy may be wrong because the firm may have already adopted the strategy to respond later or make no response at all. Similarly, in both tables, the IT maturity variables (IT integration and IT organization) have impact on the change in IT investment. Thus, depending on competitive strategy, to encourage investment in IT, the IT managers must be prime movers in developing planning processes for linking information strategies to business needs and in encouraging experimentation with new technology. In order to enhance "IT organization," the IT managers should not only personally attempt to understand the business, but should also insist that other IT personnel gain a good understanding of the business and the firm. They must ensure that the structure of the IT function is aligned with the organizational structure, create an environment where user ideas are given attention in IT planning, and promote good relationships with users.

For researchers, this study shows that IT maturity is a significant factor in predicting how firms would react in the face of new developments in the environment, such as trade agreements. Further longitudinal studies are needed to discover whether these relationships are affected once the trade agreements have been in place for some time.

In addition, since firms vary widely in competitive strategy, IT maturity, and size, these characteristics should be considered important variables in studying firms' IT investment decisions. The findings of this study can further be refined to gain insights into the behavior of firms when faced with environmental changes when the data are collected on a longitudinal basis.

For academicians, this study shows that IT organization, IT integration, and competitive strategy are important predictors of a firm's strategic response to trade agreements. Since there is significant movement toward globalization of economies, IT managers will be increasingly called upon to help firms compete in such economies. It is therefore important that the IS curriculum provide not only technical knowledge, but also a good understanding of strategic management, globalization, business planning, and strategic decision making.

NOTES

1. The passage of the Single European Act of 1986 (SEA) by the European Parliament, and the subsequent passage of the act by all European Community (EC) governments by mid-1987, called for the creation of "an area without internal frontiers in which the free movement of goods, persons, services and capital is ensured" (Single European Act, § II, subsection I—Internal Market, Article 13, article 8a, 1986). The liberalization of capital markets was intended eventually to include all forms of capital controls, foreign exchange restrictions, noncommercial monetary flows, and the entire financial services industry, including banking. The alterations in the product and geographic markets in banking in Europe are expected to alter the nature of international banking in the 1990s [2].

According to the 1992 *Economist* survey [102], "January 1st 1993 is the new date set for the single banking market. On that date any bank anywhere in the Community will be able to open up branches in any other member-country, with their soundness being supervised only by the supervisors of the parent. . . . The insurance industry is being opened up steadily, but only commercial insurance policies will be sellable right across the EC by the start of the next year." Under the agreement, banks incorporated within the EC would be able to operate in all member states without obtaining separate national bank licenses. Bank operations in any country within the EC would be the same as those allowed by their home-country license, and most regulatory and supervisory authority would rest with the home country. The subsidiaries of multinational banks whose home domicile is outside the EC are to be treated the same as EC firms. This results in an added degree of competitive advantage for banks who actually capitalize their European operations, as opposed to simple branches designed for more specific financial purposes. The directive on insurance services provides that property/casualty insurance may be offered across national boundaries without the authorization of the host state in cases where the risk to the customer is defined as "large." In such cases, the host member state only has the right to access certain types of information. For all other insurance business, the host state can insist that the issues be locally authorized.

Since the fall of 1993, EC is known as the European Union (EU). Of the 15 members of the European Union (EU), not all countries accepted all points in the treaty of Maastricht. For example, regarding the Economic and Monetary Union (EMU), the United Kingdom (UK) and Denmark opted out of the agreement. The EMU is due to be set up in 1997 if 7 out of 15 member countries are deemed to qualify, and by 1999 at the latest. During the three years 1994–96, a European Monetary Institute (EMI) will pave the way for the independent European Central Bank, empowered to issue a European currency. The establishment of the EMU is dependent on a critical mass of 7 out of 12 states satisfying strict convergence criteria on inflation, budget deficits, and currency stability, as well as the political will to do so.

2. The Free Trade Agreement (FTA) that went into effect in 1989 between the United States and Canada eliminated or drastically reduced most tariff and other trade barriers between the two countries and permitted increased cross-border investment in many industries. The Can-

ada-U.S. FTA was expanded in 1993 to include Mexico, becoming the North American Free Trade Agreement (NAFTA). The FTA is based on the basic principle of national treatment. Under this principle, all powers granted to U.S. banks are also granted to foreign banks operating in the United States. However, under the existing U.S. banking laws, banks are not allowed interstate branching. Although Canadian banks have a strong presence in the U.S. market, with 51 subsidiaries, branches, agencies, or offices, the Canadian banking industry would like to see the existing restrictions on affiliations between banks and securities firms lifted, as well as the barriers to interstate banking [45]. They argue that national treatment puts the country with the more open market—in this case, Canada—at a clear disadvantage. Under the FTA, U.S. banks in Canada benefit from the powers granted to domestic banks—for example, the ability to establish a national system of branches and to participate in securities activities, while Canadian banks in the United States are severely limited in both of these areas, due to the United States' more restrictive banking laws.

3. Under NAFTA, all banks and security firms will be allowed to establish wholly owned subsidiaries in Mexico. Also, with the implementation of NAFTA, any insurance company with existing joint ventures will be allowed to obtain 100 percent ownership by 1996. By the elimination of the Mexican domestic content rule under NAFTA, U.S. companies will be treated on a par with Mexican companies on investment. Also, all restrictions on U.S. sales of telecommunications equipment and investment in the Mexican market will be lifted.

4. Clemons [22] suggested that cooperation can be an especially effective strategy for globalization under a variety of conditions, such as (1) when rapid implementation of a global strategy is necessary; (2) when there is a need simultaneously for different multidomestic strategies and for effective global integration; and (3) when regulatory or national-interest barriers hinder a single player from effectively expanding into foreign market.

5. The nine items used were: (1) the number of functions dependent on IS, scaled from 1 = very few to 7 = all of them; (2) the extent to which technology has penetrated the firm in impact/performance; (3) the extent to which mainframes, micros, process control devices are installed in the firm; (4) the basis for evaluating performance of IS, ranging from 1 = cost savings only to 7 = contribution to firm's overall objectives; (5) knowledge of the IT managers about the firm's business plans, scaled from 1 = uninformed to 7 = well informed; (6) top management's knowledge about information technology, similarly scaled from 1 = uninformed to 7 = well informed; (7) the extent of formalization in IS planning; (8) the extent to which the IS plan takes the business plan into account; (9) the extent to which the IS plan involves top management.

6. "Distinctive competence" refers to those things that a firm does especially well compared with its competitors. It is an aggregate of numerous specific activities that the firm tends to perform better than other firms within a similar environment. Based on the Miles and Snow findings, top managers in firms with different business strategies each developed different distinctive competence in their firms to support the desired strategy. A firm may have distinctive competence in IT, and, therefore, that competence is refereed to the degree to which IT supports the firm's business strategy.

7. Depending on whether the IT's net impact is more on the agency or transaction cost. Transaction cost is defined as the sum of the coordination cost and transaction risk [27]. IT has been shown to reduce (1) the internal coordination costs [6, 42], (2) the external coordination costs (which can lead firms to turn to markets) [48, 69, 65], and more importantly (3) the transaction risks [27]. The combined effects of reduction in coordination costs and risks alter the balance (the net impact) in favor of a greater degree of outsourcing. Ultimately, the governance structure of interfirm interactions is affected by increased reliance on fewer and long-term cooperative suppliers [25].

8. Even as IT continues to reduce coordination costs, the need to provide incentives for noncontractible investments will frequently limit the number of suppliers firms use [7]. Recent studies suggest that, depending on product complexity and price volatility, firms find appropriate balance among their short-term purchasing in the spot market and their long-term outsourcing relationships, and their virtual integration [24, 25].

9. To interpret the nature of the discriminant function, we need to look at the characteristics of the variables that define them. That is, we must look at the size of the structure coefficients for the discriminant function; the larger the coefficient of the predictor, the more important the

variable is in discriminating between the groups. A positive coefficient indicates that the larger the variable, the greater the expected probability of change in IT investment; a negative coefficient indicates that the larger the variable, the smaller the expected probability of change in IT investment.

10. The canonical correlation is the maximum correlation that can be generated between a linear combination of the discriminatory variables and a linear combination of the groups that are represented by $(n-1)$ dummy variables, where n is the number of groups.

11. A number of alternative methods have been proposed for arriving at unbiased estimates of classification error rates. The jackknife procedure originally proposed by Lachenbruch, referred to as the Lachenbruch method, has the advantage over some of the other classification procedures by not resting on the assumption of normality. This procedure omits each observation sequentially, calculates a classification function based on the remaining $N-1$ observations, and then classifies the omitted observation.

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APPENDIX A

Now we would like to assess the Competitive Strategy of your organization.

Please circle one of the following types of competitive strategies that best describe your organization.

1. (*Defender*) An organization with this type of strategy attempts to locate and maintain a secure niche in a relatively stable product or service area. The organization tends to offer a more limited range of products or services than its competitors, and it tries to protect its domain by offering higher quality,

superior service, lower prices, and so forth. Often an organization with this type of strategy is not at the forefront of developments in the industry—it tends to ignore industry changes that have no direct influence on current areas of operations and concentrates instead on doing the best job possible in a limited area.

2. *(Prospector)* An organization with this type of strategy typically operates within a broad product-market domain that undergoes periodic redefinition. The organization values “first in” in new product and market areas, even if some of these efforts prove not to be highly profitable. The organization responds rapidly to early signals concerning areas of productivity, and these responses often lead to a new round of competitive actions. However, an organization with this type of strategy may not maintain market strength in all areas it enters.
3. *(Analyzer)* An organization with this type of strategy attempts to maintain a stable, limited line of products or services, while at the same time moving out quickly to follow a carefully selected set of the more promising new developments in the industry. The organization is seldom major competitors in areas compatible with its stable product-market base, the organization can frequently be “second-in” with a more cost-efficient product or service.
4. *(Reactor)* An organization with this type of strategy does not appear to have a consistent product-market orientation. The organization is usually not as aggressive in maintaining established products and markets as some of its competitors, nor is it willing to take as many risks as other competitors. Rather, the organization responds in those areas where it is forced to by environmental pressures.

APPENDIX B: Results of Factor Analysis of IT Maturity Variables

IT maturity variable	IT planning mode factor 1	IT control mode factor 2	IT organiza- tion factor 3	IT integra- tion factor 4
Our IT projects support the business objectives and strategies of our company.	0.89383			
We continuously examine the innovative opportunities IT can provide for competitive advantage.	0.87325			
We are adequately informed on the current use of IT by competitive forces (e.g., buyers, suppliers, and competitors) in our industry.	0.83333			

We are adequately informed on the potential use of IT by competitive forces (e.g., buyers, suppliers, and competitors) in our industry.	0.82416			
We have an adequate picture of the coverage and quality of our IT systems.	0.73876			
We are content with how our IT project priorities are set.	0.78992			
In our organization, the responsibility and authority for IT direction and development are clear.		0.83335		
In our organization, the responsibility and authority for IT operations are clear.		0.79007		
We are confident that IT project proposals are properly appraised.		0.78884		
We constantly monitor the performance of IT functions.		0.77006		
Our IT function is clear about its goals and responsibilities.		0.71847		
Our IT function is clear about its performance criteria.		0.69858		
In our organization, user ideas are given due attention in IT planning and implementation.			0.86935	
Our IT specialist understands our business and the firm.			0.85328	
The structure of our IT function fits our organization.			0.85019	
The IT specialist-user relations in our firm are constructive.			0.80611	
In my firm top management perceives that future exploitation of IT is of strategic importance.				0.80985
There is a top-down planning process for linking information systems strategy to business needs.				0.80811
Some IT development resource is positioned within the business unit.				0.79885
The introduction of, or experimentation with, new technologies takes place at the business unit level under business unit control.				0.61297
Eigenvalues	4.6725	3.584	3.2916	1.77
Percentage of variance	23.407	17.9	16.5	8.9
Reliability	0.8848	0.8595	0.8019	0.7792