Industrial and Corporate Change, Volume 14, Number 6, pp. 897–940
doi:10.1093/icc/dth079
Advance Access published November 3, 2005

Changing economic environments, evolving diversification strategies, and differing financial performance: Japan's largest textile firms, 1970–2001

Asli M. Colpan and Takashi Hikino

Japan's largest textile firms have adopted the strategy of diversification into new product markets, since they started facing industry maturity and macroeconomic turbulences. We find that the nature and magnitude of capabilities had decisive impacts on the direction of diversification. Our panel data analyses show that different diversification paths actually yielded contrasting performances. The outcomes also suggest that the effectiveness of specific diversification schemes was contingent on macroeconomic environments. Ultimately, however, only the commitment to technology, not marketing or finance, ensured long-term profitability.

1. Introduction

Having long faced structural troubles for macro- and microeconomic reasons, diversification has been the primary measure for economic adjustments employed by large firms in Japan's matured textile industry. The recent figures on the major companies illustrate that textile products only represent around 40% of the total sales, which provides the best evidence for the rising significance of new product categories. The relative decline of textile businesses became inevitable when the major generic growth strategies within those product categories, such as horizontal expansion, vertical integration, backward and forward, and international expansion, did not bring the long-term solution in confronting the maturing state of the enterprises' textile domains.[1] This

[1]Following the conventional use in industrial organization economics, diversification is defined as the entry of a firm into new product markets. Some studies such as the one by Kodama (1995: 69–76) and Gemba and Kodama (2001) on diversification of Japanese industries and another by Pavitt (1992) on the general properties of innovation include vertical integration in diversification, but here they are separated in order to clarify the strategic choices of enterprises. See Scherer and Ross (1990: 57–96), Chandler (1990: 14–46), and Chandler and Hikino (1997: 29–37) for the four generic categories of growth strategies.

has been especially true since the 1970s, because various reorganization measures of textile businesses did not yield satisfactory financial results.

This article aims to shed light on the economic motives, basic directions, and financial outcomes of the diversification strategies by exploring the investment patterns of Japan's largest textile enterprises. In particular, it analyzes the effects of firms' dissimilar technological resources and capabilities on the different directions of diversification that ultimately determine the profitability of relevant enterprises as they face changing macroeconomic environments. In focusing on the resources and capabilities in the enterprises' growth, the analysis mainly employs the capability-based view of the firm (Dosi *et al.*, 2000a). For most of its proponents, the capability-based view of the firm has had the technology-intensive and dynamic sectors of the economy as its explanatory target (Steil *et al.*, 2002). The present study extends the analytical object to an industry that is historically labor-intensive and now mature.

With a few exceptions (Kodama, 1995; Delios and Beamish, 1999; Geringer *et al.*, 2000; Gemba and Kodama, 2001), the empirical analyses of recent diversification measures adopted by the Japanese firms have not been satisfactory, especially when compared to those on the US companies. The latest Japanese attempt on this issue (Asaba and Kagono, 2004) has turned out to be unexpectedly sketchy in topical coverage and limited in technical rigor. Taking the textile businesses of the country as a controlled industry-level sample, the present research aims to systematically tackle this very issue of the diversification strategy of Japanese firms through both descriptive and statistical approaches. The ultimate goal here is to pin down which business models have functioned most effectively for Japan's large enterprises. To this end, entire companies are divided into a few strategic groups in order to identify the collective characteristics of the companies that possessed similar resources, capabilities, and business models and to illustrate the effects of specific diversification measures on the performances of the enterprises. As the sample of the largest companies includes those with different technological origins and evolutionary patterns, the textile industry of Japan is an appropriate basis to test the long-term effectiveness of specific elements and types of resources and capabilities.

Other than Chandler's (1962) historical perspective, most diversification studies have not allowed for the dynamic effects of temporal and macroeconomic environments because they customarily used cross-sectional figures or averaged data over time. They thus eventually consider strategies without systematically assessing whether strategic consequences vary with time and contextual changes (Geringer *et al.*, 2000). The longitudinal swings of economic conditions should affect the strategy performance nexus and thus require the different matching of particular resources and capabilities with specific business environments. This study examines the relationships between product diversification and economic performance as environmental conditions fluctuate and aims to reveal the long-term dynamics of performance in different macroeconomic contexts. In our longitudinal analysis, we examine this issue by employing contrasting business environments: the turbulent period of the 1970s, the booming years of the 1980s, and the depression decade of the 1990s.

Section 2 briefly proposes the conceptual framework relevant to our research questions and formulates the major hypotheses of the study. In Section 3, we identify the sample of the leading companies, explore the developmental backgrounds of diversification models, and analyze the different corporate strategies for new market entry among the three groups of companies: technology-driven, textile adherent, and market-led. In Section 4, we conduct a series of econometric tests employing the panel data. After specifying the variables and clarifying the methodology, we analyze the performance differences among the enterprises that advocated the three distinctive business models for each of the three strategic time periods constituting distinctive macroeconomic environments. We employ multiple regression analysis that is designed to investigate the effects on the profitability of the basic diversification models as well as of other strategic contents.[2]

2. The conceptual framework and tested hypotheses

The approaches in this article are broadly based on the resource- and capability-based view of the firm (Teece, 1982; Wernerfelt, 1984; Dosi *et al.*, 2000b). The resource-based theory is specifically concerned with the origins, functions, evolution, and sustainability of rent-generating heterogeneous factors inside firms. According to the resource-based theory, firms are a collection of lumpy resources. Companies differ because they accumulate different bundles of resources, and it is these resources that determine the type of strategies a firm can pursue effectively. Successful companies accumulate unique bundles of resources that are difficult to imitate, and these unique resources are the basis of competitive advantages (Goold and Sommers Luchs, 1996).

While the capability-based view of the firm largely overlaps the resource-based view, part of the difference between them, as Dosi *et al.* (2003: 11) clarify, rests in terminology. The authors suggest that a resource-centered language risks conveying a reified view of capabilities as object-like entities. The capability-based view, on the other hand, makes it easier to articulate the underlying process story. The authors further argue that capabilities are not things but ways of doing things, that is, the properties of collective knowledge essentially revealed through implementation.

In concentrating on resources and capabilities in the firm's growth, resources are defined as the stocks of available factors of production, tangible and intangible, that the firm owns (Amit and Schoemaker, 1993: 35). Following then a well-established definition (Nelson and Winter, 1982: 103; Dosi *et al.*, 2000a: 1–22), capabilities are

[2]The majority of our statistical data were collected from *Yuka Shoken Hokokusho* (Report on Securities and Stocks) that is the semiannual reports to the Ministry of Finance. This was supplemented by the data in *Kaisha Shikiho* (Quarterly Reports on Listed Corporations), *Kaisha Zaimu Karute* (Analysis of Companies' Finance), and company annual reports since the late 1960s. Further information to fill in missing values was obtained through communication with the executives in the particular companies.

taken as firms' abilities to utilize their resources efficiently. However, not all elements of a firm's capabilities are strategically relevant in the long run. Critical to the formation of effective corporate strategies are the capabilities that can be developed and deployed as the durable sources of competitive advantages in multiple markets (Collis, 1996: 126; Malerba and Orsenigo, 1996; Patel and Pavitt, 1997). Those capabilities function as an agent which enables individual companies to readjust to new competitive environments (Teece *et al.*, 1997; Dosi *et al.*, 2003).

2.1 Resources and capabilities as a determinant of growth direction

The resource- and capability-based approaches provide theoretical explanations for the direction of diversification as a source for a firm's growth. According to the well-established hypothesis, the direction of a company's diversification is attributable to the matching of the nature of its available resources and capabilities to the market opportunities in the environment. An enterprise's firm-specific resources thus serve as the driving force of its diversification strategy (Mahoney and Pandian, 1992).

MacDonald (1985) finds that enterprises are more likely to enter into industries which are related to their primary activities. He suggests that research and development (R&D)-intensive firms direct their diversification toward R&D-intensive product markets. While he uses R&D expenditures as a proxy to capture the firm's endowment of unique knowledge, his results reflect the transfer of shareable idiosyncratic organizational and intangible capital among related activities (Prescott and Visscher, 1980; Williamson, 1985). Similarly, Montgomery and Hariharan (1991) further make significant contributions by employing product-level data to examine the resource profile of diversifying firms. Their findings support the view that the resource endowment of diversifying firms is critical in predicting the resource characteristics of the destination industry.

In analyzing the relationship between resources and capabilities and new product market entry, we employ a descriptive analysis of the evolutionary patterns of individual firms. The purpose here is to clarify the impact of historical antecedents, or firms' pre-entry resources and capabilities, on their timing and direction of diversification. We then employ a quantitative approach to complement the historical narrative and elaborate the exact mechanism of the capabilities strategy performance dynamics. While there is adequate theoretical literature on this matter (see Helfat and Lieberman, 2002 for a useful summary), little empirical research has been conducted for further progress in understanding this issue. Silverman (1999) is one of the first to examine empirically the hypothesis that firms prioritize their diversification choices according to the relative applicability of their resources across these options. He tests the effects of firms' heterogeneous technological resources as measured by patent data on diversification behavior. In the end, Silverman finds that a firm's technological resource base significantly influences its diversification decisions.

2.2 Diversification strategy-economic performance nexus

Resource- and capability-based approaches provide a theoretical perspective for predicting a superior performance for certain categories of firm diversification. In these theories, quasi-rents resulting from scope economies in the sharing of strategic resources and capabilities are claimed to create sustained competitive advantages and thus higher performance (Barney, 1991; Teece *et al.*, 1997). According to the hypothesis, therefore, related diversification brings higher profitability compared to unrelated diversification. The two main arguments to explicate these results are (i) the wider scope of diversification suggests the presence of less firm-specific resources that normally yield lower rents; and (ii) a given resource will lose more value when transferred to markets that are less similar to those in which the resource originated (Mahoney and Pandian, 1992).

The most common finding by diversification strategy-performance studies is that related diversifiers exemplify higher results in their economic performances (Rumelt, 1974; Bettis, 1981; Varadarajan and Ramanujam, 1987; Datta *et al.*, 1991). These outcomes have been intuitively enticing as they support the resource-based and related models of the firm (Prahalad and Hamel, 1990; Teece *et al.*, 1997). Other works, however, have shown that single product models or unrelated diversification can be more advantageous than related diversification (Michel and Shaked, 1984; Lubatkin, 1987). Despite considerable research efforts, the findings derived from different approaches have remained contradictory, and the impact of product diversity on performance is not yet clear.

This study amplifies the previous research through both descriptive and econometric approaches and takes the textile industry as a controlled industry-level sample. The purpose here is to examine the long-debated relationships between diversification conduct and economic performance. We specifically test whether this linkage-individual strategy and its consequence-changes in different macroeconomic environments over time. Studies following Rumelt (1984) have typically considered diversification as an intra-firm decision-making process to match resources and capabilities and strategic options with industry conditions in a steady manner, which eventually ignores the larger effects of environmental economic forces (Geringer *et al.*, 2000). A review article by Mayer and Whittington (2003), however, illustrates that temporal variations have a significant impact on financial outcomes of product diversification strategies, although they fall short of the reasons for such variations across time periods. A recent empirical study by Geringer *et al.* (2000) examines the impact of changing environmental conditions on the diversification strategies and their outcomes regarding Japanese firms from 1977 to 1993. They discover that as environmental conditions fluctuate, strategies change, which in turn have varying effects on performance. While that study, following Cool and Schendel (1987), employs endogenous intra-firm factors to identify time periods, we instead use exogenous economic indicators. Our longitudinal analysis, furthermore, encompasses the three decades from 1970 to 2001 that indicate swinging macroeconomic environments: the volatile decade of the 1970s, the growth years and economic bubble of the 1980s, and (by contrast) the lasting depression of the 1990s. By taking a longer time span overall and focusing on exogenous factors to set apart strategic phases, we aim to pin down the dynamic relationships between economic environments, diversification strategy, and financial performance.

3. Company sample and descriptive analyses

3.1 The major players of Japan's textile industry

The notable characteristics of the Japanese textile industry have been the competitive yet stable oligopoly in which the original group of companies that founded the individual segments of the industry dominated their respective business domains (Colpan, 2004). Table 1 lists the 10 largest Japanese textile enterprises measured by their assets in 2001 and 1970, with their founding years and original product lines indicated. For the period of the present study, we found no single permanent entries, or exits from, for that matter, into the group of the top 10.[3] In 2001, the total assets of the 10 companies together stand for around 76% of all the textile enterprises, whose stocks are listed, and around 62%, even when all the listed companies in apparel business are included in the broad textile industry.[4]

Among the 10 enterprises, Kanebo, Toyobo, Nisshinbo, and Kurabo commenced their businesses as cotton spinners. In contrast, Toray, Asahi Kasei, Teijin, Kuraray, and Mitsubishi Rayon were all established as rayon fiber manufacturing companies, mostly as the subsidiaries or divisions of other companies. On the other hand, Unitika was founded in 1969 by the merger of the cotton spinning company, Nichibo (previously Dainippon Boseki), and its former rayon fiber subsidiary, Nippon Rayon. In addition, therefore, to being the largest and dominant corporations within the whole textile industry, the 10 firms represent two different backgrounds: cotton spinning companies and rayon manufacturing enterprises.[5]

[3]Nitto Boseki briefly appeared as the tenth largest in 1990, after the company in the 1980s aggressively pursued the diversification strategy into building materials, particularly glass fibers. Kanebo then have dropped out of the top ten, when the company got forced to reorganize and split off in 2004.

[4]The figures are based on 103 textile and apparel companies listed on organized stock exchanges. The data for those enterprises come from Toyo Keizai, *Kaisha Shikiho* (Quarterly Reports on Corporations), the third issue of 2001, Toyo Keizai, Tokyo.

[5]Although the present analysis concentrates on the largest enterprises, some of the basic growth strategies illustrated among them can well be applied to the textile companies with smaller sizes and of varied origins. Preliminary findings suggest two basic patterns of sustainable growth among them: concentrating on niches or certain product categories by establishing technological and market advantages; and diversifying into unrelated product markets. Actually, however, many companies remained small in their original product markets and struggled financially or already exited from the market.

Table 1 The 10 largest Japanese textile enterprises in 2001 ranked by assets

Companies	Total assets (¥ million)		Founding date	Original product line
	2001	1970		
1. Toray	1,461,133	357,868	1926	Rayon fiber
2. Asahi Kasei	1,240,007	302,383	1922	Rayon fiber
3. Teijin	1,058,513	247,400	1918	Rayon fiber
4. Kanebo	712,609	152,156	1887	Cotton yarn
5. Toyobo	540,114	178,906	1882	Cotton yarn
6. Kuraray	512,479	133,788	1926	Rayon fiber
7. Unitika	377,143	191,736	1969	Cotton yarn, Rayon fiber (merger of Nichibo and Nippon Rayon)
8. Mitsubishi Rayon	359,041	137,642	1933	Rayon fiber
9. Nisshinbo	334,460	48,607	1907	Cotton yarn
10. Kurabo	206,609	53,039	1888	Cotton yarn

Source: Compiled from *Kaisha Shikiho* (2002), Toyo Keizai Shinposha, Tokyo, Japan; *Nippon Kaishashi Soran, Jyokan* (The Comprehensive Directory of the History of Japanese Companies) (1995), Vol. 1, Toyo Keizai Shinposha, Tokyo.

3.2 Historical backgrounds of diversification strategies

In terms of the companies' building of capabilities, particularly technological ones, the first significant turning point of the Japanese textile industry came when synthetic fiber manufacturing became the driving force of the entire industry in the 1950s. In the end, the combination of accumulated capabilities and government policy created two distinctive groups among the largest textile companies in terms of their entry into synthetic fiber manufacturing (Suzuki, 1994). One group of companies could get into synthetic fiber production in its early developmental phase through the deployment of their technological capabilities that they had nurtured in rayon fiber manufacturing. In this group were eight companies: Toray, Teijin, Asahi Kasei, Kuraray, Mitsubishi Rayon, Toyobo, Dainippon Boseki, and Nippon Rayon. However, the three companies, Kanebo, Kurabo, and Nisshinbo, were left out of early entry into synthetic fiber markets (Nihon Kagaku Sen'i Kyokai, 1974: 277–301).

Note that among the companies with cotton textile origins, Toyobo and Dainippon Boseki commenced synthetic fiber manufacturing, while the other three, Kanebo, Kurabo, and Nisshinbo, stayed narrowly focused on natural fiber domains. Actually, by the first half of the 1930s those five companies with cotton fiber origins had caught up with inherent rayon producers in terms of their technological capabilities through serious commitment to rayon fiber manufacturing (Yamazaki, 1975: 34–37; Yonekawa, 2000: 29–34). Thanks to the government-enforced relocation and realignment of production facilities and technical know-how in the wartime and postwar reorganizations of the industry, the three companies became narrowly focused on their original cotton operations (Nihon Kagaku Sen'i Kyokai, 1974: 277–301; Sakamoto, 1990). These involuntary strategic alterations would critically influence the subsequent patterns of capability developments and investment decisions of the targeted companies. This is because the three, Kanebo, Kurabo, and Nisshinbo, exhibited relative weakness in terms of their resources and capabilities necessary for synthetic fiber entry, and also because Ministry of International Trade and Industry (MITI) eventually recognized the significance of the accumulated capabilities and utilized them as a screening device (Ozawa, 1980: 146). As the three enterprises focusing on natural fiber could not commit the substantial amount of capital, especially when technological and market risks were still high, this divergence would critically influence their subsequent diversification strategies and thus the overall business models (Fujii, 1971).[6]

The technological division of the largest textile companies into separate groups turned out not to be temporary. Government's industrial policy subsequently secured the benefits of the firms that had initially committed to large-scale production facilities

[6]Belated diversification into synthetic fiber production that Kanebo and Nisshinbo attempted without adequate technological resources and capabilities naturally did not result in the overall competitiveness and thus bolstered the strategies for these companies to pursue diversification in unrelated directions.

and technological investment. This advantage became firm as government policies continued to regulate late entry through such measures as size restrictions. To compete effectively, the investments of late entrants had to be theoretically larger because the minimum efficient size of plants was increasing. Size limitations thus prevented late entrants from achieving full-scale economies and enjoying large profits that the original entrants had captured, while markets were maturing with increased supply capacity and price decline (Suzuki, 1999: 99–100). For the individual companies belonging to any of the groups, two additional developments, the capability development by synthetic fiber producers and the new strategic moves on the part of natural fiber manufacturers, then constituted the critical means to distinguish their business models and growth strategies.

Thanks to the favorable market environment under the government regulation umbrella, synthetic fiber manufacturers continued to invest in massive production facilities and build up resources and capabilities in respective product areas. This would eventually lead to technological expertise in polymer chemicals in general. In responding, for instance, to growing demand in plastics-user industries such as automobiles and electrical appliances, synthetic fiber enterprises transferred their technological knowledge into commercializing plastics and chemical products. The companies apparently had an advantage in terms of speed and costs in technologically related product markets (Makino, 2002). The competitive strength of technological frontrunners in synthetic fibers and related areas generated the increasing entry barriers. The technological bases that they nurtured through learning and the exploitation of scale and scope economies of synthetic fiber operations became a formidable hurdle for late entrants to catch up and compete.

Given the rising technological barriers and MITI-induced regulations, a common strategy among the three companies with natural fiber focus, Kanebo, Kurabo, and Nisshinbo, became cooperated with, rather than competition against, the technological frontrunners. The companies started the spinning of synthetic fibers through procuring raw materials from makers such as Toray and Teijin. Furthermore, they established close ties with particular synthetic fiber makers to utilize their spinning facilities. For instance, Nisshinbo reorganized a part of its spinning businesses to manufacture specifically for Teijin (Nisshinbo, 1969).

With the structural troubles in their textile markets, however, the three technology-laggard companies started seeking their growth markets in other product areas. Thus, while holding on to their conventional textile businesses, they came up with diversification strategies based on business models that focused industry areas unrelated to their conventional domains. Kanebo exemplifies this strategy of unrelated diversification. In the 1960s, it commenced a demand-driven strategy that emphasized varied but growing markets such as foods, cosmetics, and pharmaceuticals and attempted to integrate the diverse domains of consumer markets by introducing a coherent marketing-oriented theme called the “Greater Kanebo” plan (Kanebo, 1998: 651–680).

3.3 Macroeconomic developments and strategic adjustments since the 1970s

Since the 1970s, changes at the macroeconomy level have become the foremost motives for intensive diversification efforts by the large textile enterprises. Three major events in the macroeconomic environment governed the principal rationales for those strategies in the 1970s. First, the currency realignment of 1971 that brought the transition to the floating exchange rate system resulted in the appreciation of yen and thus the difficulties in export markets in general. Second, the 1971 consent with the US in line with the Multi-Fiber Agreement restricted the Japanese textile exports. And last but not the least, the oil shocks of 1973 and 1979 raised the prices of feedstocks for synthetic fibers such as naphtha and also of energy in general. While, as a long-term and ultimate consequence of these three developments, the performance of textile companies deteriorated, the further revaluation of the yen, thanks to the Plaza Accord of 1985, and the escalating competition from the newly industrializing countries such as Taiwan and South Korea made the Japanese situation even worse (Colpan *et al.*, 2002).

Textile companies attempted to cope with the structural troubles of their product markets by utilizing and stretching their accumulated resources and capabilities. In an environment in which no major technology breakthrough emerged in textile manufacturing since the 1970s, companies still attempted product innovations in specialty and high value-added items such as highly moisture-absorbing nylon filaments and fast-drying, perspiration-absorbing polyester woven fabrics (Toray, 1997; Teijin, 1998). Nevertheless, the markets for such specialty products turned out to be not large enough to bring about adequate positive outcomes for the entire company.

The other generic strategies of corporate growth did not contribute in an adequate manner, either. The relocation of production facilities to the countries that provide better opportunities for international markets might have kept the companies' cost position as low and equal as competitors that took similar actions, but no viable sources for sustainable competitive advantages got materialized (Horaguchi, 1992). The forward integration into apparel operations required different capabilities than those of material making. Besides, since the textile companies saw apparel as an unstable and risky trade, entry into this field remained limited. Alternatively, backward integration into feedstock petrochemicals was also problematic, because, thanks to the two oil crises followed by the Plaza Accord, textile enterprises lost their cost competitiveness to integrated companies with both oil refining and petrochemicals operations (Hikino *et al.*, 1998; Itami, 2001).

Large textile companies ultimately confronted the maturing state of their original businesses by intensifying their strategies of diversification into industries and products outside textile domains. The struggle of textile trades actually resulted not only from the deteriorating competitiveness of Japanese industry in international markets but also from the secularly declining growth of textile demand in domestic markets. Table 2 illustrates that among the major industrial sectors in Japan, the textile business fared worst in terms of market growth in the long run, and the depressing conditions

Table 2 Growth of domestic market demand, by sector and industry, 1966–2000 (averaged annual rates in percentages)

	Sector/industry	1966–1970	1971–1975	1976–1980	1981–1985	1986–1990	1991–1995	1996–2000
1	Agriculture, forestry, and fishing	2.44	5.96	–1.65	–0.46	–0.33	–3.54	–3.80
2	Mining	12.09	15.67	10.02	–6.01	5.32	–6.62	3.80
3	Manufacturing	12.60	3.50	4.79	2.16	5.51	–2.16	–0.24
	1 Food	5.66	4.58	2.36	1.14	2.76	0.27	–0.23
	2 Textiles	4.64	–2.80	–1.57	0.56	1.59	–5.95	–4.87
	3 Pulp and paper products	10.12	4.15	6.09	0.73	4.48	–0.63	–1.04
	4 Chemicals	9.28	4.11	6.87	0.83	4.82	–0.69	1.04
	5 Petroleum and coal products	9.37	15.74	9.10	–2.96	1.77	–3.10	4.65
	6 Non-metallic mineral products	13.78	3.63	6.34	–2.18	4.37	–2.19	–2.65
	7 Primary metals	16.18	3.56	4.47	–0.19	5.65	–5.17	–1.74
	8 Metal products	15.92	1.10	3.92	0.81	6.94	–3.06	–3.48
	9 General machinery	21.77	1.00	4.16	4.40	8.67	–4.42	–1.06
	10 Electrical machinery and equipment	21.39	–0.67	7.09	10.78	6.64	–0.72	2.13
	11 Transportation equipment	14.04	3.48	6.95	3.44	7.19	–2.04	0.13
	12 Instruments	14.77	–2.31	9.13	1.39	6.36	–4.85	1.32
	13 Other manufacturing	11.76	5.06	2.65	1.61	6.04	–2.17	–2.13
4	Construction	13.70	6.54	4.96	–1.09	9.39	–0.39	–1.28
5	Electric, gas, and water supply	8.33	10.06	12.53	2.82	0.71	2.14	1.96
6	Wholesale and retail trade	12.39	12.07	1.80	1.08	7.85	–1.88	0.83

Table 2 Continued

	Sector/industry	1966–1970	1971–1975	1976–1980	1981–1985	1986–1990	1991–1995	1996–2000
7	Finance and insurance	13.02	7.91	5.30	6.93	8.73	–1.74	2.20
8	Real-estate	9.88	6.84	8.57	4.85	6.55	5.84	3.15
9	Transportation and communications	10.54	5.74	5.53	1.82	4.95	2.03	2.69
10	Service	13.89	7.18	7.12	6.40	8.23	3.34	3.31

Source: Calculated from Economic Planning Agency, the Government of Japan, *Kokumin Shotoku Tokei Nenpo* (Annual Report for National Accounts), 1966–2000, Tokyo.

Note: Domestic market demand = domestic production + imports – exports. Calculations are made at constant prices.

would deteriorate further in the 1990s. Understandably, several other product markets appeared much more attractive. In re-examining their basic business models then, the companies had to consider two different forces for competitiveness and profitability: internal technological capabilities in terms of product and process developments; and external market demand in terms of new opportunities for entry. Because individual companies possessed different capabilities and competitive positions and thus their assessment of market opportunities would not be the same, individual companies in the end took dissimilar directions for diversification through an individual combination of technology-push and market-pull factors.

Consequently, the significance of textile segments as a percentage of the total sales progressively declined for all the large firms starting in the 1970s. Table 3 lists the ratio of textile sales of the 10 companies from that decade to the present and represents the extent of non-textile diversification strategies of the largest companies.

3.4 Identification of strategic groupings

The procedure to identify strategic groups is based on the proposition that firms with comparable resources and capabilities seek the similar patterns of firm growth and thus will be clustered in the same strategic groups. The product diversification categories necessary to determine the different directions and extent of diversification are conventionally the descriptive groupings. The present study employs the groupings which the authors developed in previous research concerning the historical examination of long-term behaviors adopted by the identical group of firms in the sample (Colpan, 2004). The companies actually illustrate three distinctive group behaviors: technology-driven diversifiers, textile adherents, and market-led diversifiers. The number of firms classified in the groupings is 5, 2, and 3, respectively. The particular categorical groupings and their individual membership within the groups that this research identifies ultimately reconfirm an implicit consensus within Japanese business circles.[7]

The descriptive groupings were then validated on the basis of various quantitative variables: entropy measures, related and unrelated, based on the JSIC (Japan Standard Industrial Classification) codes; technological, marketing, and financial resources; and textile and apparel commitments. Employing these strategic variables, we perform the analyses of variance to test the relevance of the categorical groupings. The outcomes generally verify the descriptive groupings. We will present these findings later in Table 5 in the next section. Before getting into the technical details, however, we first summarize the overall developmental characteristics of the three strategic groups.

[7]The following industry managers and researchers were interviewed for the clarification and affirmation of the three groupings: Takeshi Abe (October 6, 2004), Makoto Hagiwara (April 4, 2002), Osamu Hasegawa (March 28, 2002), Hideaki Ishihara (January 27, 2004), and Fumikatsu Makino (February 3, 2004).

Table 3 Significance of textile businesses for the largest enterprises, 1970–2000

Companies	Ratio of textile sales to total sales (%)						
	1970	1975	1980	1985	1990	1995	2000
Toray	92.1	77.6	74.5	63.2	55.3	48.2	41.0
Asahi Kasei	75.0	58.8	38.2	27.6	17.2	14.5	12.0
Teijin	95.0	70.0	69.7	71.3	64.5	53.7	53.0
Kanebo	83.1	73.9	68.8	56.9	51.5	44.8	30.0
Toyobo	99.0	97.0	89.2	82.2	75.7	68.8	56.0
Kuraray	82.0	71.8	73.0	69.3	45.3	36.6	31.0
Unitika	97.7	92.0	80.9	78.8	66.4	51.2	47.0
Mitsubishi Rayon	86.1	80.0	60.6	45.6	48.0	46.8	33.0
Nisshinbo	88.5	81.0	74.0	76.0	67.0	61.0	49.0
Kurabo	95.0	91.4	91.0	88.8	76.6	73.2	65.0

Source: Compiled from individual companies' annual reports and *Yuka Shoken Hokokusho* (Report on Securities and Stocks), Okurasho Insatsukyoku, Tokyo, various years, supplemented by a data file provided by Iwao Nakamura at Japan Chemical Fibers Association.

3.4.1 Strategic Group 1: technology-driven diversifiers

Historically accumulated endowments in technological resources and capabilities, complemented by continuous investments in R&D for a variety of technologically related businesses, typified the firms that adopted this business model. Toray, Teijin, Asahi Kasei, Kuraray, and Mitsubishi Rayon, the firms with their origins in specialized rayon fiber manufacturing, are included in this group. Consecutive entry into new businesses such as plastics, chemicals, membranes, and filters became technologically possible, as companies transferred their accumulated knowledge in organic, particularly polymer, chemistry, and fiber engineering. Those resources thus played the role of an extendable core from which technological capabilities led the companies to extensive product markets. That core functioned as the source of technological synergy among those diverse products.

Their commitment to R&D for the above-mentioned businesses thus resulted in the further accumulation of the technological capabilities of the companies. Their relatively higher levels of R&D spending represented the firms' opportunities for differentiation and segmentation, because substantial investments in R&D are a necessary condition to develop new products, improve existing ones, or upgrade production processes in these highly knowledge-intensive industry categories. The comparison of the specific timing of entry into individual product markets reconfirmed technology-driven diversifiers' commitment into cumulative capability building: The initiation of these firms' entry into the major non-textile product markets was concentrated in the 1970s, while they diversified into different segments within those broad business lines in the 1980s and 1990s.

The technology frontrunners, however, did not necessarily stay within the technology boundaries of narrow capability spheres. They apparently entered into businesses far from their conventional bases, particularly when those markets enjoyed growing demand. Yet a closer look reveals that the newly added businesses such as medical devices, pharmaceuticals, and optical disks were largely the ones that had been nurtured and supported by the companies' technological resources and capabilities. For instance, for their diversification into pharmaceutical businesses and artificial organ manufacturing, firms built on their chemical synthesis technologies and synthetic membrane know-how, respectively, as they acquired and assimilated the necessary basic biotechnology (Toray, 1997: 743–745).

In contrast, diversion into unrelated markets which did not draw on strength from the companies' technological roots, did not become a significant source of value in corporate growth. Those businesses were thus mostly divested. For instance, Asahi Kasei diversified into frozen food business in 1972 when the company formed a joint venture with Daiei, the then largest discount department chain in Japan. The company continued to invest in food trades including bakery products through a joint venture with the confectionery company, Morinaga, in 1986. In the end, however, Asahi Kasei sold all of its food businesses to Japan Tobacco in 1999 because of poor profits (Asahi Kasei, 1981; Hirota, 2002).

The diversification strategy of Toray outlines the basic directions that the firms in this strategic group took. Given the troubles in its basic textile operations in the 1970s, increasing demands particularly from the information technology and housing construction industries encouraged Toray to intensify its range of plastic applications into the fields of electronic materials in 1970 and construction materials in 1975. Toray then began its pharmaceuticals operations in 1977 by the manufacturing of prostaglandin, an unsaturated fatty acid derivative, thanks to its joint research with Kaken Pharmaceutical, a medium-sized pharmaceutical company. Toray's medical products business for the manufacturing of artificial kidneys followed in the same year, which resulted from the polymethylmethacrylate membrane development of the company's Basic Research Laboratories, accompanied by joint research and clinical studies with Harvard University and Tokyo Women's Medical University (Toray, 1997: 743–744). As membrane technologies were utilized for several medical products, Toray then exploited new business opportunities for its reverse osmosis membranes and developed ones for water managing purposes, such as recycling water purification, in cooperation with its subsidiary Toray Engineering in 1980. Toray's diversification then accelerated along these major business lines up to the present day (Makino, 2002).

3.4.2 Strategic Group 2: textile adherents

These were the firms that did not fully realize their technological potential for non-textile market entry or necessarily commit themselves to R&D activities for chemical products. Enterprises represented by Toyobo and Unitika deliberately concentrated on high-end textile products throughout the 1970s, thanks to the historical identity of textile business as their inherent domain (Abe and Tanimoto, 2003: 20–22). The companies had become highly integrated into various downstream operations, including apparel, by that time, so that sunk costs in textiles were higher compared to the enterprises that had more specialized upstream operations.[8] Given the past investment in resources and capabilities in large-scale facilities in synthetic fibers as well as in the entire vertical processes of textiles, both natural and synthetic, those companies regarded the textile domain as their competitive advantage in terms of resources and capabilities. This domain commitment functioned as a core rigidity and thus an exit barrier out of textiles.

Toyobo or Unitika did not fully commit themselves to R&D activities for chemical product markets, even when technology-driven companies started establishing their learning bases in technologically related markets beyond textiles in the 1970s. Because they did not build technological capacities for non-textile entry, the firms consequently fell behind in terms of their diversification into those petrochemical businesses.

[8]Most of the technology-driven diversifiers actually integrated forward into fabric production. They, however, adopted subcontracting arrangements in weaving operations so that sunk costs and exit barriers were substantially lower compared to the case of textile adherents. The technology-driven diversifiers seldom ventured into apparel trades.

Chemical-related businesses stayed relatively small in the companies' product portfolio, until they would give up their textile-centred growth strategy in the early 1980s. None of their subsequent restructuring toward polymer chemicals, however, brought about the distinctive capabilities possessed by technology-driven diversifiers.

The example of Toyobo illustrates this problem of delayed entry. Toyobo's business model was unique in that the firm regarded textiles, especially high-end ones, as its central business domain throughout the 1970s (Toyobo, 1986: 313–336; Abe and Tanimoto, 2003: 20–22). Since the company did not make substantial investments in R&D, its non-textile operations in the early 1980s were still limited to a narrow range of engineering plastics and enzymatic reagent businesses. Entry into the latter product market commenced with the necessary know-how of fermentation technology through the company's efforts to utilize yeast, which was cultivated from rayon waste in its pulp plants (Ishihara, 2002).

Toyobo was forced to modify its business model in the 1980s because the company's performance visibly declined among the largest textile companies. In spite of the short-lived prosperity of the 1980s, the company became convinced that conventional textile domains would not lead it in promising directions (Toyobo, 1986: 527–528). The company thus belatedly started diversification efforts into such fields as membranes, filters, artificial organs, and electronic materials, which only followed the strategies of its rivals. However, Toyobo could not catch up with technology-driven enterprises, as those companies that had accumulated capabilities in the knowledge-intensive products had already secured their strong market positions.

3.4.3 Strategic Group 3: market-led diversifiers

Compensating for the limited scope of technological resources and capabilities, three technology-laggard companies followed "market-led" diversification patterns. Nisshinbo, Kurabo, and Kanebo are included in this group. This business model emphasized investments in marketing and/or financial capabilities, which were especially directed toward the rapidly growing product markets. Their strategies for entry into a number of expanding product markets commenced as early as the 1950s and 1960s when the firms in the other two groups were preoccupied with the development of synthetic fibers.

The companies' diversification patterns in the 1970s and thereafter exemplified their entry into a variety of product markets whose common character was the high growth of targeted markets. The basic reasons for the continuing investments by the technology-laggard firms in a number of diverse directions were twofold. First, they could not develop any distinctive technological capabilities that generated a growth core in their extensive product portfolios. Their meager amounts of investments in R&D which were scattered in the diverse operations further put the companies into less advantageous positions in the relevant markets. As a whole, those limited capabilities did not allow the firms to establish an overall competitive position for a broad range of products. Second, they could not secure effective market power even through the investment in marketing and advertisement for their consumer-oriented businesses. They thus had to continue to seek new ventures in new venues. The cases of Nisshinbo and Kurabo in particular typified the first premise, whereas the diversification pattern of Kanebo offers the appropriate example for the second premise.

Nisshinbo diversified into a number of varied areas including color imaging and control systems and biological support derivative businesses. This entry became possible through the belated and narrowly focused investments in R&D committed by the company, although its technological resources and capabilities still remained localized and confined (Nisshinbo, 1989; Shiohata, 2003). On the other hand, the conventional strength of the company in its corporate financial position gave no clear directions in terms of targeting specific industries or products. Kurabo, in the meanwhile, continued its basic textile orientation while holding on to its diversification into a number of businesses whose market prospects were positive. In this regard, the company's strategy came close to that of Nisshinbo, as Kurabo actually entered into similar markets in information systems, electronic-applied equipment, and biomedicals. Kurabo also attempted others, including flower and plant growing, real-estate leasing, and equipment for pollution control (Kurabo, 1988: 643–650).

Kanebo intensified its diversification into growing product markets under its unifying corporate theme of the "goods and services enriching consumers' daily life." The company introduced its "Pentagon Management" scheme in 1974, as it escalated a diversified growth policy which included five domains: textiles, cosmetics, pharmaceuticals, food, and housing construction and sales. Kanebo grew into areas of cosmetics and housing through internal development, while in food and pharmaceuticals the company relied on the acquisition of medium-sized enterprises such as the Izumi Confectionary and Nakataki Pharmaceuticals (Kanebo, 1988: 820, 916). In addition to its pentagon businesses, Kanebo added electronics business as its sixth growth direction, as the company formed a joint venture with Mitsubishi Electronics for the manufacturing of IC and LSI chips in 1982 (Hasegawa, 2002).

4. Three strategic groups and the effectiveness of different diversification models

Because textile companies with different resources and capabilities adopted distinctive diversification strategies, the financial performance of these enterprises should ultimately represent the effectiveness of individual business models. Through statistical approaches, we therefore test the long-term effectiveness of various elements and types of capabilities and the management's deployment of those competitive resources.

4.1 Identification of strategic time periods

In order to trace the long-term pattern of the efficacy of contrasting diversification models, performance comparison encompasses the period from the end of the 1960s to the beginning of the 2000s. We employed a prolonged time span in order to test the basic and lasting strategic adjustments across different periods. Each strategic time period was broadly identified through a historical examination of the major economic factors affecting investment patterns of individual enterprises. Those include the following: macroeconomic indicators such as gross domestic product (GDP) growth and wholesale prices; and financial factors like exchange rate and stock prices. To test the genuine effect of environmental changes, we deliberately selected these variables that were exogenous to managerial decision-making, as proposed by Geringer *et al.* (2000).

According to Figure 1, the entire time span of three decades can be conveniently divided into three distinct strategic time periods (STPs): STP 1 covers 1970–1981, STP 2 1982–1989, and STP 3 1990–2001. The first phase of the 1970s represents the thriving yet turbulent years. After the rapid and stable growth of the 1960s, Japanese economy experienced unprecedented instability, thanks to the currency realignment of 1971 and the two major oil shocks of 1973 and 1979. The second period of the 1980s was the decade of prosperity and bubbles that started in 1982 when the Japanese economy absorbed the aftershocks of the second oil shock. While economic growth performance in general remained sound, real-estate prices continued to rise to extraordinary levels and stock markets witnessed an unprecedented boom. The final period of the 1990s characterizes the decade of nagging depression that began in 1990 when the bubble economy of the second half of the 1980s abruptly came to an end with the collapse of real-estate prices and equity markets. The Japanese economy entered into a recession that would last for more than a decade.

4.2 Dependent variables, strategic variables, and control variables

As in prior studies (Bettis, 1981; Grant and Jammine, 1988; Delios and Beamish, 1999), this article used accounting-based measures to define a firm's profitability. Despite some criticisms regarding employment of these measures, accounting-based figures have been commonly used to evaluate strategic and management effectiveness. Geringer *et al.* (1989) provided an extensive argument in favor of sales-based measures in international companies, and Tallman and Li (1996) supported the employment of return on sales (ROS), although the various measures of profitability were typically correlated (Robins and Wieserma, 1995). Following those arguments, ROS was employed as our primary dependent variable to illustrate the profitability of companies. We however tested return on assets (ROA), obtaining similar but slightly weaker results. We thus summarize the results for ROS regression in the following analyses.

Given the descriptive and qualitative nature of product diversification groupings, as was explained above in detail, we supplemented our categories with the entropy measures, related and unrelated, based on JSIC codes. Following the general guideline by Palepu (1985), firm participation in different two-digit JSIC codes was treated as unrelated diversification. Owing to the aggregated nature of the data at the source, three-digit JSIC codes were used to classify related diversification. This procedure

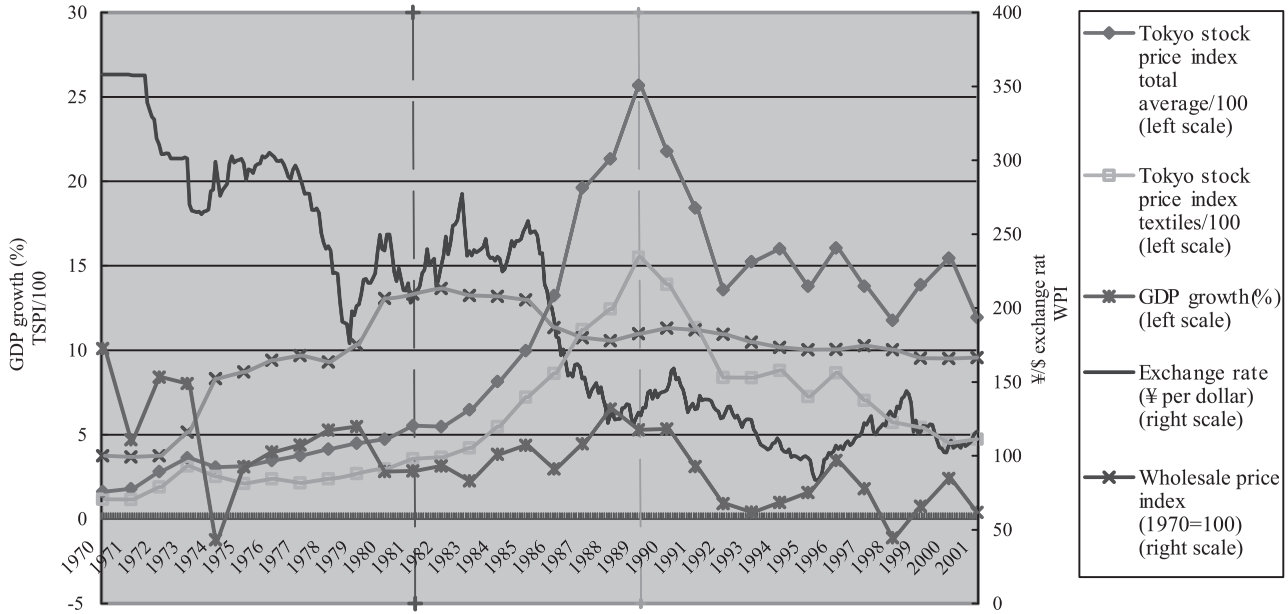

Figure 1 Three strategic time periods based on economic indicators.
Source: Statistics Department, the Bank of Japan; Tokyo Stock Exchange; *Annual Report of International Finance Bureau*, Ministry of Finance, Japan; *World Development Indicators,* World Bank; *Report on National Accounts*, Economic Planning Agency, Government of Japan.

sounded reasonable but generated one dilemma for the "textile adherent" business category. Because in the statistical calculations their diversification from "JSIC 142," natural fiber spinning, to "JSIC 204," manufactured fiber production, looked unrelated in the same manner as the entry into food or other distant markets, unrelated diversification entropy for these firms was partially overemphasized. Nevertheless, because the strategies of the textile adherent firms were well represented by their high textile sales ratios up to the 1980s, those figures would correct some distortions of entropies in terms of overall statistical outcomes.

Other variables were included on the basis of their potential to explain the performance differences among firms. Following Bettis (1981), Caves (1982: 9), and Delios and Beamish (1999), we assessed a firm's possession of technological and marketing assets by respectively employing R&D and advertising intensity. We employed R&D expenditures as a percentage of firms' total sales to represent technological assets that constitute a firm's extensible core skills or capabilities (Rumelt, 1974). We then used advertising expenditures as a percentage of firms' total sales to illustrate a company's commitment to marketing assets. In order to capture the significance of sound financial management, the model introduced another variable, Equity, which represents the proportion of shareholders' equity in the total assets. One improvement offered by the present model was that we examine the impact of the ratio of textile sales on profitability. Textile sales ratio was the proportion of a firm's textile-related businesses in its total sales. Since our descriptive analyses have showed that firms ultimately failed to yield the satisfactory financial results by concentrating on textile businesses, this variable was included in the regression model. Another unique variable employed in the model was apparel integration, as it has become significant in textile business. By apparel integration, we signified the forward entry into apparel production. We used a dummy variable to represent integration into clothing manufacturing. The dummy took the value "1," when the firm integrated into apparel making, and the value "0" otherwise.

We controlled for two other variables that are likely to influence financial performance: firm size and industry growth. Firm size was included to test the significance of scale economies and market power and was represented by employee count.[9] To control for industry effects, some studies employed industry dummy variables (Grant *et al.*, 1988; Geringer *et al.*, 2000), while others used industry characteristics (Robins and Wieserma, 1995; Tallman and Li, 1996; Delios and Beamish, 1999). We included a variable representing industry growth rates as Christensen and Montgomery (1981) specifically link the performance impact of product diversification with the quantitative measure of the relative industry growth rates. Industry growth was measured here by the average annual growth

[9]We initially employed natural logarithm of total assets to measure size. We however replaced it with employee count because of the very high correlation between variables including LnAsset and RD, and LnAsset and Textile% in STP 1, and ADV and LnAsset, and Textile% and LnAsset in STP 2.

rate of the industry shipments, weighted to reflect a firm's relative sales in the different product markets in which it operates. Industry shipments for each three-digit JSIC category in which a firm participated were multiplied by the proportion of firm sales in that industry and then aggregated for the firm's whole businesses (This methodology is similar to the industry-level controls employed by Christensen and Montgomery, 1981; Robins and Wieserma, 1995). Note that, given the product portfolio adjusted growth rate that is employed, the industry growth variable used here theoretically represents both exogenous industry environment and endogenous strategic choice by the management. In order to avoid this categorical mix-up, studies have often employed the industry dummies or growth rate of the largest business by sales. These approaches, however, may introduce significant distortions in regression calculations, because each one of the enterprises in our sample operated in several industries, and the relative weight of individual business segments is significantly varied by company. The specific way of employing our specification would thus technically produce the least biased result of calculation. Table 4 summarizes the variables and their operational definitions used in this study.

Table 4 Variables and their definitions

Dependent variables	
Financial performance	ROS, current (ordinary) profits[a]/total sales
Strategic variables	
Product diversification strategy	Strategic groups
	Tech, technology-driven diversifiers
	Text, textile adherents
	Market, market-led diversifiers
	Entropy measure
	Er, related entropy
	Eur, unrelated entropy
Technological assets	RD, R&D expenditures/total sales
Marketing assets	ADV, advertising expenditures/total sales
Financial assets	Equity, shareholders equity/total assets
Textile sales ratio	TextSale, textile sales/total sales
Apparel integration	Apparel (dummy variable, 1 or 0)
Control variables	
Firm size	Employee, number of employees
Industry growth rate (weighted)	IndGro, weighted average annual growth rate of industry shipments

[a]Current or ordinary profits are calculated by subtracting from, or adding to, operating profit such items as balance of interest payments that represent non-operating profit or loss.

4.3 *Validation of strategic groupings through the tests of mean differences*

The qualitative strategic groupings detailed in Section 3.4 should be validated through statistical tests. To this end, we check significant mean differences between the groups by employing the analysis of variance (ANOVA) and the Scheffé method of multiple comparisons. We first clarify the expected relationships of various independent variables to specific groupings. Because of its technological capabilities and their application to related product areas, the Tech group should illustrate high value in Er and RD and low value in Eur and Apparel. We anticipate high values in Textile% and Apparel and low values in RD for the companies in the vertically integrated Text group. For the Market firms, because of their expansion into unrelated areas through the utilization of marketing investments and conservative financial structure, high values are expected in Eur, ADV, and Equity, while their RD should be low. In general, each group as a whole should be significantly separated in a statistical sense from the others.

We first ran one-way ANOVA on each variable using the three qualitative diversification categories as factor variables. The means were calculated for each one of the Tech, Text, and Market categories including 5, 2, and 3 firms, respectively, for three STPs: 12 years encompassing the 1970s (STP 1), 8 years in the 1980s (STP 2), and 12 years since the 1990s (STP 3). Employing 2-year average figures, thus, the observations in the pool for Tech, Text, and Market were 30, 12, and 18 for STP 1 and STP 3, and 20, 8, and 12 for STP 2. The *F*-statistic here referred to the statistical significance of intergroup differences of means. Following the work of Bettis (1981), we then used the Scheffé method of multiple comparisons to determine which of the three pairwise comparisons (Text–Market, Text–Tech, and Market–Tech) are statistically different.[10] This method allows for the simultaneous inference from pairwise comparisons with an ANOVA. A series of simple *t*-tests under such circumstances are inappropriate (Bettis, 1981).

Table 5 summarizes the results of the one-way ANOVA which are run separately on the three strategic groups for STP 1, STP 2, and STP 3. As Table 5 illustrates, the null hypothesis of equal means between Tech, Text, and Market categories is rejected at high levels of significance for Er, Eur, RD, Equity, TextSale, and Apparel in STP 1. We reject the null hypothesis that the group means are equal for Er, Eur, RD, ADV, Equity, TextSale, Apparel, and IndGro in STP 2 and ROS, Er, Eur, RD, Equity, TextSale, Apparel, Employee, and IndGro in STP 3.

Table 6 presents the outcomes of Scheffé method of multiple comparison for each variable that shows high levels of significance in ANOVA. The outcomes generally verify the originally assumed relationships between various independent

[10]When we employed other post hoc tests including Bonferroni and Tukey, the results did not show any significant differences than those outcomes by Scheffé. The only exception is that Text-Market difference of related entropy in STP 1 became statistically significant at the 0.1 level (**p = 0.097**) when we measure by Tukey post hoc test.

variables, and intergroup variations are overall large enough to distinguish these groups. For related and unrelated entropy measures, significant differences exist between Tech and Market firms both in STP 2 and in STP 3. While Tech firms show higher Er in STP 2 and STP 3, Market firms exhibit higher Eur in all three STPs. Text firms illustrate statistically significant and higher Er compared to Market firms in STP 3 and higher Eur relative to Tech firms in STP 1. Tech firms' R&D investment is higher than that of Text and Market firms by 0.991 and 1.613%, respectively, in STP 1. Text firms appear to spend 0.622% more of sales on R&D than Market firms in the same period. While the basic relationships in terms of the firms' R&D investments remain the same, the differences between the three groups become sharper in STP 2 and especially in STP 3. As for advertisement expenditure, the only statistically different investment pattern exists between Text and Market firms, as the latter shows 0.864% more in terms of advertising intensity in STP 2. Market firms illustrate more equity strength by 6.315% in STP 1, 15.728% in STP 2, and 23.623% in STP 3 than Text firms. Equity strength of Text firms is 29.409% less than Tech firms in STP 3. As for the proportion of textile sales, Text firms appear to stick to textiles with 19.167% more than Tech firms in terms of their sales ratios in STP 1 and 22.583% in STP 2, while that difference declines to 18.300% in STP 3. Text firms show a higher degree of apparel integration compared to both Market and Tech firms in all the STPs, while Tech firms hardly commit to apparel operations. Between three groups, there seems to be no highly significant differences in terms of employee count that represents firm size. The industry growth variable illustrates that Tech firms seem to operate in relatively high growth markets compared to Text and Market companies in STP 2 and STP 3.

4.4 Strategic groups and economic performance

4.4.1 Comparisons of performance means

For an initial check whether significant differences exist between the three strategic groups in terms of mean performance measures, ANOVA, and Sheffé tests were performed. The statistical results, as has been presented in Tables 5 and 6, illustrate that we cannot reject the null hypothesis that the group means are equal at any reasonable level of significance in STP 1 and STP 2. This indicates that no single strategy enjoys significant performance advantages over the others in those time periods. Outcomes for STP 3 are quite interesting, as they are remarkably different from those for STP 1 and STP 2. We find a highly significant difference of about 4.1% between Tech and Text and Tech and Market categories in terms of ROS.[11] The results signify that technology-driven strategy outperforms both the market-led and textile adherent strategies in STP 3.

[11]The outcomes were similar in terms of ROA, while the difference among the categories was slightly less, at about 2.8 and 2.9% between Tech and the other two categories, Market and Text, respectively.

Table 5 Analysis of variance (ANOVA)

Variable	Mean			Standard deviation			*F*–statistic	Sigificance
	Tech	Text	Market	Tech	Text	Market		
STP1 (turbulent period)								
ROS	0.025	–0.001	0.024	0.027	0.038	0.034	2.323	0.108
Er	0.719	0.742	0.644	0.102	0.051	0.179	2.857	0.066*
Eur	0.366	0.724	0.788	0.260	0.110	0.369	15.365	0.000**
RD	2.030	1.039	0.416	0.265	0.196	0.194	231.705	0.000**
ADV	0.596	0.389	0.827	0.270	0.305	1.081	1.778	0.178
Equity	19.311	15.882	22.197	6.461	3.924	9.692	2.684	0.078*
TextSale	71.916	91.083	81.416	13.072	7.723	9.139	13.589	0.000**
Apparel	0.000	1.000	0.670	0.000	0.000	0.485	74.100	0.000**
Employee	11038	13602	9743	4978	4583	5309	1.897	0.160
IndGro	–1.117	–1.699	–1.213	3.941	3.471	2.571	0.121	0.886
STP2 (prosperity period)								
ROS	0.047	0.028	0.034	0.022	0.007	0.018	2.004	0.155
Er	0.771	0.682	0.608	0.105	0.129	0.163	6.097	0.005**
Eur	0.445	0.730	0.915	0.291	0.057	0.196	13.661	0.000**
RD	3.473	2.223	0.843	0.892	0.469	0.462	49.532	0.000**
ADV	0.705	0.216	1.080	0.415	0.041	1.202	3.467	0.042**
Equity	29.889	17.790	33.518	8.394	6.878	21.109	2.875	0.071*
TextSale	55.500	78.080	71.570	16.730	4.958	13.942	8.954	0.001**
Apparel	0.000	1.000	0.670	0.000	0.000	0.492	48.100	0.000**
Employee	8038	7618	6246	4131	2424	1648	1.147	0.329
IndGro	0.519	–0.677	–0.182	0.856	0.638	0.653	7.990	0.001**

Table 5 Continued

Variable	Mean			Standard deviation			*F*–statistic	Sigificance
	Tech	Text	Market	Tech	Text	Market		
STP3 (depression period)								
ROS	0.060	0.018	0.018	0.016	0.004	0.019	49.849	0.000**
Er	0.780	0.802	0.617	0.120	0.004	0.173	10.826	0.000**
Eur	0.569	0.770	0.960	0.412	0.050	0.212	8.852	0.000**
RD	5.181	3.033	1.589	1.351	0.369	0.443	74.649	0.000**
ADV	1.098	0.852	1.234	0.526	0.515	1.319	0.761	0.472
Equity	46.389	16.980	40.603	7.346	8.627	23.236	16.139	0.000**
TextSale	41.533	59.833	53.333	15.590	9.485	16.066	7.832	0.001**
Apparel	0.200	1.000	0.670	0.407	0.000	0.485	20.080	0.000**
Employee	6927	5041	5087	2988	2046	2399	2.765	0.073*
IndGro	–2.612	–4.554	–3.980	1.464	0.748	1.880	9.032	0.000**

STP 1, $n = 60$; STP 2, $n = 40$; STP 3, $n = 60$.

* Significant at the 0.10 level.

** Significant at the 0.05 level.

Table 6 Scheffé method of multiple comparisons

Variable	Pairwise comparison	STP 1 (turbulent period)			STP 2 (prosperity period)			STP 3 (depression period)		
		Difference	Standard error	Significance	Difference	Standard error	Significance	Difference	Standard error	Significance
ROS										
	Tech–Text	–	–	–	–	–	–	0.041	0.005	0.000**
	Tech–Market	–	–	–	–	–	–	0.041	0.005	0.000**
	Text–Market	–	–	–	–	–	–	–0.001	0.006	0.997
Er										
	Tech–Text	–0.022	0.042	0.871	0.088	0.054	0.274	–0.022	0.044	0.880
	Tech–Market	0.075	0.037	0.136	0.163	0.047	0.006**	0.161	0.039	0.001**
	Text–Market	0.097	0.046	0.118	0.074	0.058	0.461	0.184	0.048	0.001**
Eur										
	Tech–Text	–0.358	0.095	0.002**	–0.285	0.136	0.129	–0.201	0.108	0.133
	Tech–Market	–0.422	0.083	0.000**	–0.470	0.091	0.000**	–0.391	0.094	0.001**
	Text–Market	–0.062	0.130	0.833	–0.185	0.143	0.447	–0.190	0.118	0.361
RD										
	Tech–Text	0.991	0.081	0.000**	1.249	0.299	0.001**	2.148	0.344	0.000**
	Tech–Market	1.613	0.077	0.000**	2.629	0.264	0.000**	3.592	0.300	0.000**
	Text–Market	0.622	0.092	0.000**	1.230	0.316	0.001**	1.444	0.375	0.001**
ADV										
	Tech–Text	–	–	–	0.489	0.301	0.280	–	–	–
	Tech–Market	–	–	–	–0.375	0.263	0.370	–	–	–
	Text–Market	–	–	–	–0.864	0.328	0.042**	–	–	–

Table 6 Continued

Variable	Pairwise comparison	STP 1 (turbulent period)			STP 2 (prosperity period)			STP 3 (depression period)		
		Difference	Standard error	Significance	Difference	Standard error	Significance	Difference	Standard error	Significance
Equity										
	Tech–Text	3.429	2.465	0.387	12.099	6.056	0.152	29.409	5.248	0.000**
	Tech–Market	−2.887	2.239	0.441	−3.629	5.034	0.773	5.786	4.628	0.463
	Text–Market	−6.315	2.728	0.078*	−15.728	6.719	0.079*	−23.623	5.532	0.000**
TextSale										
	Tech–Text	−19.167	3.794	0.000**	−22.583	6.006	0.003**	−18.300	5.043	0.003**
	Tech–Market	−9.500	3.311	0.021**	−16.069	5.242	0.015**	−11.800	4.402	0.034**
	Text–Market	9.667	4.139	0.074*	6.514	6.553	0.614	6.500	5.502	0.502
Apparel										
	Tech–Text	−1.000	0.090	0.000**	−1.000	0.112	0.000**	−0.800	0.134	0.000**
	Tech–Market	−0.667	0.079	0.000**	−0.667	0.098	0.000**	−0.467	0.117	0.001**
	Text–Market	0.333	0.099	0.006**	0.333	0.123	0.034**	0.333	0.146	0.084*
Employee										
	Tech–Text	–	–	–	–	–	–	1885	925	0.136
	Tech–Market	–	–	–	–	–	–	1840	878	0.122
	Text–Market	–	–	–	–	–	–	−45	1042	0.999
IndGro										
	Tech–Text	–	–	–	1.197	0.319	0.003**	1.943	0.513	0.002**
	Tech–Market	–	–	–	0.702	0.278	0.053*	1.369	0.447	0.013**
	Text–Market	–	–	–	−0.495	0.347	0.373	−0.574	0.559	0.593

STP 1, $n = 60$; STP 2, $n = 40$; STP 3, $n = 60$.

* Significant at the 0.10 level.

** Significant at the 0.05 level.

Note: The table shows only the cases where *F*-test rejected the null hypothesis of equal means between groups in the ANOVA in Table 5.

4.4.2 Least-square regression tests

We employed multiple regression analyses to examine the effectiveness of product diversification strategies that the Japanese textile firms have followed since the 1970s. We used pooled time-series cross-sectional data set for the analysis. As was the case for ANOVA, the same regressions were performed separately on three data sets representing the three time periods. The first (STP 1), with 2-year average figures in the pool, covered from 1970 to 1981, while the second (STP 2) 1982–1989, and the third (STP 3) 1990–2001. STP 1 thus concerns 60 observations, STP 2, 40, and STP 3, 60, making a total of 160 observations for the entire periods. The employment of the sets of 2-year averages could partially moderate the temporary disturbances and transient errors. Besides, we could reduce the troubles associated with the high levels of heteroscedasticity among the cross-sectional data and serial autocorrelation that often occurred with the time-series data. Averaging the data over 2-year intervals appeared appropriate in terms of the intra-company stability of independent variables after examining the structural changes in the mean vectors of those variables.[12] We then employed time dummy variables for temporal effects to correct for possible analytical troubles, and the estimation technique employed was least-squares dummy variable methods of the general linear model (see Sayrs, 1989 and Geringer *et al.*, 2000 for the technical and methodological advantages of this approach).[13]

The regression was designed to investigate the effects of diversification measures and other strategic contents on profitability. However, the inclusion of the qualitative product diversity variables in the model turned out to be inappropriate, thanks to the severe multicollinearity problems between the qualitative categories and quantitative indexes. This was not necessarily a surprising outcome, because our descriptive product diversity categories were primarily defined according to those quantitative characteristics. Those variables that showed very high degrees of collinearity (pairwise correlation coefficient higher than or equal to 0.6) for STP 1 included positive relationships between Tech and RD, Text and Apparel and negative relationships between Tech and Apparel, Tech and Eur, Tech and Market, and Market and RD. In STP 2, significantly high positive correlations were found between Tech and RD, Text and Apparel, and Market and Eur, while negative relations exist between Tech and Apparel, Tech and Market, and Market and RD. In STP 3, we observed positive relationships between Tech and RD and Tech and ROS and negative relationships between Tech and Apparel, Tech and Market, Text and Equity, and Market and RD.

[12]As we checked the mean vectors of the numerical variables, no statistically significant structural changes (at the 10% significance level or more) were found over the time periods.

[13]Since the significance level of Levene's Test of the homogeneity of variances of the dependent and of the covariates were at lowest 0.272 (F-value = 1.387), thus greater than 0.10, equal variances assumptions of the model was not violated. We also estimated our results with generalized least-squares analysis, which is not sensitive to bias from heteroscedasticity and/or autocorrelation (Bergh and Holbein, 1997). Dummies representing temporal effects are not shown for the coherence and clarity of presentation in Table 8 and also in Table 10.

Hence, our regression model included the entropy and all other independent variables. It is thus specified as:

$$\begin{aligned}\text{ROS} = {} & \beta 0 + \beta 1(\text{Er}) + \beta 2(\text{Eur}) + \beta 3(\text{RD}) + \beta 4(\text{ADV}) + \beta 5(\text{Equity}) + \beta 6(\text{TextSale}) \\ & + \beta 7 \ (\text{Apparel}) + \beta 8(\text{Employee}) + \beta 9(\text{IndGro}) + \beta 10(\text{Time dummies}) + e\end{aligned}$$

4.4.3 Results and interpretations of least-square regressions

Table 7 gives the correlation matrix among all the variables. We find correlations among variables at most at a –0.576 level, which is between Apparel and RD in STP 1. We then check variance inflation factors (VIF) for each variable to reexamine for any possible troubles. As no one value of VIF is larger than 10, which is employed as a rule of thumb to detect serious multicollinearity, we can say that collinearity does not appear to be a major problem for this study.

Table 8 presents the estimation of the least-square regressions for the dependent variable ROS for the entire time periods as well as for STP 1, STP 2, and STP 3, separately. The regression results are satisfactory with high explanatory power. For the full sample, we find that related entropy, R&D investments, sound financial structure, and industry growth have positive and significant impacts on firm profitability. Other variables show insignificant relationships with apparel integration exhibiting the negative significance at a level of 0.052. The results, however, vary across different time periods.

The regression results for STP 1 show positive and significant coefficients for Equity and IndGro. In the volatile macroeconomic environment, industry growth understandably illustrates critical influence, while sound financial structure seems vital in terms of a company's profitability. None of the other variables including Er, Eur, RD, ADV, or TextSale are significant, which confirms the previous ANOVA results that no strategic groups dominated in terms of profitability in this period. Only in STP 1, we find statistically significant temporal effects, possibly thanks to the capricious environmental factors working in this time period. As we thus allow the intercepts to shift over time, the R^2 of the model increased substantially from 0.559 to 0.867, suggesting a better fit of the data. Performance outcomes in the 1970s then may not necessarily reflect appropriate circumstances for the systematic comparison of the success or failure of diversification strategies. This is because exogenous factors such as the currency realignment and two oil shocks have overwhelmed the synthetic fiber and upstream petrochemical industries in those years.

In STP 2, on the other hand, regression outcomes show several statistically significant coefficients at least at a 0.025 level. Both related and unrelated entropies have positive coefficients, implying that both related and unrelated diversification strategies have positive impact on profitability. This is further supported by the positive and significant coefficients for R&D intensity, advertising intensity, equity, and textile sales. These outcomes are appealing as they provide evidence that all the three business models,

Table 7 Pearson correlation coefficients and descriptive statistics

	Mean	Standard deviation	Er	Eur	RD	ADV	Equity	TextSale	Apparel	Employee	IndGro
STP 1(turbulent period)											
ROS	2.104	3.220	−0.098	0.026	0.186	−0.153	0.542*	−0.108	−0.367*	−0.027	−0.179
Er	0.702	0.128		−0.351*	0.101	−0.222	−0.125	−0.106	−0.116	0.188	0.079
Eur	0.564	0.339			−0.388*	0.245	0.076	−0.043	0.357*	0.229	0.063
RD	1.367	0.742				−0.153	0.204	−0.449*	−0.576*	0.058	0.064
ADV	0.621	0.633					−0.246	−0.160	0.177	0.251	−0.078
Equity	19.401	7.360						−0.037	−0.278*	0.135	−0.031
TextSale	78.600	13.267							0.538*	0.060	−0.310*
Apparel	0.400	0.494								0.156	−0.046
Employee	11081	5109									−0.016
IndGro	−1.263	3.441									
STP 2(prosperity period)											
ROS	0.039	0.021	0.513*	0.122	0.342	−0.227	0.549*	−0.160	−0.562*	0.164	−0.073
Er	0.704	0.145		−0.567*	0.453*	−0.532*	0.291	−0.026	−0.396*	−0.036	−0.062
Eur	0.614	0.332			−0.396*	0.280	0.252	−0.067	0.190	0.470*	−0.242
RD	2.319	1.345				−0.041	−0.043	−0.448*	−0.533*	0.306	0.225
ADV	0.719	0.764					−0.240	−0.556*	0.133	0.306	0.395*
Equity	28.881	13.689						0.076	−0.350	−0.027	−0.184
TextSale	64.840	17.035							0.466*	−0.527*	−0.549*
Apparel	0.400	0.496								−0.144	−0.354*
Employee	7384	3225									0.307
IndGro	0.069	0.887									

Table 7 Continued

	Mean	Standard deviation	Er	Eur	RD	ADV	Equity	TextSale	Apparel	Employee	IndGro
STP 3 (depression period)											
ROS	0.039	0.026	0.243	–0.419*	0.562*	0.022	0.449*	–0.256	–0.499*	0.213	0.250
Er	0.712	0.147		–0.384	0.363*	0.194*	–0.512	0.092	0.182	–0.088	0.030
Eur	0.730	0.356			–0.428*	0.191	–0.124	–0.165	0.339*	0.369*	0.013
RD	3.674	1.883				0.118	0.238	–0.193	–0.357*	0.280*	0.253
ADV	0.955	0.688					–0.284*	–0.266*	0.048	0.337*	0.168
Equity	37.955	18.607						0.061	–0.531*	0.022	0.278*
TextSale	48.733	16.385							0.390*	–0.505*	–0.514*
Apparel	0.500	0.504								–0.180	–0.503*
Employee	6318	3418									0.298*
IndGro	–3.411	1.693									

STP 1, $n = 60$; STP 2, $n = 40$; STP 3, $n = 60$.

* Significant at 0.05 level.

Table 8 Least-square regressions for dependent variable ROS: strategic and economic factors

Variable	Entire periods		STP1 (turbulent period)		STP2 (prosperity period)		STP3 (depression period)	
	Coefficient	Significance	Coefficient	Significance	Coefficient	Significance	Coefficient	Significance
Er	0.217	0.003** (3.102)	–0.064	0.380 (–0.891)	0.674	0.009** (2.953)	0.486	0.000** (4.193)
Eur	0.084	0.367 (0.906)	–0.024	0.804 (–0.250)	0.513	0.004** (3.317)	–0.268	0.002** (–3.268)
RD	0.225	0.019** (2.393)	–0.131	0.386 (–0.879)	0.556	0.002** (3.736)	0.305	0.000** (3.959)
ADV	–0.059	0.408 (–0.830)	–0.022	0.835 (–0.209)	0.730	0.001** (3.845)	–0.352	0.000** (–4.680)
Equity	0.350	0.000** (3.962)	0.464	0.002** (3.383)	0.489	0.004** (3.333)	0.441	0.001** (3.591)
TextSale	–0.152	0.199 (–1.292)	–0.166	0.250 (–1.173)	0.607	0.002** (3.572)	–0.324	0.007** (–2.845)
Apparel	–0.191	0.052* (–1.968)	–0.269	0.104 (–1.676)	–0.451	0.018** (–2.591)	–0.229	0.057* (–1.972)
Employee	–0.100	0.266 (–1.119)	–0.045	0.701 (–0.388)	–0.089	0.497 (–0.693)	0.266	0.013** (2.625)
IndGro	0.343	0.000** (3.907)	0.456	0.000** (4.935)	0.269	0.025** (2.441)	–0.079	0.353 (–0.942)
F-statistic	19.750**		28.393**		22.453**		42.324**	
R^2	0.705		0.867		0.877		0.896	

Entire periods, n=160; STP 1, n=60; STP 2, n=40; STP 3, n=60.

** Significant at the 0.05 level.

* Significant at the 0.10 level.

Note: The coefficients are standardized coefficients to determine the relative importance of significant predictors. The t-values are shown in parenthesis.

Tech, Text, and Market, proved successful, and no single business model had significant performance advantages over another. However, integration into apparel operations shows significantly negative coefficients. Relative to these pure firm-level strategy variables, industry composition and growth variable make a positive yet smaller contribution to firms' profitability.

Regression outcomes for STP 3 illustrate remarkably different results than those of both STP 1 and STP 2. The findings regarding entropy measures indicate significantly positive outcomes for the related entropy. On the other hand, the value for unrelated entropy is negative and significant. The presence of a positive and statistically significant coefficient for R&D clearly supports our findings for the success of technology-driven diversifiers and implies that investments into technological resources and capabilities have become the major sources for the survival of the largest companies. The regression results concerning marketing and financial assets show opposite signs. The coefficient for advertising intensity is significant yet now negative, which provides evidence that marketing orientation on which market-led firms relied has not proven successful in STP 3. As for financial policies, represented by the proportion of shareholders' equity in the total assets, we find positive and highly significant results at a 0.001 level. This may be taken as an indicator that capabilities in sound finance are effective in generating high profits in STP 3. Yet, in the depressed environment of the 1990s, as was the typical case of market-led firms, particularly Nisshinbo, finance capabilities alone with scattered and unrelated product portfolios do not bring the long-lasting high yields.[14]

On the contrary to the outcomes in STP 2, regression results for STP 3 illustrate negative and significant coefficient for textile sales ratio. This may indicate that while firms are able to achieve positive results with textile operations in the second time interval, they cannot necessarily yield the similar financial results in STP 3. As for forward integration into apparel operations, we again find a negative effect on profitability. Given that we also find negative and significant coefficients for apparel integration in STP 2, we may conclude that textile firms have remained ineffective in creating competitive advantages in apparel businesses. It seems a challenging task for the textile manufacturers to face Japan's established apparel producers and combat extensive imports especially from China. Firm size measured by employee count turns positive and significant only in STP 3. Although not conclusive, this may indicate that in the depressed market conditions the overall size of companies implies stronger market power that yields some form of monopoly profits.

Interestingly, in contrast to the two previous periods, the combined contribution of industry composition and market growth becomes insignificant. This change may imply that a generic strategy that allocates resources to expanding markets, which had

[14]Chatterjee and Wernerfelt (1991) found that unrelated diversification that relied primarily on financial resources had a lower performance than related diversification that exploited a firm's intangible resources.

functioned effectively in the 1980s, does not thus contribute to firm profitability in the contraction of the 1990s. Note that the growing markets such as electronics and chemicals (as has been illustrated in Table 2) actually enjoyed higher profitability in the 1980s and even the 1990s, as Table 9 summarizes. These results probably entail that the firms that attempted to exit from the less profitable commodity sectors such as cotton textiles and low-end synthetic fibers were not quite successful in those potentially profitable yet novel markets. Either the companies hesitated to adopt that entry strategy because of the lack of technology or even when they entered, they could not yield any profits, thanks to the absence of competitiveness. In sum, in the 1980s, besides the companies' efforts on the rationalization and restructuring of domestic production, such environmental factors as rising demand in high value-added segments of textiles as well as in markets outside textiles could pull the profitability upward for all the companies (Sakaino, 1987). In the 1990s, however, the firms had to have some form of competitive advantages for entry, survival, and profitability. More tailored strategies for competitiveness at the individual firm level thus seemed the determining factor for the firm's financial performance.

4.4.4 Effects of macroeconomic variables on performance

A closer look at the relationships between macroeconomic variables such as GDP growth rate, changes in consumer price index (CPI), and exchange rate fluctuation (Exch) on one hand and firms' financial performance on the other reveals an interesting pattern to reconfirm our findings related to market environments. Note that all Japanese enterprises, and industries for that matter, take those macroeconomic variables as an exogenous factor. The regression results concerning the significance of macroeconomic environments are summarized in Table 10. In the 1970s, when the Japanese industries experienced unprecedented economic shocks, the macroeconomic variables seem to have exercised a significant impact on the performance of entire companies with a coefficient of determination as high as 0.599. GDP growth understandably has a positive and significant influence, while the changes in consumer prices have a negative and significant impact, implying that macroeconomic instability played an important function. Exch shows a negative contribution with somewhat weaker significance. Because those macroeconomic factors dominated the strategy performance relationships, no single business model worked effectively to outperform the others in this period.

In the subsequent two periods, the explanatory power of the three macroeconomic variables visibly declines. This is particularly so in the 1990s with R^2 being 0.111. Only the growth of GDP shows a positive and significant result in the prosperous decade of the 1980s, while none of the variables turn out to be statistically significant in the depressed 1990s. The results for the 1980s illustrate that rapid economic growth and bursting demand without volatile prices may have contributed to firm profitability as long as companies committed to any of the three business models. This strategy-performance nexus may have temporarily masked the ineffective diversification

Table 9 Financial performance in terms of ROS by sector and industry, 1966–2000 (averaged annual rates in percentages)

	Sector/industry	1966–1970	1971–1975	1976–1980	1981–1985	1986–1990	1991–1995	1996–2000
1	Manufacturing	3.02	2.52	2.12	1.92	2.60	1.76	1.94
	1 Food	3.36	3.30	2.96	2.78	3.46	2.86	2.82
	2 Textiles	2.64	1.76	1.34	1.24	2.50	0.70	1.20
	3 Pulp and paper products	2.66	2.94	2.04	2.64	3.18	2.00	2.62
	4 Chemicals	6.24	4.60	4.00	4.36	6.78	5.30	7.12
	5 Petroleum and coal products	n/a	n/a	1.32	0.18	2.14	2.10	0.78
	6 Non-metallic mineral products	5.94	4.10	3.62	2.96	4.50	2.52	2.04
	7 Primary metals	5.36	2.68	2.62	1.54	4.52	1.48	1.50
	8 Metal products	4.96	3.76	2.74	2.52	4.06	2.84	2.22
	9 General machinery	6.06	4.44	4.00	3.98	4.26	2.48	3.06
	10 Electrical machinery and equipment	6.82	4.40	4.70	5.36	4.22	2.24	2.86
	11 Transportation equipment	6.02	3.90	4.40	3.90	3.70	2.20	3.34
	12 Instruments	n/a	4.92	5.36	5.40	4.32	3.04	5.10
	13 Other manufacturing	3.56	3.08	2.72	2.44	3.64	3.18	3.42
2	Construction	2.96	3.04	2.02	1.94	2.78	2.76	1.68
3	Electric, gas, and water supply	10.05	4.41	5.37	7.60	8.50	4.96	5.07
4	Wholesale and retail trade	1.24	1.42	1.06	0.82	1.22	0.96	0.96
5	Real-estate	9.94	6.06	3.16	3.06	4.30	–1.80	1.48
6	Transportation and communications	4.86	2.58	2.08	1.70	3.62	2.22	2.60
7	Service	3.72	3.78	3.54	2.98	3.00	1.84	2.08

Source: Calculated from *Hojin Kigyo Tokei Nenji Betsu Chosa* (Annual Survey of Statistics on Incorporated Business), Ministry of Finance, 1966–2000, Japan.

Table 10 Least-square regressions for dependent variable ROS: Macroeconomic factors

Variable	Entire periods		STP1 (turbulent period)		STP2 (prosperity period)		STP3 (depression period)	
	Coefficient	Significance	Coefficient	Significance	Coefficient	Significance	Coefficient	Significance
GDP	0.489	0.000** (3.696)	0.722	0.000** (4.432)	0.353	0.083* (1.790)	0.190	0.267 (1.122)
CPI	−0.277	0.134 (−1.508)	−0.293	0.020** (−2.441)	−0.275	0.302 (−1.049)	−0.182	0.301 (−1.044)
Exch	−0.043	0.663 (−0.434)	−0.102	0.267 (−1.128)	−0.124	0.652 (−0.455)	−0.039	0.829 (−0.217)
F-statistic	9.585		12.360**		3.085**		1.463	
R^2	0.327		0.599		0.278		0.111	

Entire periods, $n = 160$; STP 1, $n = 60$; STP 2, $n = 40$; STP 3, $n = 60$.

* Significant at the 0.10 level.

** Significant at the 0.05 level.

Note: t-values are shown in parenthesis. CPI is employed here because wholesale price index showed significant multicollinearity troubles in the regressions.

schemes of some enterprises as we pointed out above. The result for the 1990s implies that it was not the macroeconomic factors anymore that significantly affected the firm performance. It was rather the specific business models, which dictated industry entries and investment decisions of individual companies that critically influenced their financial outcomes.

5. Conclusions and implications

The longitudinal analyses of diversification strategies within the controlled environment of Japan's textile industry have yielded three major results. First, as the resource- and capability-based view of the firm theoretically predicts, the nature and magnitude of resources and capabilities that individual enterprises accumulated exercise critical impacts on their contrasting diversification patterns. Our historical and descriptive analysis concludes that the behavior of the largest textile companies represented three evolutionary models: technology-driven diversifiers, textile adherents, and market-led diversifiers. With their accumulated technical expertise in rayon manufacturing, technology-driven diversifiers made the early determination in terms of entering into a number of technologically related product markets and carried out substantial investments in R&D to implement those decisions. By contrast, textile adherents perceived their competitive advantages to rest on natural and synthetic textiles because their resources and capabilities were predominantly embedded in that business domain. This allegiance to textiles ultimately functioned as a lock-in mechanism that grew into core rigidities. On the other hand, compensating for the limited scope of technological resources and capabilities, laggard firms followed market-led diversification paths. While these enterprises strove to generate capabilities in marketing or finance, they diversified into product markets that were growing but technologically unrelated. These three diversification models, in turn, exercised critical influences on the performances of the companies in the long run.

Second, among the diversification strategies described above, the business model committing to technology investments and related diversification constitutes an enduring growth model that ultimately yields higher profitability relative to the other business models. The series of econometric tests illustrate that only the distinctive capabilities in technology have ensured that firms sustain competitive advantages. Historically accumulated endowments in technological resources and capabilities, followed by continuous investments in R&D, have become the grounds for the survival and growth of those companies. While past research proved this point in the context of dynamic industries (Steil *et al.*, 2002, part 3), we have found out that the significance of technology investment and diversification into related businesses stands true even in a mature industry context such as Japan's textiles.

Especially in the adversarial market conditions that Japanese textile companies started facing in the so-called Heisei Depression of the 1990s, it was not the capability development in marketing or finance functions that would bring about sustainable competitive advantages. Several companies, particularly technology laggards, actually explored those directions, as they circumvented rising technology hurdles. Not only could capabilities in finance be merely a complement, rather than a substitute, in generating the long-lasting high yields, but also the entry into the "soft" markets through marketing investments did not prove successful. While the new industry environment may be less technology intensive, it is likewise ferociously competitive in that long-established companies in relevant fields would seek market leadership based on their marketing resources and capabilities. In the final analysis, in a strenuous environment in which Japanese enterprises in textiles lost overall price competitiveness, only accumulated technological resources and capabilities have generated the continuous flow of profits for individual companies. As that industry has progressively become technology- and capital-intensive, the coordinated development and deployment of these resources and capabilities constitute the core factor for competitive advantage.

Third, and the core argument of the article is that, as macroeconomic and industry settings change, the particular strategies of diversification have varying effects on financial performance. Rather than showing fixed relationships, the strategy-performance nexus is contingent on economic environments. Actually, only in the prosperous 1980s did all of the three basic diversification models function effectively. In the other phases of economic environments, lasting profitability did not result from apparently attractive schemes for mature businesses, such as entering into unrelated yet growing markets while exiting textiles or even concentrating the companies' core capabilities on the original textile domains. This result concerning the temporal variations supports the recent findings of Mayer and Whittington (2003) who concluded that the diversification performance relationship is not stable across time periods. Such environmental variability could explain the inconsistent conclusions that have been a troublesome aspect of past diversification studies (Grant, 2002).

This last point in particular yields a few important implications for the directions of future diversification research. The still inconclusive issue of the diversification strategy-cum-financial performance mechanism should benefit from more systematic and dynamic analyses by considering different environmental conditions. It would be especially useful for diversification studies to extend the arguments developed in this study to other industries in Japan, dynamic as well as mature, and also to other geographical areas where environmental factors should differ. Another fruitful extension would be to take longer time spans to examine the changing significance of the effects of diversification upon firm performance, as Cantwell and Piscitello (2000) did for the varying impact of technological competence accumulation on diversification and internationalization from 1901 to 1995. Given the potential significance of the evidence of this study, its longer term empirical extensions in different geographical and industry settings may thus have crucial implications for the theoretical advancement of corporate strategy-financial performance research.

Acknowledgements

Participants of the following conferences and seminars gave useful comments on the earlier versions of this article: Spring Colloquia Series, Institute of Industrial Relations, University of California at Berkeley, the Fourth Asia Academy of Management Conference in Shanghai, and the 2005 Academy of Management Meeting in Honolulu. We especially thank Takeshi Abe, Giovanni Dosi, Haruo Imai, James R. Lincoln, David Mowery, and Masahiro Shimotani for their helpful suggestions. Thorough criticism provided by three anonymous reviewers and valuable editorial support offered by Josef Chytry is deeply appreciated. We also acknowledge the financial assistance of the Japan Society for the Promotion of Science, the Mizuho Securities Endowment at the Graduate School of Economics, Kyoto University, and the Shanghai Center for Economic Research at Kyoto University.

Addresses for Correspondence

Asli M. Colpan, Institute of Economic Research, Kyoto University. Email: macolpan @kier.kyoto-u.ac.jp

Takashi Hikino, Graduate School of Economics, Kyoto University, and Kyoto Center for Japanese Research, Stanford University. Email: hikino@econ. kyoto-u.ac.jp

References

Abe, T. and M. Tanimoto (2003), 'The restructuring of cotton spinning companies in the postwar Japan,' *The 27th Fuji Business History Conference Proceedings*, Shizuoka, 1–23.

Amit, R. and P. J. Schoemaker (1993), 'Strategic assets and organizational rent,' *Strategic Management Journal*, **14**, 33–46.

Asaba, S. and T. Kagono (eds) (2004), 'Takakuka Senryaku no Saikento' (Reexamination of Diversification), *Soshiki Kagaku*, **37**(3), 2–32.

Asahi Kasei (1981), *Asahi Kasei Kogyou: I Shoku Ju Sougo Kagaku Kigyo* (Asahi Kasei Industry: Textile, Food, Housing and Chemicals Enterprise), Asahi Sonorama: Tokyo.

Barney, J. B. (1991), 'Firm resources and sustained competitive advantage,' *Journal of Management*, **17**, 99–120.

Bergh, D. D. and G. F. Holbein (1997), 'Assessment and redirection of longitudinal analysis: Demonstration with a study of the diversification and divestiture relationship,' *Strategic Management Journal*, **18**(7), 557–571.

Bettis R. A. (1981), 'Performance differences in related and unrelated diversified firms,' *Strategic Management Journal*, **2**, 379–393.

Cantwell, J. and L. Piscitello (2000), 'Accumulating technological competence: Its changing impact on corporate diversification and internationalization,' *Industrial and Corporate Change*, **9**, 21–51.

Caves, R. E. (1982), *Multinational Enterprise and Economic Analysis*, Cambridge University Press: New York.

Chandler, A. D. Jr (1962), *Strategy and Structure*, MIT Press: Cambridge, MA.

Chandler, A. D. Jr (1990), *Scale and Scope: The Dynamics of Industrial Capitalism*, Harvard University Press: Cambridge, MA.

Chandler, A. D. Jr and T. Hikino (1997), 'The industrial enterprise and the dynamics of modern economic growth,' in A. D. Chandler Jr, F. Amatori and T. Hikino (eds), *Big Business and the Wealth of Nations*, Cambridge University Press: Cambridge.

Chatterjee, S. and B. Wernerfelt (1991), 'The link between resources and type of diversification: Theory and evidence,' *Strategic Management Journal*, **12**, 33–48.

Christensen, H. K. and C. A. Montgomery (1981), 'Corporate economic performance: Diversification strategy versus market structure', *Strategic Management Journal*, 2, 327–343.

Collis, D. J. (1996), 'What is a "related" corporate strategy?,' in M. Goold and K. Sommers Luchs (eds), *Managing the Multibusiness Company: Strategic Issues for Diversified Groups*, Routledge: London, 122–142.

Colpan, M. A. (2004), 'Diversified expansion and different business models in the Japanese textile industry,' *Journal of Textile, Apparel, Technology and Management*, **3**(4), 1–13.

Colpan, M. A., T. Hikino, M. Shimotani and A. Yokoyama (2002), 'The structural transformation and strategic reorientation of Japanese textile businesses,' *The Kyoto University Economic Review*, vol. LXXI, N. 1/2, 65–75.

Cool, K. and D. E. Schendel (1987), 'Strategic group formation and performance: The U.S. pharmaceutical industry, 1963–82,' *Management Science*, **33**, 1102–1124.

Datta, D. K, N. Rajagopalan and A. M. A. Rasheed (1991), 'Diversification and performance: Critical review and future directions,' *Academy of Management Journal*, **28**, 529–558.

Delios A. and P. W. Beamish (1999), 'Geographic scope, product diversification, and the corporate performance of Japanese firms,' *Strategic Management Journal*, **20**, 711–727.

Dosi, G., R. R. Nelson and S. G. Winter (2000a), 'Introduction: The nature and dynamics of organizational capabilities,' in G. Dosi, R. R. Nelson and S. G. Winter (eds), *The Nature and Dynamics of Organizational Capabilities*, Oxford University Press: New York, 1–22.

Dosi, G., B. Coriat and K. Pavitt (2000b), 'Competences, capabilities and corporate performances,' Laboratory of Economics and Management, Dynacom Working Paper, Laboratory of Economics and Management, Sant'Anna School of Advanced Studies, Pisa.

Dosi, G., M. Faillo and L. Marengo (2003), 'Organizational capabilities, patterns of knowledge accumulation and governance structures in business firms: An introduction,' Dynacom Working Paper, Laboratory of Economics and Management, Sant'Anna School of Advanced Studies, Pisa.

Fujii, M. (1971), *Nippon Sen'i Sangyo Keieishi: Sengo Menbo kara Gosen made* (Business History of Japan's Textile Industry: From Cotton Textiles to Synthetics in the Postwar Period), Nippon Hyouronsha: Tokyo.

Gemba, K. and F. Kodama (2001), 'Diversification dynamics of the Japanese industry,' *Research Policy*, **30**, 1165–1184.

Geringer M. J., P. W. Beamish and R. C. daCosta (1989), 'Diversification strategy and internationalization: Implications for MNE performance,' *Strategic Management Journal*, **10**(2), 109–119.

Geringer, M. J., S. Tallman and D. M. Olsen (2000), 'Product and international diversification among Japanese multinational firms,' *Strategic Management Journal*, **21**, 51–80.

Goold, M. and K. Sommers Luchs (1996), *Managing the Multibusiness Company*, Routledge: London, 13–15.

Grant, R. M. (2002), 'Corporate strategy: Managing scope and strategy content' in Pettigrew A., Thomas H. and R. Whittington (eds.), *Handbook of Strategy and Management*, Sage: London, 72–97.

Grant, R. M. and A. P. Jammine (1988), 'Performance differences between the Wrigley/Rumelt strategic categories,' *Strategic Management Journal*, **9**, 333–346.

Grant, R. M., Jammine A. P. and H. Thomas (1988), 'Diversity, diversification and profitability among British manufacturing companies, 1972–84', *Academy of Management Journal*, **3**(4), 771–801.

Hasegawa, O. (2002), Associate Department Manager, Kanebo Gohsen Limited and Kanebo Spinning Corporation, Interview on March 28, 2002 in Osaka.

Helfat, C. E. and M. B. Lieberman (2002), 'The birth of capabilities: market entry and the importance of pre-history,' *Industrial and Corporate Change*, **11**(4), 725–760.

Hikino, Takashi, Tsutomu Harada, Yoshio Tokuhisa and James A. Yoshida (1998). 'The Japanese puzzle: Rapid catch-up and long struggle,' in Ashish Arora, Ralph Landau and Nathan Rosenberg (eds), *Chemicals and Long-Term Economic Growth*, John Wiley and Sons Inc.: New York, 103–135.

Hirota, M. (2002), General Manager, Public Relations Section, Department of Legal and General Affairs, Asahi Kasei, Interview on September 10, 2001 in Tokyo.

Horaguchi, H. (1992), *Nihon Kigyo no Kaigai Chokusetsu Toshi, Ajia eno Shinshutsu to Tettai* (Foreign Direct Investment of Japanese Firms: Investment and Disinvestment in Asia), Tokyo University Press: Tokyo, 151–183.

Ishihara, H. (2002), Director General Manager Advanced Materials Research Department, Toyobo Research Center Co. Ltd, Interview on February 9, 2002 in Kyoto.

Itami, H. (2001), *Nihon no Sen'i Sangyo: Naze Korehodo Yowakunatte Shimattanoka*? (Japan's Textile Industry: Why has it become this weak?), NTT Shuppan: Tokyo.

Kanebo (1988), *Kanebo 100-nen Shi (100-years history of Kanebo)*, Kanebo, Osaka.

Kodama, F. (1995), *Emerging Patterns of Innovation: Sources of Japan's Technological Edge*, Harvard Business School Press: Boston, MA.

Kurabo (1988), *Kurashiki Boseki 100-nen Shi (100-years History of Kurabo)*, Kurashiki Boseki: Osaka.

Lubatkin, M. (1987), 'Merger strategies and stockholder value,' *Strategic Management Journal*, **8**, 39–53.

MacDonald, J. M. (1985), 'R&D and the directions of diversification,' *Review of Economics and Statistics*, 67(4), 583–590.

Mahoney, J. T. and J. R. Pandian (1992), 'The resource-based view within the conversation of strategic management,' *Strategic Management Journal*, **13**(5), 363–380.

Makino, F. (2002), General Manager on Special Assignment Chemical Division, Toray Industries Inc, E-mail communications, January 16 and March 7, 2002.

Malerba, F. and L. Orsenigo (1996), 'Technological regimes and firm behavior,' in G. Dosi and F. Malerba (eds), *Organization and Strategy in the Evolution of the Enterprise*, Macmillan Press Ltd.: London, 42–71.

Mayer, M. and R. Whittington (2003), 'Diversification in context: A cross-national and cross-temporal extension,' *Strategic Management Journal*, **24**, 773–781.

Michel, A. and I. Shaked (1984), 'Does business diversification affect performance,' *Financial Management*, **13**(4), 18–25.

Montgomery, C. A. and S. Hariharan (1991), 'Diversified entry by established firms,' *Journal of Economic Behavior and Organization*, **15**, 71–89.

Nelson, R. R. and S. G. Winter (1982), *An Evolutionary Theory of Economic Change*, Harvard University Press: Cambridge, MA.

Nihon Kagaku Sen'i Kyokai (1974), *Nihon Kagaku Sen'i Sangyo Shi* (History of Japanese Chemical Fiber Industry), Kyokai: Tokyo.

Tsunabuchi, S. (1989), *Nisshinbo: Roman e no Chosen* (Nisshinbo: Challenge to Romance), Bizinesusha: Tokyo.

Ozawa, T. (1980), 'Government control over technology acquisition and firms' Entry into new sectors: The experience of Japan's synthetic-fiber industry,' *Cambridge Journal of Economics*, **4**, 133–146.

Palepu, K. (1985), 'Diversification strategy, profit performance and the entropy measure,' *Strategic Management Journal*, **6**, 239–255.

Patel, P. and K. Pavitt (1997), 'The technological competencies of the world's largest firms: complex and path-dependent, but not much variety,' *Research Policy*, **26**, 141–156.

Pavitt, K. (1992), 'Some foundations for a theory of the large innovating firm,' in Giovanni Dosi, R. Giannetti and P. A. Toninelli (eds), *Technology and Enterprise in a Historical Perspective*, Clarendon Press: Oxford.

Prahalad, C. K. and G. Hamel (1990), 'The core competence of the corporation,' *Harvard Business Review*, **68**(3), 79–91.

Prescott, E. and M. Visscher (1980), 'Organizational capital,' *Journal of Political Economy*, **88**, 446–461.

Robins, J. A. and M. F. Wiersema (1995), 'A resource-based approach to the multibusiness firm: Empirical of portfolio interrelationships and corporate financial performance,' *Strategic Management Journal*, **16**, 277–300.

Rumelt, R. P. (1974), *Strategy, Structure, and Economic Performance*, Harvard University Press: Cambridge, MA.

Rumelt, R. P. (1984), 'Towards a strategic theory of the firm,' in R. B. Lamb (ed.), *Competitive Strategic Management*, Prentice-Hall: Englewood Cliffs, NJ, 566–570.

Sakaino, M. (1987), *Sen'i Gyokai* (Textile Trade), Kyoikusha: Tokyo.

Sakamoto, S. (1990), 'Senji taisei ka no boseki shihon (Spinning Businesses in the Wartime),' in M. Shimotani (ed), *Senji Keizai to Nihon Kigyo* (Wartime Economy and Japanese Businesses), Showado: Kyoto, 125–175.

Sayrs, L. W. (1989), *Pooled Time Series Analysis*, Sage: Newbury Park.

Scherer, F. M. and D. Ross (1990), *Industrial Market Structure and Economic Performance*, Houghton Mifflin Company: Boston, MA.

Shiohata, N. (2003), Manager, Development Planning Division, Nisshinbo, E-mail communications, January 23–24, 2003.

Silverman, B. S. (1999), 'Technological resources and the direction of corporate diversification: Toward an integration of the resource-based view and transaction cost economics,' *Management Science*, **45**(8), 1109–1124.

Steil, B., D. G. Victor and R. R. Nelson (2002), *Technological innovation and economic performance*, Princeton University Press: Princeton, NJ.

Suzuki, T. (1994), 'Toray corporation: Seeking first-mover advantage,' in Takeshi Yuzawa (ed.), *Japanese Business Success, The Evolution of a Strategy*, Routledge: New York, pp. 81–86.

Suzuki, T. (1999), 'Industrial policy and the development of the synthetic fiber industry: Industrial policy as a means for economic growth,' in H. Miyajima, T. Kikkawa and T. Hikino (eds), *Policies for Competitiveness Comparing Business-Government Relationships in the Golden Age of Capitalism*, *Fuji Conference Series 3,* Oxford University Press: Oxford, 81–104.

Tallman S. and J. Li (1996), 'Effects of international diversity and product diversity on the performance of multinational firms,' *Academy of Management Journal*, **39**(1), 179–196.

Teece, D. J. (1982), 'Towards an economic theory of the multiproduct firm,' *Journal of Economic Behavior and Organization*, **3**, 39–63.

Teece, D. J., G. Pisano and A. Shuen (1997), 'Dynamic capabilities and strategic management,' *Strategic Management Journal*, **18**(7), 509–533.

Teijin (1998), *Teijin no 80-nen* (80-years of Teijin), Teijin: Osaka.

Nippon Keieishi Kenkyusho (1997), *Tore 70-nen Shi* (70-years history of Toray), Toray: Tokyo.

Toyobo (1986), *Toyobo 100-nen Shi* (100-years history of Toyobo), Touo Boseki: Osaka.

Varadarajan, P. R. and V. Ramanujam (1987), 'Diversification and performance: A reexamination using a new two-dimensional conceptualization of diversity in firms,' *Academy of Management Journal*, **30**, 380–393.

Wernerfelt, B. (1984), 'A resource-based view of the firm,' *Strategic Management Journal*, **5**, 171–180.

Williamson, O. E. (1985), *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*, Free Press: New York.

Yamazaki, H. (1975), *Nippon Kasen Sangyo Hattatsushiron* (Analysis of the Development of the Japanese Synthetic Fiber Industry), Tokyo Daigaku Shuppankai: Tokyo.

Yonekawa, S. (2000), *Boseki Kigyo no Hasan to Fusai* (Failure and Debt of Spinning Businesses), Nihon Keizai Hyoronsha: Tokyo.

Yuka Shoken Hokokusho (Report on Securities and Stocks) (1970–2001), Okurasho Insatsukyoku: Tokyo.