Protection, Promotion and Cooperation in the European Semiconductor Industry

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Abstract. EC Member States' national champion policies of the 1970s were not successful in developing firms that led in their home markets, and the corresponding EC policies of the 1980s (many of which encouraged inter-European strategic alliances) were not successful in developing firms that led in the European market. Using strategies that involve world-wide cooperation, European firms are beginning to carve out secure places for themselves in what is now a world market. Joint ventures have been critical in bringing European firms up to world performance levels, but extra-European as well as intra-European cooperation has been essential.

Key words: R&D joint ventures, semiconductors.

JEL Codes: O32, O38

I. The Semiconductor Industry as a Crucible of Organizational Innovation

Certain industries at certain times assume a profile that is far out of proportion to the place objective measures would give them in the economy. Very often these industries are seen as characteristic of a whole line of economic development.

So it was with the iron and steel industry, which played an essential role in the first industrial revolution and which came to be identified with successful industrialization. So it was with the automobile industry at the beginning of the 20th century, when it was the bellwether of assembly-line production, and again in the 1980s, when it gave birth to lean production techniques. So it is today with the semiconductor industry, the output of which is essential to the spread of high technology production methods throughout the economy.

In each of these cases, the development of the industry in question was associated not only with a product but also with a way of organizing economic activity. For iron and steel, the organizational innovation was extensive vertical integration (Chandler, 1977, pp. 359–363; 1990, pp. 127–140). For automobiles (first incarnation) it was the multidivisional firm (Chandler, 1962, 1964) and (second incarnation)
just-in-time links between suppliers and assemblers (Cusumano, 1985; Womack et al., 1990).

From the point of view of the organization of productive activity, a distinctive characteristic of the semiconductor industry is the thicket of strategic alliances, often brokered by governments, linking firms that operate in the industry. The industry has also served as a laboratory for competing frameworks of public support to private innovation. On another level, the evolution of public policy in Europe toward the semiconductor industry reveals much about way government policy toward business has changed as governments confront the reality of an increasingly Single Market, but a Single Market that is itself a component of a larger world market.

II. Why Europe Lagged

A discussion of Europe’s persistent also-ran status in the semiconductor industry must begin with consideration of the factors behind the positions of the United States and Japan.

1. THE US LEAD

The first semiconductor, a transistor, was invented in 1947 at Bell Laboratories.\(^1\) In a definitional sense, therefore, the United States led the semiconductor industry, just as every inventor of a new product begins with a 100 per cent market share. Early market conditions, however, rewarded behavior that had the effect of maintaining that lead. Although those conditions no longer exist, their consequences remain.\(^2\)

Joint ventures were not particularly important in the early years of the U.S. semiconductor industry. The industry did develop in an environment that favored the rapid circulation of information about technological and market advances, which is one of the effects attributed to R&D joint ventures and strategic alliances. This was partly a consequence of a strategic decision by Bell Laboratories (Morris, 1990, p. 80)\(^3\)

In April 1952 Bell Laboratories, adopting an open-door policy from the start, held an eight-day symposium to explain how point-contact transistors could be made, and also to reveal information regarding work in progress on junction transistors; the information made available at this time included detail and processing information involving methods of crystal growing and device construction. This first Bell symposium was attended by 35 firms, including 10 from overseas, each paying an entrance fee of $25,000, the amount to be deducted from the licensing fees.

\(^1\) For a review of the development of semiconductor technology, see Morris (1990).

\(^2\) This may be thought of as an example of hysteresis; more generally, see Kreps and Spence (1985).

\(^3\) The dissemination policy was reinforced by a 1956 antitrust consent decree (Steinmueller, 1988, p. 335-6).