

To Create an Industry: The Growth of Consumer Electronics Manufacturing in Mexico and Taiwan

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In 1970, an observer of the investment by the consumer electronics multinationals in Mexico and Taiwan could not have predicted the marked difference in the development of these two nations. The contrast between the Mexican and Taiwanese electronics industry could not be more striking—Taiwan's electronics industry was a result of expanding foreign direct investment. Taiwan experienced an expansion of foreign exchange, employment and development of assembler-supplier relations. But, most importantly, it developed local firms capable of supplying these foreign assemblers. Among the Latin American nations, Mexico received the preponderance of investment in consumer electronics. Unlike in Taiwan, investments in Mexico never led to the development of an indigenous industry nor created a synergy between the assemblers and the local suppliers. This paper explores the reasons for the divergence between the two economies, related to the investor's objectives, the investor's position in the international market, and the specific regional location of production chosen for each nation/locality. A complete and historically accurate understanding of the divergence between these two countries can be obtained by examining firm and general industry strategies regarding production and production location between 1965 and 1982. This permits a nuanced understanding of the complexities of local industrial development and the potential role of the foreign investor and, in the process, move beyond simplified arguments about the centrality of the state industrial development.

CONTEMPORARY EXPLANATIONS OF local industrial development have moved the theoretical debate away from its original poles of market purity and dependency (see, for example, Amsden 1989;

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Evans 1989; Gereffi and Wyman 1990; Wade 1990). The inclusion of alternative, non-market, and in some cases non-structural, elements is today considered paramount for stimulating the latent talents of local entrepreneurs in developing countries. This more interdisciplinary approach to development is heralded by sociologists, economists and development studies specialists alike (Evans 1995; Pack 1992; Romer 1992; Wade 1990). What these studies permit is the reincorporation of institutional agency (such as the state, the corporation and secondary associations), beyond that of the market, for guiding, protecting and stimulating local industrial entities.

For Evans (1995), the success of industrial development is contingent upon the combined embeddedness and autonomy of the state. Based on his examination of the information technology industry, Evans associates industrial success with the ability of the state to remain independent from the local elite and multinational firms, yet institutionally embedded through 'a concrete set of social ties that binds the state to the society' (Evans 1995: 12). On the basis of his case study of South Korea, he articulates a scenario in which the national state enabled the development process by guiding, focusing and at times limiting the local industry. For Evans, the key lies in the state's ability to manipulate policies from initial 'midwifery' to eventual 'husbandry' (Evans 1995: 13).

Evans' model offers a partial emendation to the developmental state model in that it goes beyond the generalised optimism of the power of the state. By examining a variety of state structures, from 'predatory' (such as Zaire) to those displaying 'embedded autonomy' (for instance, South Korea and Taiwan), Evans reworks the dogmatic approach of the developmental state model to incorporate a theory of 'good' versus 'bad' government (Deyo 1987; Gold 1988; Wade 1990; White 1988). Furthermore, by focusing on one particular industry, Evans examines closely disaggregated characteristics inherent to that industry, information technology, and state policies specific to it. Evans, however, does little to question the assumption that the state is in fact the key actor, creator and generator of local development and, though moving in a positive direction away from claims of market purity, his research is still very much influenced by a specific theoretical agenda and question.

This paper examines the limits of Evans' claims in explaining the experiences of other nations, regions and industries. Specifically,

by comparing the local industrial development in Mexico and Taiwan's consumer electronics (CE) industry (parts and manufacturers) the paper demonstrates the complexity underlying their divergent development paths not explained under simple claims of a 'developmental state' or 'embedded autonomy'. Our analysis takes the debate beyond state policy through an incorporation of foreign direct investment and its role in providing an alternative trajectory of development. The success of Taiwan's local consumer electronics industry largely depends on the investment by foreign firms since the mid-1960s and the ability of Taiwan's local industry to associate with these firms. In other words, Taiwan's case emends Evans' theory that good development rests on the exclusion of foreign actors (such as South Korea). Mexico was host to a similar set of internationally competitive foreign firms during this period, and as with Taiwan, Mexico enjoyed a competitive position as an export platform for consumer electronics assemblers. However, unlike Taiwan, there were no lasting interactions between these foreign firms and the local Mexican industry, reconfirming Mexico's position as a declining producer of indigenously manufactured consumer electronics.

Our decision to examine the consumer electronics industry stems from its inherent characterisation as a high growth, high value-added industry. The build up of this industry was crucial to the development of nations like South Korea and Taiwan. By incorporating consumer electronics within their development agenda, these nations have increasingly linked themselves to a dynamic, versatile and expansive global industry. Furthermore, by examining the consumer electronics industry we are, in fact, selecting a predecessor of the information technology system. The development of a local information technology (IT) industry in Taiwan evolved directly from its initial build up of consumer electronics suppliers. Without the initial development of the CE industry, it is hard to claim that the Taiwanese IT supplier firms would have been successful.

In moving further away from Evans' state-oriented bias, this paper reincorporates in Evans' own words the 'vitality of capital', in this case both local and foreign. The experiences of Taiwan and Mexico demonstrate the case where the state's actions were ineffectual beyond the demands of the local industry and the requirements of the foreign investors. On the basis of our study we have

reached the conclusion that the success of a local industry may be closely tied to the strategies, market choices and spatial and temporal patterns of foreign direct investment (FDI) rather than to the potential 'midwifery' and 'husbandry' of state policies. Similarly, the growth of local industry may in turn be hindered by an indifferent or unstable foreign actor (such as Mexico).

In criticising the assumptions of 'embedded autonomy' and its universal applicability, this paper does not propose that the state's actions are ineffective per se, but that, in the case of Taiwan, the state's successful integration into the industrial process may be determined by its *reactive* (not active) power. Or, as in the case of Mexico, when little exists to react to, state policy may be futile at best. What follows is a description of the experiences of Mexico and Taiwan and how the nature of FDI, including the market selections, location and spatial and temporal decisions of such firms determined the development path of their consumer electronics (and electronics) industries beyond the actions of the state apparatus.

Precursors to Development: Taiwan's Experience

By the early 1970s the growth rate of Taiwan's electronics industry was unsurpassed by any other nation, including Japan (Han Yung 1972: G1). Today, this industry has the highest export rate among Taiwanese industry. As with the electronics and consumer electronics industries in many developing nations, Taiwan is host to many large foreign assemblers and manufacturers. However, unique to Taiwan is the simultaneous build up of 'many (small) locally and privately-owned suppliers of components' (Wade 1990: 93). Taiwan also hosts small, yet dynamic medium firm sectors including Tatung, Mitac, Acer¹ and Sampo. However, in general, the success of Taiwan's indigenous industry lies in the ability of its parts and components suppliers to maintain their competitive advantage within a highly competitive and global industry. The contributing factors to this success, including the role of specific local, national and international actors will be reviewed here.

Since the mid-1960s Taiwan has served as an export base for foreign consumer electronics firms. Prior to this, Taiwan hosted several foreign firms striving to secure a place in Taiwan's internal

market (Van Hoesel 1996: 281). US firms concentrated on the manufacturing of 'artificial fiber, urea, glass bottles, and antibiotics' for local consumption (Lin 1973: 137) while Japanese firms focused on Taiwan's local television and consumer durable markets (Lin 1973: 137). Under state regulations import substitution efforts and linkages between foreign and local firms were both required and initiated. By 1963, there were seven joint ventures or financial partnerships between Japan's electronics manufacturers and local Taiwanese firms,² tying local entrepreneurs early on to a rapidly expanding Japanese manufacturing sector (Wade 1990: 94).

Taiwan provided Japanese manufacturers with a source of low cost labour for assembling and manufacturing vacuum tubes, memory planes, circuit boards and capacitors, and complete television sets by such companies as Hitachi, Mitsubishi, Matsushita, Sanyo, Sony and Mitsui (Zenger 1977: 91). Of these larger Japanese firms, some firms such as Sony and Sanyo continued to 'place a high priority on acquiring access to local CTV markets' and initially had negligible export facilities (Baba 1985: 300). Other firms like Hitachi and Matsushita³ utilised Taiwan's labour intensive advantage to produce CTV solely for export to the US market and in turn aided in Taiwan's changing reputation as an ideal, cheap labour export platform.

Although these measures taken by the larger firms lay the framework for others to follow, the true catalyst for Taiwanese firms was the links they established with smaller sized Japanese parts and components manufacturers. According to Gold, 'Taiwan's function in this global strategy was to give small and medium (Japanese) manufacturers in declining industries a new lease of life'—Japan's role in the development of Taiwanese firms was of equal importance (1988: 196). By utilising joint ventures both as a means of risk sharing and to secure a local market, these smaller Japanese firms provided the Taiwanese immature industry with the necessary elements for future development (Chen 1992: 10). In seeking a local market, these firms were also required to utilise local inputs further incorporating Taiwan's firms into the dynamic system.

The products introduced by Japanese firms are closer to local demand whereby local supporting industries are either already

in place or can easily be fostered with a technology influx from Japan. Local content regulations⁴ imposed by the Taiwan government on television sets and refrigerators also forced the Japanese subsidiaries to search earnestly for local suppliers (Chen 1992: 13).

These small firms included Sumida Electronic which set up a component plant with Taiwan's Tobishi Electronic to 'manufacture IF coils in 100-employee facility' in 1967 (*Television Digest* 2 January 1967: 12). Another Japanese firm, Tokyo Communication Industrial Co., started production the same year under a joint venture to produce plastic capacitors (*Television Digest* 10 April 1967: 16).

Through these joint ventures, Taiwanese firms were tied directly to the changing face of Japanese production. Given that these smaller Japanese firms were also the main suppliers for some of the larger Japanese manufacturers, Taiwanese firms by default were forced to upgrade their facilities in order to meet the changing demands of the industry. This greatly affected the production, skill and technology of the initially premature Taiwanese firms within this tutelary system. By 1968 the Japanese were able to reduce the number of components required and 'switched to single circuit board designs, further reducing component counts' (Sanderson 1989: 13). Component makers in turn were forced to switch production if they wanted to maintain their comparative advantage.

In addition to joint ventures, Japanese firms signed technology cooperation agreements with Taiwan's industry. Between 1952 and 1982, Taiwan boasted of over 435 separate electronics and electric appliance technical cooperation agreements of which 66 per cent were with Japanese firms. The purpose of such agreements involved the 'purchase of product or process technology with the stipulation that the imported technology (would) be used to produce a new product; or increase production volume or quality or reduce production costs; or increase management or operation efficiency' (Becker and Hunter 1984: 246). These agreements provided Taiwan with additional advances in technology.

By the late 1960s, Japanese investment provided many Taiwanese firms with a protective yet competitive system within which to

pursue development. However, the ability of the local firms to pull away from what Simon (1988) calls 'restrictive agreements' provided the next step to both Taiwan's industrial autonomy and its development.⁵ This growing resistance, coupled with a 'new entrepreneurial class' and the expanding export environment in Taiwan, provided managers and investors with the impetus to break away from joint ventures and production agreements and focus on new locally owned production. This was particularly so in the 1970s and 1980s. The 'new group of entrepreneurs came on the scene, made up of Taiwanese traders who, via technical cooperation agreements and joint ventures with Japanese firms they had represented, began to manufacture electronic goods for the local market and then for export' (Gold 1988: 189).⁶ Also, a number of these new entrepreneurs were trained in the US and were actively recruited by the Taiwanese industry (Hobday 1994: 353). Still others left their positions as front men for Japanese firms to establish their own companies such as Sampo, Mitac and Proton. Many of these newly created firms focused production in areas related to consumer electronics manufacturing, including the production of parts for this and other electronics manufacturing such as computers. In effect, original linkages to the consumer electronics industry allowed Taiwan to develop a growing supplier base, a number of consumer electronics firms and an expanding computer parts industry.

The development of this relatively independent parts industry paralleled the growing demand by US manufacturers to replace their own parts networks during the early 1970s. Although on one level 'Japan has had a disproportionate importance in the technological development of Taiwan' (Simon 1988: 213), the simultaneous presence of US firms in Taiwan provided a new local market for these firms to target, further securing their future within this highly variable industry. Taiwan's role in the global shift was in direct relation to the decline of US component manufacturers and the increased demand for new supplier networks. Furthermore 'a survey on foreign firms in the early 1970's revealed that local-materials markets influenced those firms' selection of locations' giving Taiwan's industry greater legitimacy within the offshoring trend (Schive 1990: 77). This is because 'as the capabilities of the developing countries have grown, U.S. firms have increased the proportion of foreign-sourced to US parts' (Sanderson 1989: 11).

This new demand allowed Taiwan to move beyond its original role as a location for cheap labour to a supplier of low and high grade electronics parts.

The guarantee of this market, differing from the experiences of Mexican firms, secured Taiwan's dynamic role in the consumer electronics and electronics industries. Taiwanese firms were linked with the US industry through an institutional network of firms established by the Taiwanese Electric Appliance Manufacturers Association (TEAMA).⁷ This association offered benefits to both national and local firms (Kuo 1995: 170). For US firms, the association helped them overcome a 'lack of local information on the part of American managers' (Chen 1992: 13). US companies were very active in the association and helped train 'local technicians, provided technical know-how and management skills to suppliers and cooperated with technical schools on internship programs' (Kuo 1995: 172). Furthermore, once these linkages were established there was a substantial increase in local sourcing by US firms. This was mainly due to the improved reputation and quality of Taiwanese supplier companies. Specifically, 'the share of local procurement by American firms increased from 28.3% in 1975 to 45.2% in 1989' (Chen 1992: 13). 'Earlier direct foreign investment, once established, has created a potential market for materials, which have gradually come to be supplied by local producers' (Schive 1990: 77).

The development of these supplier firms must also be viewed in relation to the spatial pattern of investment within Taiwan and the high visibility between local and foreign actors. Most foreign consumer electronics firms chose not to restrict themselves to the free trade zones (FTZs)—many in fact concentrated production in or near Taiwan's capital. The reason these firms chose to cluster near Taipei is difficult to fathom. Many of the original Japanese plants were located in this area, and thus created an agglomeration effect on the economy. It would, therefore, make more sense for Japanese firms to locate in an area with more infrastructure and improved facilities. Further, Taipei was close to the northern port which offered a rapid transportation route between both nations. In addition, Japanese joint ventures were predominately located outside of the free trade zones given the restrictions placed on firms in these areas (that is, export-only status). 'Foreign firms

located in the FTZ's consistently had lower rates of local content compared to those not located in the FTZ's' (Schive and Majumdar 1990: 340).

Plants located outside of the FTZs, and specifically near Taipei tended to have a stronger connection to the local market both in terms of output and related backward linkages. Taipei also housed many of the US consumer electronics manufacturers. General Instruments was the first to arrive in Taipei in 1964. Many of the US firms also had secondary plants in the FTZs. However, the majority of 'US electronics factories (were) bonded and located in northern Taiwan' (Zenger 1977: 82, 87). This was partially a result of limited alternatives.⁸ Other areas such as Taichung, Taiwan's main free trade zone, was 'especially designed for the precision instruments industry' (Van Hoesel 1996: 283).

Traditional explanations offered by the development state and 'embedded autonomy' schools claim that an active state is directly responsible for the creation of local industrial value. However, recent studies have shown that the state initially had no planned strategy for creating an electronics industry in Taiwan (Kuo 1995). Furthermore, when policies were designed in relation to the electronics industry it remained *reactive* to the demands initiated by the local and foreign firms, not the reverse as espoused under the state guidance models (Kuo 1995: 182; Lam 1992: 225). In the 1970s the Taiwanese state began to impose restrictions on foreign direct investments. These restrictions provided a friendly and supportive environment for the growth of the local industry. In 1973 and again in 1975 several policies were enacted to limit the openness of foreign direct investment (Romer 1992; Wade 1990). The net result was a secure market and environment for local suppliers and newly emerging electronics firms. The impact of these policies was that electronics MNCs were pushed into high end production and the labour intensive export electronics industry was opened up for local capital (Poh-Kam 1995: 9). In 1975, the state created an office with the purpose of aiding local manufacturers and as a means of increasing training, production, plant planning and for the acquisition of advanced foreign technology (*Television Digest* 25 August 1975: 9). The supplier-assembler relations were well underway when these policies were enacted. It can therefore be concluded that such policies emerged as a reaction

to the successful expansion of local firms/industry and were not themselves the initiators of this expansion (Kuo 1995; Lam 1992; Simon 1988).

This reactive behaviour permits a fundamental rethinking of the causal factors of industrial development. Furthermore, studies of globalising industries require the incorporation of new actors, including foreign enterprise within the development process (for examples of the importance of FDI in Taiwan see, Kuo 1995; Lam 1992; Schive 1990; Van Hoesel 1996; Wade 1990; Zenger 1977). By incorporating FDI into the analysis, we move beyond Evans' embedded autonomy and his claims that the presence of multinational firms prior to state action only generates what he calls 'dependent development' (such as Brazil). Contrary to this claim, the case of Taiwan demonstrates both the potential of foreign firms to assist in the initial generation of the local industry and the active role of the local firms to control this process through a *tool* of protective legislation.

Mexico: A Legacy of Decline

In contrast to Taiwan's development, Mexico has no significant indigenous consumer electronics, or parts supplier industry to speak of. Mexico's television and radio manufacturers and component producers of the early 1960s were unable to withstand international competition from Asian producers (such as Majestic Corporation). By the mid-1980s, the majority of Mexico's parts suppliers had succumbed to this competition, in many ways paralleling the experiences of US firms (Fujita et al. 1994; Perez Nuñez 1990). A few years later, Mexico's largest manufacturers, as with many of those from the US, were forced to leave the industry (Fujita et al. 1994: 222).

As previously argued, the success of Taiwan's indigenous industry was tied directly to the initial links with foreign firms and the eventual aggressive strategies of the local industry to foster skill and technical development through continuous foreign-local ties. These continuous, dynamic relations provided the impetus for generating an internationally competitive, high-tech local supplier base. In other words, the development of Taiwan's indigenous structure depended on the establishment and continuity of these

foreign–local connections. Why was there not a similar structure in place between Mexico's indigenous consumer electronics industry and the foreign firms it hosted? Some analysts point to the national policy and the ambiguity of the Mexican state (see, for example, Grunwald and Flamm 1985; Sklair 1993; Tchiang 1991; Wilson 1992). In emending these claims, our analysis closely examines the nature of the foreign investors, their spatial and temporal characteristics and their strategy to reveal a more complex explanation for both the lack of foreign–local ties and the eventual demise of Mexico's indigenous industry.

Homogeneity, Narrowed Production and Location Decisions: Consumer Electronics Maquiladoras 1965–74

Foreign consumer electronics firms began to invest in Mexico in 1965 under the Border Industrialisation Programme, permitting cities along the US–Mexican border to house foreign-owned plants or *maquiladoras* ('in-bond'), establish free trade zones and build industrial parks in order to attract potential foreign investors. Although employment remained the main objective of the programme, the state had expectations for additional foreign exchange earnings, investment spin-offs, technology exchanges (agreements) and the incorporation of 'national inputs into the output of the in-bond plants' (Herrera Ramos 1988: 255; see also, Fernandez-Kelly and Nash 1983; Koido 1993: 114; Stoddard 1987). The fact that such local-foreign exchanges never materialised in the consumer electronics industry requires a closer examination of the programme, the nature of the foreign investors involved and the specifics of this industry during the 1965–82 period.

By 1965, Mexico offered many US consumer electronics firms a means of lower wages and, therefore, production costs. Furthermore, Mexico's border offered many smaller US firms a low cost, low risk alternative to other offshoring locations in the East (such as Taiwan and Singapore) (Chen 1992: 5). Given this proximity and characteristic, Mexico initially attracted a different type of US investor than hosted by Taiwan. Whereas Taiwan tended to house many large, stable US and Japanese investors, Mexico initially attracted a weaker, less stable, highly transient *US-based* industry. Mexico did not attract a significant non-US clientele until after the early 1980s (such as Japanese, South Korean and Taiwanese).⁹

Mexico prevented many small US black and white parts and components manufacturers from 'folding altogether' (*Newsweek* 24 January 1972: 60). In other words, Mexico's initial consumer electronics investors created a climate conducive to low end, low technology production, setting the stage of Mexico's declining legacy—'in black and white you had companies in the loft turning out sets and selling them almost by intuition while they benefited while someone reduced the cost of components. With color you just can't survive that way' (Teitelman 1994: 70).

These smaller components manufacturers were neither interested nor capable of establishing joint ventures with Mexican firms. For one, they had no need to penetrate Mexico's market, their objective was instead a desperate attempt to hold on to what little market remained in the US for low quality parts or components. This disinterest in market expansion reflected the overall strategy of the US industry during the 1960s and 1970s—'apart from a very tentative attempt by Zenith to export to Japan in the early 1960's, the industry simply did not bother with foreign markets' nor for that matter with joint ventures (Turner 1973: 55).

The nature and size of Mexico's own industry further diminished the need for Mexico's supplier firms to establish initial ties with the border industry. Mexico had established a significant local industry by the mid-1960s dominated by large, family-owned firms such as Majestic Corporation, a conglomerate consisting of 57 Mexican firms (*Business Week* 21 March 1970: 49; Fujita et al. 1994; Pozas 1993). The company was competitive in both Mexico and Latin America and provided Mexico's local suppliers with a somewhat stable market. According to *Business Week*, its output was similar to that of US producers, such as General Electric, Philco and Admiral (*Business Week* 21 March 1970: 49). Majestic focused on low end markets by producing cheaper, colourful radios and television sets. By 1958, its manufacturing operations were self-sufficient; like most of Mexico's larger consumer electronics producers, it utilised Mexico's suppliers of parts and components (*Business Week* 21 March 1970: 49).

Majestic was not the only indigenous consumer electronics company. By 1967, there were over 250 Mexican electronics (including consumer electronics) firms sourcing 98 per cent of all inputs from local Mexican components and parts manufacturers (*Comercio Exterior* May 1970: 21). Consumer electronics dominated

Mexico's electronics industry through the 1960s and 1970s. In 1970, three-fourths of all electronics production was concentrated in consumer electronics (Peres Nuñez 1990). In many ways the success of these Import Substituted Industrialisation (ISI) plants gave domestic firms even less of an incentive for linking with the border firms. These firms retained their competitive status until the late 1970s and therefore provided a functional market for local suppliers, one not visible in the maquiladoras until the late 1970s.

In addition to the smaller US parts investors, was the simultaneous investment by larger US television manufacturers. Warwick (Sears) set up plants in 1966 and 1968 in Tijuana, Mexico. Warwick was the border's largest manufacturer until the mid-1970s. Warwick, however, held only 7–9 per cent of the market share in the US, reconfirming Mexico's low quality, low technology legacy (*Television Digest* 1969: 9(12): 7). Other firms such as General Instrument, Motorola, RCA and Zenith also set up plants along the border before 1972. However, these firms had little need for establishing connections with Mexico's local industry or parts firms. Apart from Warwick, GTE, Magnavox and Teledyne, the majority of these firms used their Mexican production facilities to produce components (43 of 47 consumer electronics maquiladoras focused on components between 1966–73). Zenith established two parts plants in Matamoros in 1971 and RCA set up a deflection yoke plant in Ciudad Juarez in 1969. Warwick had one component plant along the border in 1968. In other words, initially there was little desire on the part of US manufacturers to source parts from Mexico given their own production facility at the border.

The importance of component production in Mexico before the mid-1970s is evident from the export figures. Figures for electronics goods and components point to the manufacturing and re-importing of goods produced by US firms for the US market. Mexican exports were primarily in transistors before 1970, at which time there was a shift in manufacturing to television tuners and tantalum capacitors (*Television Digest* various years). Though Mexico dominated the tuner market, Taiwan was not far behind. In 1971 and 1972, Mexico held 43 per cent of the tuner market while Taiwan was slightly behind with 38 per cent of this market. The difference, however, between Taiwan and Mexico lay in the heterogeneity of Taiwan's exports. Mexico continued to be a leader in components until the mid-1970s—when export figures shifted,

there were dramatic demarcations in the type of output. Taiwan, however, continued a myriad of exports, from black and white, to components (including tubes) to colour television sets (first CTV exports from Taiwan to the US were from Admiral Corporation in 1969) (*Television Digest* 16 June 1969: 10). This diversity contributed to a more secure environment for local production whereas Mexico's initial lead in component exports revealed its trend of receiving blocks of production that fluctuated according to the whims of US capital and the pressures from US trade regulations.

The location of the US firms further precluded the establishment of joint ventures between the US firms and Mexico's local industry. Most of the indigenous consumer electronics suppliers were located in the interior of Mexico, in close proximity to Majestic and other national firms. However, they lacked the linkages between the local and foreign firms seen in Taipei, Taiwan. In fact, there was no locally owned electronics plants in northern Mexico until the Grupo Industrial Alfa set up a television production plant in Monterrey in 1974. Even this development did little to secure local-foreign linkages given Monterrey's economic proximity to Mexico City than to the Frontera region.

Apart from a general lack of communication between the border firms and the interior firms, there was a second spatial pattern which precluded the establishment of local-foreign connections. Since the beginning of the maquiladora programme there were over thirteen Mexican border cities actively seeking US investors.¹⁰ Of these thirteen Mexican cities, there were five *major* maquiladora centres along the eastern part of the border alone, including Ciudad Juarez, Nuevo Laredo, Piedras Negras, Matamoros and Brownsville (*Newsweek* 23 June 1969). Moreover, there was stiff competition between these border cities fuelled by the growing interest of industrial real estate companies located in the US. Although the first concentration of US electronics plants was in Nogales, Mexico and Tijuana, by the early 1970s other cities launched their competitive drive to attract more US firms; in 1970 the city of Nogales set up an industrial park which was 'organized . . . by US investors' and designed by the US firm, Arthur D. Little (Kent 1971: 6). By the early 1970s, Ciudad Juarez and other border cities followed suit and established their own industrial parks. These new parks were usually dependent on one large US firm. The strategy was to

lure other US investors to the border by advertising the presence of the large producers. For example, Teletronic's investment (which later went bankrupt) in 1969 provided Matamoros with an industrial base. In the early 1970s, RCA began production in Ciudad Juarez. William Mitchell, a US citizen, was hired to 'sell the idea' of RCA's park to other Fortune 500 firms (Sklair 1993: 102). The Mexican-owned park opened in 1972 and was named after the PRONAF founder, Antonio Bermudez (*Business Week* 22 January 1972). Apart from basic facilities, the park provided investors with additional services including access to law firms and investment services, and therefore offered an alternative to Tijuana and Nogales. Ciudad Juarez succeeded in luring many large US firms; however, very few of them were electronics firms. Its role as host for electronics manufacturers did not become apparent until after the 1974–75 recession.

The pre-1974 Mexican government policy towards maquila investment was characterised by some as 'ambiguous' (see, for example, Sklair 1993: 50; Wilson 1992: 27) and by others as detrimental (Grunwald and Flamm 1985). Wilson (1992) concluded that the lack of state action precluded the development of local–foreign investment. However, the evidence presented above demonstrates a logic internal to both the US consumer electronics industry and to the 'growth machine' climate in the border cities, indicating that there was little for the state to react to. Attempts were made by the state to stimulate linkages with the domestic firms in the interior. Furthermore, with regard to the maquiladoras, the state pursued what some have called a flexible approach, opting to waive regulations and restrictions in the hope of increasing (not suppressing) foreign investment (Werrett 1972; Wright 1991).

By 1971 the government actively sought new investors by offering more location choices for maquiladora plants (that is, the interior cities) (Sklair 1993: 140). The response of the US firms, however, was minimal. Locating in the interior of the country, though offering somewhat cheaper labour, did not appeal to the needs of many US plants and their desire to be close to their market—the US. Even where interior investment did occur, the desire for increased local sourcing never materialised—local content rates rarely increased beyond 8 per cent and although significantly higher

than the average border rates of 2 per cent these figures remained significantly lower than Taiwan's average rate of 30 per cent (Wilson 1992).

Despite some initial developments in the interior, the investment climate prior to 1974 offered few options for fostering links between the local and foreign firms. First, the centres of production were scattered, both from themselves and from the central industrial region and market of Mexico. Furthermore, they lacked the apparatus for generating the dual markets for the provision of training and the purchase of local supplies as seen in Taiwan. Mexico became increasingly tied to the developments and eventual stagnation of the US consumer electronics industry. Its border regions reflected this homogeneity and the legacy of poor strategy and production decisions that characterised the dying US firms. These characteristics were manifested in the decision of national suppliers to remain loyal to Mexico's domestic firms, such as Majestic located in Mexico City, rather than risk being tied to the highly mobile, shifting US firms. The risk and uncertainties were too great and the distance too far to convince the domestic industry of the advantages of foreign-local relations.

Recession and the Border

'Assembly production may be more sensitive to external economic conditions and decision-making than some other economic activities within Mexico' (Grunwald and Flamm 1985: 175). The growing instability of the border industry was reconfirmed during the 1974-75 recession—there was a 'general unwillingness of Mexican industry to risk retooling and/or increase production when the maquilas could disappear at any time' (Sklair 1993: 200). In particular, the negative effects of the recession were felt disproportionately within the consumer electronics maquiladoras. The towns of Nogales and Tijuana were hit the hardest given their reliance on investment from the smaller, black and white component producers from the north. By 1973, of the 287 companies utilising the Border Industrialisation Programme (BIP), 118 were in Baja and Sonora, many concentrated in the production of electronics components and parts (*Mexican-American Review* April 1973: 26; *Television Digest* December 1974: 49).

Nogales was initially perceived by these smaller firms as advantageous due to its proximity to parent plants, its highly publicised industrial park and, more importantly, its lower border wages

(\$0.46 per hour in Tijuana, \$0.34 in Nogales) (Kent 1971: 6). In addition to its free trade zone status, the industrial park allowed investors to gain from the institutionalised quality of the site. In particular, the park, Parque Industrial de Nogales, S.A., founded in 1969, provided assistance to new investors. An examination of the 1973 data on Nogales reveals that of the thirty-seven plants, seventeen were manufacturers of consumer electronics components. Of these seventeen plants, eight had their parent corporations or plants in Arizona, California or Texas. The remaining plants had their parent facilities in Illinois, Indiana, New Jersey, or Pennsylvania (*Industrial Development Magazine* May/June 1973: 21).

Although most of the losses during the 1974–75 recession were experienced by the smaller firms, there were significant downsizings and a few closures. For example, Motorola closed down all its semiconductor plants in the USA and moved them to Southeast Asia. Warwick shut down one of its plants. However, the concentrated losses in Nogales were compounded following the 1974 announcement that the US giant Magnavox would discontinue all production in Nogales, Mexico. By the end of the recession, most of the smaller components producers in Nogales and Tijuana had left the supplier business. By the end of this crisis, firms in the US were increasing their orders for components from Japanese and Taiwanese firms to compensate for the loss of their own supplier industry. In other words, Asian suppliers were increasingly becoming a part of the production chain by 1975. The ability of Mexico to both weather the crisis itself and rapidly establish stable links with the US maquiladoras was increasingly limited by the emergence of alternative sources.

New Border Developments: Tariffs, Trade and More Trouble

The Mexican government, too, had learned to take seriously the signs of the fragility of the maquila industry, and the years of benign neglect that had marked the first decade of the industry ended with an 'Alliance for Production' between the government and representatives of the maquiladoras (Sklair 1993: 62).

The maquiladora sector, specifically the consumer electronics industry, was characterised by several changes during the post-recession period. For one, given the previous instability, fluctuating

unemployment rates and rising wages, the Mexican state actively sought to improve the maquiladora investment environment. In 1976, the state 'lowered wage costs', countering its wage hikes of the previous year and launched promotional campaigns and seminars highlighting the benefits of maquiladoras for foreign firms (*Television Digest* February 1976: 6). Although these efforts may have improved the environment, it is difficult to say that these policies attracted new investment in the sector given the simultaneous increase in Asian competition.

As a result of this international competition, by 1977, Mexico experienced an increase in the consumer electronics maquiladora investment from the US. Most significantly, Zenith moved more of its production facilities to the border that year. Prior to this, Zenith's Mexican plants had only assembled components. In 1977 Zenith opted to move most of its production facilities from the USA to the border (with the exception of tubes). The same year, RCA, Sylvania, CTS and Sanyo also started production in the border areas (*Television Digest* 1977: 4, 7, 10, 11, 40). Sanyo was the first Japanese television company to own a production facility in Mexico which it inherited in 1976 following its purchase of Warwick. This move paralleled the growth of Japanese companies in the US and was directly linked to the Orderly Market Agreement restrictions imposed on Japanese imports.

The investment in the maquiladora industry during the post-crisis period shifted from Tijuana and Nogales to Ciudad Juarez and Reynosa. Both cities experienced considerable growth in consumer electronics firms after the 1974 crisis. However, unlike the growth in Tijuana and Nogales, Ciudad Juarez and Reynosa received a disproportionate amount of investment from large US manufacturers. This was not unique to Mexico, but reflected the shift within the television and electronics industry. 'Increasingly, a relatively small number of very large transnational corporations dominate production In such circumstances, small-scale operations become less and less visible' (Dicken 1992: 327-28). Furthermore, production in Ciudad Juarez and Reynosa recorded higher than average employment figures (approximately 400 employees per plant). The increasing demand for labour contributed to the new investors' decision to locate in cities like Ciudad Juarez. Cities like Nogales and Nuevo Laredo had significantly smaller labour markets in comparison to the larger cities bordering Texas.

The focus of production itself shifted from components and parts. This shift is reflected in the export figures. By the late 1970s, Mexico moved away from its role as a parts supplier and exporter of complete television sets (mostly B&W). Instead, its export statistics indicate that US firms increasingly used Mexican plants to assemble colour TV chassis and kits, otherwise known as incomplete sets. This shift in production was a direct response to the import restrictions on Mexico, which required the US producers to assemble part of the final products in the US in order to avoid excessive tariffs. Companies like RCA, Sylvania, Zenith, Thomas, Quasar and Motorola shifted their production to incomplete sets in Mexico. These restrictions also altered the nature of imports from Japan, Taiwan and Singapore.

The new maquiladora environment was more stable than that in the previous period. For one, Ciudad Juarez was able to weather the 1982 recession. This was mainly due to the presence of larger, more secure firms. Reynosa, in housing Zenith, had a secure hold on the US consumer electronics assembly. However, the likelihood that this new environment, even with active state involvement, would contribute to supplier-assembler relations was limited because of the simultaneous growth of supplier companies in Taiwan and their strengthened position and within the industry. Taiwanese and Japanese competition had devastated the US parts supplier industry. Furthermore, many US firms deliberately moved production to Mexico because by doing so they could access Japanese and Taiwanese parts at lower tariff rates. There were substantially higher tariffs when these parts were shipped to Mexican plants and assembled into chassis and television kits. An example of this was the colour cathode-ray tubes (CRT)¹¹ for smaller television sets. As Japanese companies were the only suppliers, US companies chose to offshore the assembling of the smaller sets in order to reduce total costs (Ohgai 1996).

The decline of US parts and components suppliers was seen in Mexico's domestic industry as a result of the 1974 international crisis and a declining local market (rising black market). In 1981, the Mexican state issued the Plan to Promote Popular Electronic Goods in an attempt to upgrade the industry. However, the reduction of industrial protectionism,¹² the second international crisis of 1983 and continued international competition, including the increase in affordable imports, further destabilised the national industry—by the mid-1980s. The remaining consumer electronics producers

from the ISI period concentrated their efforts on assembling imported rather than locally sourced parts—this included foreign ISI plants such as Philips which replaced all locally produced parts with foreign made components and eventually moved their plants from the interior to the border areas for exports (UNCTC 1992: 66). The use of local parts sourcing declined from 95 per cent (in both B&W and CTV) to less than 10 per cent by 1988 (Peres Nuñez 1990: 93). Furthermore, there was a simultaneous decline in the number of producers in Mexico; by 1988 the number of audio (25 per cent) and video equipment manufacturers (47 per cent) had declined significantly (Fujita et al. 1994: 222). In other words, even if gains were achievable for Mexico's local industry, there were no existing suppliers to link to the border cities.

The lack of local sourcing in Mexico is best illustrated by the 806/807 tariff schedules. These items indicate the amount of materials imported into a country for assembly. 'By definition these tariff items deal with U.S. parts and components that come back to the United States, often for further processing and for sale domestically and abroad' (Grunwald and Flamm 1985: 14). Specifically, '806 permits the reimport of "fabricated" but in effect unfinished metal products into the United States for further processing; 807 permits only the "assembly" of finished goods for reexport to the United States for final consumption' (Grunwald and Flamm 1985: 13). In fact, 'in 1970, countries outside the United States added 1,673 million dollars of value (parts) before returning the assembled goods. 78 million—or 4.7 per cent of the total—was added in Mexico, making Mexico one of the smallest suppliers of value added under the (offshoring) program' (*Mexican-American Review* April 1972: 8).

Several researchers claim that the 806/807 figures for Mexico reflect Mexico's position within the group of offshoring nations (see, for example, Grunwald and Flamm 1985; Sklair 1993; Wilson 1992). In other words, the utilisation of 806/807 items was an integral part of the decision by the US firms to move production facilities to Mexico, thereby immediately precluding any advantages for sourcing domestically. We would venture to say that these trade figures are not as static as previously assumed. Though 806/807 items from Mexico grew with new investment in the maquiladoras, as seen in Taiwan, the selection of production sites became more flexible with the emergence of new domestic suppliers.

As argued earlier, there was a growing demand for components suppliers by the US companies by the mid-1970s. This demand was met by an increasing components supply from Taiwan and Japan. This is reflected in the shift in local sourcing in Taiwan from 10 per cent in 1972 to over 30 per cent by 1979 (Wilson 1992: 24).

In contrast to Taiwan, Mexico was unable to meet this growing demand for components mainly because such an investment was perceived as highly risky due to the transient nature of border firms. By the time Mexico established a more stable industry, it was apparently too late to join the market. By the early 1980s, new suppliers, mainly from Asian NICs, had secured their market advantage. The ability of Mexico, or any other nation, to compete in this market was limited at best. For one, the remaining US producers at the border increasingly looked to the East for suppliers. Furthermore, the demand for quality suppliers grew. When Taiwan first entered the market, the quality of parts was not given much importance. This enabled Taiwan's firms to focus on low quality, low technology parts as a means of gaining access to these markets. Their connections with US and Japanese firms and increasing entrepreneurial innovation permitted an eventual shift to higher quality parts, thereby offering Taiwanese firms a more secure place in a quality driven industry.

Given that Mexican firms, by 1980, never made this initial link with the US firms due to the vulnerability, instability and hyper-mobility at the border, there were few alternatives available for both the national industry or the state to act to improve the investment environment and catch up with the accelerated industrial growth of Taiwan. Those Mexican consumer electronics firms that did remain assembled low quality goods, further alienating them from the international market. In many ways, by not forging links with the US consumer electronics firms during the late 1960s and 1970s, Mexico's industry secured minimal leverage—its border maintaining little more than an electronics enclave economy.

Conclusion

To argue that the determining factors explaining the development of Taiwan's industry are based on the initial role of the state simplifies the important contributions of foreign capital and the

active pursuit of complementary state policy by local entrepreneurs. The development of Taiwan's indigenous consumer electronics industry illustrates a case where state policy was secondary to the agency of foreign investors and the local entrepreneurs with whom they were connected. This case moves the debate further than that proposed under the 'embedded autonomy' model. Under this model, foreign investment is only perceived as beneficial to the local industry once there has been considerable indigenous build up under well-planned, constructive policy. In fact, we see a more passive state apparatus in our case study of the electronics industry in Taiwan, and quite possibly a degree of embeddedness to the pressures from local entrepreneurs.

Conversely, the Mexican state had few linkages or local-foreign interactions on which to base constructive policy. Where attempts were made to facilitate these ties, Mexico was vulnerable to the whims of US capital (that is, inward looking markets, absence of joint ventures). Given its proximity to the US, Mexico inherited an initial investment scenario incompatible with the needs of indigenous firms (that is, stability and expanding markets). In other words, Mexico's reliance on the US consumer electronics firms provided it with few alternatives for upgrading its local facilities. Given the highly competitive nature of the industry, without an existing apparatus to generate positive, symbiotic ties with foreign firms (such as Taiwan) or a strong, national government to protect and stimulate local industry (such as South Korea), Mexico was destined to lose its indigenously based consumer electronics industry.

NOTES

1. Mitac and Acer produce computers. Tatung and Sampo are the largest electronics producers.
2. Local capital involved in the electronics industry can be divided into two types. The first were large manufacturers who sold to the local market and were tied closely with the government. The second were small firms who 'assembled light bulbs, batteries, or radios' (Kuo 1995: 170).
3. Also used Taiwan for exports of radio and B&W TV sets.
4. Firms seeking access to the local Taiwanese market were required to purchase 20 per cent of their parts from local Taiwanese companies.
5. In many cases, these joint ventures tied local capital into agreements that slowed down their ability to export directly. 'Many local capitalists, especially

- those allied with small Japanese manufacturing backed Japanese trading firm, found themselves tied into a web of contractual agreements that prevented their competition in the market or even handling their own procurement and marketing' (Gold 1988: 190).
6. Many of these new entrepreneurs had received a university education in the US (Gold 1988: 189).
 7. TEAMA was founded in 1948 as a mix of Taiwanese repair and maintenance shops and manufacturers of light bulbs, cables and transformers (Kuo 1995: 169). In 1952 the association focused more on producers, many of whom had been producing radios and parts for local consumption.
 8. It should be noted that only Kaohsiung (central Taiwan) was open during this first investment phase in 1965. Nantze and Taichung did not open until later in 1970.
 9. The Mexican state made several attempts to diversify its foreign investors. In 1971 and 1972 there were discussions with the Japanese to establish joint ventures in Mexico and with European firms to set up new plants in the country (Werrett 1972: 88).
 10. In contrast, Taiwan only had two cities in 1965, and four by the mid-1970s.
 11. A CRT or cathode-ray tube is a funnel shaped electron tube that converts electrical signals into a visible form.
 12. This reduction of state protectionism was directly linked to Mexico's choice to increase exports during the oil boom.

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