Case 4

DAIMLER CHRYSLER AND THE WORLD AUTOMOBILE INDUSTRY*

THE MERGER

The merger between Daimler Benz and Chrysler Corporation announced in May 1998 was the biggest industrial merger in history. It created the world's third largest automotive company (after GM and Ford) with 421,000 employees worldwide and sales of over $130 billion.[1] The prospects for the merger looked good. Because of the two companies' complementary product ranges, regional concentrations, and capabilities, its logic was acclaimed by both investors and auto industry analysts. The extent of the companies' pre-merger and post-merger planning by the two companies was also unusual. Under the vision of "one company, one vision, one chairman, two cultures," the merged company established an elaborate structure of joint Chrysler-Daimler integration teams which began work on reconciling and integrating almost every aspect of the two companies development, technology, operations, and marketing with a view to achieving the $3 billion in cost savings that the merger anticipated.

Within a year, however, the merger had run into trouble. The rapid exodus of Chrysler's senior managers made it clear that the deal was not so much a merger of equals as a German takeover. Despite the efforts of the post-merger integration teams, few of the anticipated cost savings had been realized. Most serious was the rapidly deteriorating performance of Chrysler. With its dominance in the once-lucrative sport-utility and minivan sectors eroding, and a dearth of new product, revenues and profits sagged during 2000. By September 2000, Daimler-Chrysler's share price had almost halved from its post-merger high, and Chrysler's losses for the second half of the year were forecast to reach $700 million. Moreover, the task of integrating Daimler and Chrysler had been complicated by further acquisitions: in order to build the group's position in Asia it acquired a third of Mitsubishi motors in March 2000 and 10 percent of Hyundai in June.

In February 2001, DaimlerChrysler launched a turnaround plan for Chrysler and Mitsubishi Motors. Restructuring at Chrysler involved plans to reduce material costs by 15 percent, reduce the workforce by 20 percent, and close six plants. Over the medium term cost reduction would require increased global integration between Chrysler, Mitsubishi and Mercedes Benz. The number of platforms used by Chrysler and Mitsubishi were to be cut from 29 to between 13 and 16, the number of engines cut by between 15 and 30 percent, and Mercedes technology would be shared more widely. A restructuring charge of $3.9 billion was taken in the first quarter of 2001, and for the whole year Chrysler's anticipated operating losses of $2.2 billion.

Restructuring was accompanied by a tightening of top management control. In place of the automotive and sales councils that Daimler Benz and Chrysler set up after the merger, Chairman Jurgen Schrempp created a tightly knit executive auto committee headed by himself and Mercedes-Benz chief Jurgen Hubbert and including Chrysler CEO Dieter Zetsche, commercial vehicles director Eckhard Cordes, Mitsubishi board member Manfred Bischoff, and corporate strategy director Rudiger Grube. The new committee would make all key strategic decisions and coordinate production and marketing across the group's divisions.

For 50 year-old Rudiger Grube, his position head of corporate development including corporate strategy, mergers & acquisitions as well as corporate e-business represented both continuity and change. During the years following the merger, he had taken change of the post-merger integration initiative. His most pressing responsibilities for the remainder of 2001 would be to continue and accelerate the effort to build a truly global business and in doing so release the potential efficiencies from integrating the activities Mercedes, Chrysler, and Mitsubishi. However, once the cost savings from the restructuring plan had been achieved, Grube realized that DaimlerChrysler's performance—and its strategy—would be increasingly dependent upon the future prospects for the automobile industry as a whole.

As Grube began working on DaimlerChrysler's corporate strategy, he asked his team to look more closely at the development of the world automobile industry over the next four years. The primary focus of the strategy team was on the outlook for the world economy. With the US and possibly Europe too threatening to join Japan in recession and with only hesitant recovery by Southeast Asia, Latin America, and Russia from the financial crisis of 1998, the prospects for automobile demand were poor. But market demand was only one factor affecting the industry's profitability over the period 2002-2005. During the latter past five years, the demand for new cars had been fairly buoyant—supported in particular by the booming US economy. Nevertheless, the final performance of even the major producers had been poor. Grube was struck by a recent report by Stern Stewart & Company on the industry: throughout the 1990s the industry's return on capital employed had been far below its cost of capital with the result that EVA (economic value added) was negative in every year from 1991 to 1999 (see Table 4.1).

[Table 4.1 about here]

To what extent would DaimlerChrysler's financial performance in the future be constrained by adverse industry economics? If the auto industry's future profitability was to be similar to that of past, and unless DaimlerChrysler was able to achieve a level of profitability far in excess of its rivals, it seemed unreasonable for the company to risk the destruction of shareholder through continuing to make multi-billion dollar projects that were unlikely to cover their cost of capital. The prospects for profitability in the world automobile in the future depended critically upon the evolving structure of the industry. The problems of the 1990s had been caused not so much by lack of demand as by the pressure of competition created by too many producers each of which was investing in too much capacity. The recent wave of consolidation in the industry offered a possible solution to these past problems of excessive competition. Yet it was also likely that the industry might be transformed by new forces that would also have huge implications for competition and profitability in the industry as a whole, and the basis for competitive advantage.

THE MARKET

Trends in Market Demand

From its beginnings in Europe and the United States during the 1890s, the automobile industry had grown almost continuously until the mid-1980s. However, market growth has followed different time-paths in different parts of the world. The US market entered its period of rapid growth during 1910–28. In Europe, the growth phase was both later and more subdued. By the late 1950s and early 1960s, the US market had reached maturity, though in Europe and Japan, market penetration of the automobile continued during the 1960s and 1970s. During the last two decades of the 20th century, the advanced industrial world had seen little growth in automobile demand and in the US, even during the booming 1990s, production failed to surpass the peak reached in 1973 (see Table 4.2). The problem of market saturation has been compounded by the tendency for cars to last longer. Table 4.3 shows the increase in the average age of cars in use in the US.

[Tables 3.2 and 3.3 about here]

As a result, the automobile producers have looked increasingly to the newly industrializing countries for market opportunities. During the 1980s and 1990s countries such as Korea, Malaysia, Taiwan, Thailand, Turkey, Brazil, and Argentina offered the best growth prospects. As these markets became increasingly saturated, so China, India, and the former Soviet Union were seen as the "next wave" of attractive markets. With the opening of many of these countries to trade and direct investment, the world production of cars and trucks has continued to grow (Table 4.4 shows world production).

[Table 4.4 about here]

The Evolution of the Automobile

The early years of the industry were characterized by considerable uncertainty over the design and technology of the motor car. Early "horseless carriages" were precisely that—they followed design features of existing horse-drawn carriages and buggies. Early motor cars demonstrated a bewildering variety of technologies. During the early years, the internal-combustion engine vied with the steam engine. Among internal-combustion engines there was a wide variety of cylinder configurations. Transmission systems, steering systems, and brakes all displayed a remarkable variety of technologies and designs, as well as considerable ingenuity.

Over the years the technologies and designs of different manufactured parts tended to converge as many approaches (and their manufacturers) were eliminated through competition. The Ford Model T represented the first "dominant design" in automobiles—the technologies and design features of the Model T set a standard for other manufacturers to imitate. During the 1920s, the process of development continued, especially in car bodies with the general adoption of the enclosed, all-steel body.

During the post-war period, technological and design convergence continued. During the 1970s and 1980s, most of the models which were "outliers" in terms of distinctively different design disappeared: the VW Beetle with its rear, air-cooled engine, the Citroen 2-CV and its idiosyncratic braking and suspension system, Daf with its "Variomatic" transmission. The fall of the Berlin Wall was followed by the disappearance of other automotive idiosyncrasies, such as the 3-cylinder Wartburg and the 2-cycle Trabant. Engines became more similar: typically 4 or 6 cylinders, usually in-line (although V-6 and V-8 configurations are common in larger engines) with overhead camshafts. Front-wheel drive and disc, anti-lock brakes became standard; suspension and steering systems became more standard; body shapes became increasingly alike. Although the automobile continued to evolve, technological progress has tended to be incremental: innovations have included application of electronics to ignition, braking, and engine control; safety features such as air bags; and developments such as multi-valve cylinders, traction control systems, all-wheel drive, variable suspensions, and inter-cooled turbos. The key design innovations of the 1990s was the "cab forward" design (pioneered by Honda), which increased the ratio of passenger space to engine space. The quest for fuel economy resulted in the substitution of lighter materials (aluminum, plastics, ceramics, and composites) for iron and steel (see Table 4.5).

[Table 4.5 about here]

During the 1990s, electronic components accounted for an increasing proportion of the value of cars. A 1950 Mercedes had about 10 meters of wiring. A 1995 SL 500 with full options had 3,000 meters of wiring and 48 different microcomputers. The 1998 Ford Taurus embodied more computing power than was used in the 1969 moon landing. Current development, including satellite navigation systems, communications technology (telematics), emergency signaling, collision-avoidance radar, and intelligent monitoring systems, will only increase the importance of electronic technology within cars. Yet, despite the adoption of new, technology-based accessories and design improvements, there is little in today's family cars that is radically new (see Table 4.6).

[Table 4.6 about here]

Designs and technologies have converged among manufacturers. While different types of vehicle (family cars, sports cars, passenger minivans, sport-utility vehicles) retain distinctive design features, within each of these categories manufacturers' product offerings have become increasingly similar. By 2000, GM was using wireless telephony-based "vehicle locators" to help motorists find their vehicles among the ranks of similar-looking automobiles. Convergence of technology and design meant a quest for new types of differentiation. All the major manufacturers strive to develop new "concept cars", and introduce novel design features. Recent years have seen a flood of new small car designs aimed particularly at the European market: Ford's Ka, Toyota's Yaris, and DaimlerChrysler's Smart car. Some manufacturers have experimented with retrodesign features (e.g. DaimlerChrysler's PT Cruiser).

Convergence also occurred across countries. US cars downsized, Japanese and Italian cars became larger. Although the automobile market remained highly segmented, the increased convergence of national markets was evident from the tendency for the same market segments to emerge in different countries. Thus, Mercedes, BMW, Jaguar, and the up-market brands of the Japanese (Lexus, Infiniti, etc.) dominated the luxury segment throughout most of the world. Toyota, Land Rover, Chrysler (Jeep), Suzuki, and a few other manufacturers led the worldwide sport-utility segment (4-wheel drive vehicles designed for off-road use). The passenger minivan segment established by the Chrysler Caravan in North America appeared in Europe as the "multi-purpose vehicle" (MPV) segment led by the Renault Espace. The major differences between countries were in the *sizes* of the various segments. Thus, in the US, the "mid-size" family sedan was the largest segment, with the Ford Taurus, Honda Accord, and Toyota Camry the leading models. In Europe and Asia, small family cars ("subcompacts") formed the largest market segment. Other national differences were also apparent. In North America, pickup trucks, used as commercial vehicles in most of the world, increasingly displaced passenger cars.

The Evolution of Manufacturing Technology

At the beginning of the twentieth century, car manufacture, like carriage-making, was a craft industry. Cars were built to order according to individual customers' preferences and specifications. In Europe and North America there were hundreds of companies producing cars, few with annual production exceeding 1,000 vehicles. When Henry Ford began production in 1903, he used a similar approach. Even with fairly long runs of a single model (the first version of the Model T, for example), each car was individually built. The development of more precise machine tools permitted interchangeable parts, which ushered in mass production: batch or continuous production of components which were then assembled on moving assembly lines by semi-skilled workers. The productivity gains were enormous. In 1912 it took 23 man-hours to assemble a Model T, just 14 months later it took only 4. The resulting fall in the price of cars opened up a new era of popular motoring. By the 1920s automobile manufacturers were emerging among the ranks of the world's biggest industrial enterprises.

If "Fordism" was the first major revolution in process technology, then Toyota's "lean production" was the second. The system was developed by Toyota in post-war Japan at a time when shortages of key materials encouraged extreme parsimony and a need to avoid inventories and waste through defects. Key elements of the system were statistical process control, just-in-time scheduling, quality circles, teamwork, and flexible production (more than one model manufactured on a single production line). Central to the new manufacturing was the transition from static concepts of efficiency optimization towards continuous improvement to which every employee contributed. During the 1980s and 1990s all the world's car manufacturers redesigned their manufacturing processes to incorporate variants of Toyota's lean production.

New manufacturing methods required heavy investments by the companies in both capital equipment and training. The 1980s were a period of unprecedented high investment expenditures. However, as GM was to learn after spending more than $10 billion in upgrading its plants, the essence of the Toyota system was not new manufacturing "hardware" in the form of robotics and computer-integrated manufacturing systems. The critical elements were the "software"—new employee skills, new methods of shop-floor organization, redefined roles for managers, and new relationships with suppliers.

The new flexible manufacturing technology together with modular designs reduced the extent of scale economies in assembly. During the 1960s and 1970s it was believed that efficiency required giant assembly plants with outputs of at least 400,000 units a year. During the past decade, most of the new plants established had output capacities of between 150,000 and 300,000 units.

New Product Development

The declining importance of scale economies in assembly has done little to assist smaller automobile producers. The critical scale issues are related to the huge and increasing costs of new product development.

Despite the modest pace of technological innovation, the cost of developing new model development rose steeply as a result of increasing complexity of automobiles, the application of electronics and new materials, higher safety requirements, quality improvements, new environmental standards and the need for increased fuel efficiency. By the late 1980s the cost of creating an entirely new, mass-production passenger car from drawing board to production line was about $1.25 billion. By the early 1990s, the costs of major new models had escalated substantially above this level (see Table 4.7).

[Table 4.7 about here]

For smaller manufacturers, the costs of developing entirely new models were entirely beyond their means. One way for smaller producers to remain competitive was to avoid new model changes: at the time of its acquisition by Ford, Jaguar's two models the XJ-6 and XJ-S were almost two decades old and almost no investment had been made in developing a new model. The tiny Morgan car company economized on product development costs by building the same model from the late 1930s on. The alternative was to license designs from larger manufacturers. Thus, Tofas of Turkey builds Fiat-designed cars, Proton of Malaysia builds Mitsubishi-designed cars, and Maruti of India produces Suzuki-designed cars.

The high cost of new product development has been the major source of the cost-uncompetitiveness of smaller producers. The result has been mergers among smaller manufacturers, and the acquisition of smaller producers by bigger ones. The desire to share development costs also results in increased collaboration and joint ventures: Renault and Peugeot established joint engine manufacturing; GM established collaboration with Suzuki, Daewoo, Toyota, and Fiat to build cars and share components.In China and India most new auto plants were joint ventures between local and overseas companies.

During the 1990s, new product development emerged as the critical organizational capability differentiating car manufacturers. Designing, developing, and putting into production a completely new automobile is a hugely complex process involving every function of the firm, up to 3,000 engineers, close collaboration with several hundred suppliers, and up to five years from drawing board to market launch. If the primary competitive advantage of the Japanese manufacturers during the 1970s was low production cost, and during the 1980s was superior quality, by the 1990s the critical Japanese advantage was shorter new product development times and lower development costs. By the early 1990s, US and European carmakers were studying the Japanese companies' use of product development teams as a means of achieving improved functional integration and accelerated product development cycles.

Attempts to lower product development costs have focussed around modular designs and "virtual prototyping" – the use of 3D computer graphics to design and test prototypes.

THE INDUSTRY

The Manufacturers

The major automobile manufacturers are shown in Table 4.8. The ranks of the leading producers are dominated by US, Japanese, and European companies. All the major manufacturers are multinational. Thus, both GM and Ford produce more cars outside the US than within it. Similarly, Honda produces more Accords in the US than in Japan As a result some countries—notably Canada, Spain and the UK—are significant auto producing countries without having any domestic auto companies (other than small specialist producers).

[Table 4.8 about here]

The key trend of the past decade has been consolidation through mergers and acquisitions. Table 4.9 lists the principal deals. At the beginning of the new century, the trend to consolidation appeared to be accelerating. The financial problems of Japanese and Korean auto companies has accelerated the process. The Korean car industry has been reduced from five to two manufacturers (both of which are partly owned by western producers). In Japan both Nissan and Mitsubishi Motor have fallen under western control.

[Table 4.9 about here]

Despite this consolidation, a number of small producers survive in protected markets. Many of these will be threatened by continued trade liberalization. For example, it is unlikely that many of China's 30-odd motor vehicle manufacturers will survive China's accession to the World Trade Organization (see Table 4.10).

[Table 4.10 about here]

Outsourcing and the Growing Role of Suppliers

Henry Ford's system of mass production tended to be supported by heavy backward integration. In Ford's giant River Rouge plant, iron ore entered at one end, Model Ts emerged at the other. Ford even owned rubber plantations in the Amazon basin. The trend of the past 20 years has been towards increasing outsourcing of materials, components, and subassemblies. This has been led primarily by the desire for lower costs and increased flexibility. Again, leadership came from the Japanese: Toyota and Nissan have traditionally been much more reliant upon their supplier networks than their US or European counterparts.

Moreover, the Japanese companies' relationships with their suppliers were much different. In contrast to the US model of arms-length relationships and written contracts, the Japanese manufacturers developed close, collaborative long-run relationships with their "first-tier" suppliers. During the 1980s and 1990s, all the world's auto manufacturers out-sourced more manufacturing and technology development while greatly reducing the number of their suppliers.

The result has been growing size and power of the parts manufacturers, especially those that develop and supply sophisticated subassemblies such as transmissions, braking systems, and electrical and electronic equipment. By the end of the 1990s, Bosch, TRW, Johnson Controls, Denso and other suppliers were key global players in the automotive sector with size and geographical scope similar to many of the automobile manufacturers (see Table 4.11). The spin-off of Visteon from Ford and Delphi-Delco from GM helped spur the creation of a new tier of "mega-suppliers" through mergers and acquisitions among tier I suppliers.

[Table 4.11 about here]

Most recent developments have shifted power from the automobile manufacturers to the key suppliers of components and technologies. However, The launch of Covisint—an online auction forum for components and materials created jointly by Ford, GM, Daimler-Chrysler, Renault and Nissan—may shift bargaining power in the opposite direction through bringing parts suppliers into more open competition with one another.

The Quest for Cost Reduction

Increasing competition in the industry has intensified the quest for cost reduction among automobile manufacturers. Cost-reduction measures have included:

?? Worldwide outsourcing. The tendency for increased outsourcing of components has been referred to above. In addition, auto firms have developed OEM supply arrangements amongst themselves: Daewoo supplies several of GM's models, Mitsubishi supplies engines and complete cars to Chrysler, BMW supplied engines to Rolls Royce (prior to its acquisition by VW).

?? Just-in-time scheduling has radically reduced levels of inventory and work-in-progress.

?? Component production and some assembly activities have been shifted to lower-cost locations: VW's North American production is based in Mexico and the company has also shifted production from Germany to the Czech Republic, Spain, and Hungary; the Japanese companies have moved more and more production to lower-cost locations in Southeast Asia; Daimler Benz and BMW have developed greenfield plants in the Deep South of the US.

?? In high-cost locations (North America, Western Europe, and Japan) increased automation has reduced labor input.

Different companies have faced different cost issues. While European manufacturers were constrained by rigid working conditions, restrictions on layoffs, and generous benefits, US companies were hit by increased provisions for pensions and health care. In Japan the critical issue for most of the 1990s was the escalating value of the yen.

The quest for economies of scale and scope in relation to product development meant that companies sought to spread rising development costs over larger production and sales volumes. Increasingly during the 1990s the auto manufacturers attempted to introduce single global products. After failing to get agreement between its European and US designers over a common Escort model, Ford's Mondeo/Contour was the company's first truly global model.

This desire for scale economies in development, manufacture, and purchasing also resulted in the standardization of designs and components across the different models of each manufacturer. The major work of DaimlerChrysler's Executive Automotive Committee during the summer of 2001 was directed towards achieving commonalties of platforms, engines, and components between the groups different models. For example:

?? Common platforms were agreed between Chrysler and Mitsubishi (Neon/Lancer and Stratus/Galant) and between Mitsubishi and Smart.

?? On engines, the number of four-cylinder engines were to be cut from 14 to 9, six-cylinder engines from 11 to 8, and 8/10/12-cyclinder engines from 10 to eight.

?? A common electrical and electronics architecture was agreed.

Excess Capacity

A major problem for the industry has been the tendency for the growth of production capacity to outstrip the growth in demand. During the 1980s and early 1990s, Japanese companies were major investors in new capacity with a number of greenfield "transplants" in North America and Europe. During the 1990s all the world's major car companies responded to the quest for globalization with new plants (many of them joint ventures) in the growth markets of Southeast Asia, China, India, South America, and Eastern Europe. During 1992–7, the Korean car companies were especially aggressive investors in new capacity. The resulting overhang of excess capacity was a key factor exacerbating intense competition in the industry. Table 4.12 shows excess capacity in the industry.

[Table 4.12 about here]

Internationalization

The driving force behind capacity expansion was internationalization. Although international growth extends back to 1920s, when Ford and General Motors established their European subsidiaries, until the 1970s the world auto industry was made up of fairly separate national markets. Each of the larger national markets was supplied primarily by domestic production, and indigenous manufacturers tended to be market leaders. For example in 1970, the Big Three (GM, Ford, and Chrysler) held close to 85 percent of the US market, VW and Daimler Benz dominated the market in Germany, as did Fiat in Italy, British Leyland (later Rover) in the UK, Seat in Spain, and Renault, Peugeot, and Citroen in France. By 1998, the industry was global in scope: in almost every significant national market, all the world's leading manufacturers had established themselves.

Internationalization has occurred through trade and foreign direct investment. Despite the efforts by the US and Europe to protect their markets against Japanese imports by means of quotas, growth in trade has been stimulated by declining tariffs and the convergence of national preferences.

During the 1970s and 1980s, Japanese car manufacturers displaced the American Big Three as the pioneers of internationalization. The patterns of international expansion were also different. While Ford and GM had established self-sufficient, fully integrated subsidiaries in overseas countries, the Japanese companies preferred to export from their home plants. The Japanese companies' transfer of production outside of Japan was initially the result of import barriers imposed by the US and Europe, and subsequently the result of the rising value of the yen. Table 4.13 shows some of the North American auto plants established by overseas (mainly Japanese) companies. By contrast, the Continental Europeans focussed mainly upon Europe and the developing world. VW acquired carmakers in Spain (Seat), Czech Republic (Skoda), Britain (Rolls Royce), and elsewhere. Fiat, PSA, and VW all established plants in Latin America, Africa, and Asia. During the mid-to-late 1990s some of the most aggressive overseas expansion was by the Korean auto producers. Daewoo has also moved rapidly into Eastern Europe with plants in Poland, Romania, and Uzbekistan, as well as starting joint ventures in India and elsewhere. However, the Korean expansionism was quickly halted by the 1998 financial crisis.

[Table 4.13 about here]

The emerging market economies of Eastern Europe, Asia, sand Latin America provided a magnet for foreign investment. China and India were identified as particularly important markets within which to establish a presence. However, the tendency has been for capacity in these markets to outstrip demand growth, with the implication that returns on these investments have typically been meagre.

Despite the tremendous internationalization of the auto industry, national producers still retain leadership in their home markets. For example, Fiat is market leader in Italy, VW in Germany, Renault and PSA in France, Hyundai and Daewoo in Korea (see Table 4.14). This is partly a legacy of import protection, partly a reflection of nationalism among domestic consumers, and partly a reflection of the importance of well-established dealership networks and intimate local knowledge of domestic manufacturers.

[Table 4.14 about here]

Industry Location

Given the shift demand to the emerging market countries and the producers quest for lower production costs, it might be expected that the geographical distribution of the industry would have changed substantially over recent decades (in the same way that other manufacturing industries— consumer electronics, small appliances, textiles, and semiconductors— have relocated in newly industrializing countries. Yet, in automobiles, such shifts have been surprisingly small. The main feature of 1950-80 was the rise of production in Japan, but since 1980, changes have been small with the three major manufacturing regions—Western Europe, North America, and Japan— each accounting for close to 30 percent of world production. The continuing dominance of this triad is despite the attempts of newly industrializing countries to develop their domestic industries, either by protecting domestic manufacturers or by encouraging inward investment. (Tables 4.15 and 4.16 show production by different regions and countries in recent years.)

[Tables 4.15 and 4.16 about here]

The advantages of these countries lie primarily in labor costs, which are often a fraction of those in the older industrialized countries (see Table 4.17). Nevertheless, with the exception of Korea, none of the new auto-manufacturing countries has emerged as a major auto-producing locality. The ability of the established auto-manufacturing countries to sustain their leadership points to the importance of factors other than wage rates in driving international competitiveness in the auto industry. Table 4.18 shows that, although wage costs are much lower in Mexico than in the US, this cost advantage is outweighed by other factors.

[Table 4.17 and 4.18 about here]

Market Segments and Market Positioning

Despite the globalization of the leading automakers, the world still lacks a single global market. The need for manufacturers to build extensive dealership chains in the markets they supply, differences in national regulations and customer preferences, differences in affluence and infrastructure, and trade restrictions all continue to segment the world

market. The world market is also segmented by types of product. The US market has traditionally been segmented by sizes of automobile: full size, medium size, compact, subcompact, and so on. At the top end of the market are "luxury cars" distinguished primarily by their price. There are also specific types of vehicle: sports cars, sport-utility vehicles, small passenger vans ("minivans"), and light pickup trucks, for example.

Margins vary considerably between product segments. Chrysler's position as one of the world's most profitable auto manufacturers during the late 1980s and for much of the 1990s was primarily a result of its strong position in SUVs (through Jeep) and minivans (through its Dodge Caravan and Plymouth Voyager models). The luxury car segment too has traditionally been associated with high margins. However, mobility barriers between segments tend to be low. Over the past decade, all the major manufacturers have broadened their product range in order to access economies of scope in technology, production and marketing, and to exploit higher margins in specialty segments. In the luxury car segment, traditionally dominated by specialist producers such as Mercedes, Jaguar, Rolls Royce, and BMW, mass manufacturers have entered, either by creating new divisions and models (e.g., Honda's Acura, Toyota's Lexus, and Nissan Infiniti) or through acquisition (Jaguar and Volvo acquired by Ford, Rolls Royce by VW, Lancia and Alfa-Romeo by Fiat, Saab by GM). Similarly, there has been an influx by the volume auto manufacturers into the minivan and SUV sector.

As the pressure of competition has increased across all market segments, manufacturers have sought differentiation advantage through introducing models that combine design features from different segments (e.g. four-wheel drive minivans, luxury SUVs, and smaller SUVs based on small-car platforms).

Vertical segmentation was also an issue for the industry. Profitability varied across the different stages of the auto industry's value chain. The prevailing wisdom was that downstream activities offered better profit potential than manufacturing activities. It was this logic that had encouraged the auto companies to outsource and spin off most of their production of components and invest in downstream activities such as consumer finance, insurance, and after-market services (for example, Ford had acquired the repair and parts supplier Kwik Fit and Hertz car rental in 1999).

THE OUTLOOK

Meetings between Rudiger Grube, his corporate planning staff, and automotive experts from both within the group and from outside consulting companies, produced both consensus and dissent. With much of the world moving into either recession or stagnation during the latter part of 2001, it was agreed that the prospects for any significant growth in market demand looked remote over the medium term. Given the growth in industry capacity resulting from the heavy investments by automanufacturers in new production capacity, it seemed likely that the industry would continue to be dogged by a substantial overhang of excess capacity. The ability of the industry to control excess capacity and limit the tendency towards price competition (including discounts and favorable trade-in allowances and credit terms) would depend greatly upon the impact of the current wave of consolidation. The spate of mergers and acquisitions had reduced the number of independent automobile manufacturers producing over 400,000 units a year from 23 in 1995 to 13 in 2001. Many industry experts believed that this consolidation would continue: as early as 1999 *Business Week* had forecast that only manufacturers with annual production of five million vehicles or over would survive, leading to the emrgence of a global "Big Six": GM, Ford, DaimlerChrysler, Toyota, VW, and Honda.[2] Others disagreed, Peugeot and BMW were adamant that the benefits of huge volume and broad scope were offset by advantages of flexibility, design innovation, and brand strength that medium sized players could muster.

Looking longer term, there was disagreement over whether the industry would mature through steady, gradual evolution, or would be subject to more radical change. The auto makers had adapted to electronics, new materials and other technological changes without any major impact on basic automotive design. The prospects for more radical technological change were linked closely with environmental issues. Fears for the demise of the internal combustion engine had proved groundless and most of investments by the companies in electrical propulsion had been viewed as wasted money. Yet, the threat of global warming was growing, and in several cities of the world problems of pollution were already encouraging government measures to substitute electrical propulsion for gasoline propulsion.

Important developments were also occurring within the value chain. The transfer of manufacturing and technology development from the auto producers to component suppliers seemed likely to continue. Many manufacturers seemed to be unconcerned about losing control over production and technology so long as they could control marketing and distribution. But here too some disturbing developments were occurring. The auto companies controlled their markets through their networks of franchised dealers, through which they supplied not only new cars but also consumer finance and spare parts. These established dealer networks were being threatened by several developments including the emergence of new automobile "megastores" (e.g. Republic Industries' Auto Nation stores and Circuit City's CarMax group) and the impact of sales through the internet. As *Business Week* observed, "Retailers have historically been the apparatus auto makers use to find homes for all the new cars they crank out. Powerful new buyers could be a threat, the relationship could change to where the retailer tells the auto maker what to do and what price to sell at."[3]

Changes in the industry's structure over time would influence not just the overall intensity of competition and the prospects of industry profitability, but also how that profit was shared among the different companies. As the companies had converged in terms of technology, design and even quality levels, so cost had emerged as the critical success factor. This in turn had created the drive to exploit economies of scale and scope. Now that all manufacturers were following

similar strategies to exploit economies of scale and scope through common vehicle platforms, common components, global models, and global sourcing, what factors would emerge as the critical determinants of competitive advantage during the remainder of the decade?

TABLE 4.1.Economic Value Added of major automobile producers (in $, millions)

	1991	1992	1993	1994	1995	1996	1997	1998	1999
General Motors	(10,719)	(8,765))	(7,807)	(4,430)	(2,963)	(6,593)	(4,807)	(7,669)	(6,160)
Ford	(6,821)	(9,386)	(6,805)	(230)	(5,412)	1,102	341	(3,980)	2,864
DailmerChrysler	(3,332)	(1,038)	1,560	2,653	488	2,271	759	5,210	588
Toyota	(506)	2,215)	(3,481)	(4,039)	(5,133)	(3,630)	(2,027	(345)	(742)
VW	(214)	(1,964)	(3,489)	2,210)	(2,445)	(2,395)	(2,319	402	76
Nissan	(1,819)	(3,651)	(4,993)	(6,795)	(4,095)	2,225) (	2,426)	(2,537)	(2,337)
Honda	(674)	(497)	(920)	(699)	(2,687	(1,602)	(233)	1,100	1,372
Fiat	(633)	(2,658)	(3,292)	(576)	(554)	(703)	(1,371)	(1,456)	(1,888)
Renault	n.a.	n.a.	n.a.	n.a.	(1,647)	(4,040)	(2,888)	(349)	(932)
Peugeot	n.a.	n.a.	n.a.	n.a.	(389)	(1,033)	(759)	462	133
Hyundai	n.a.	n.a.	n.a.	n.a.	n.a.	144	(231)	(547)	(547)
Suzuki	(112)	(49)	(120)	(195)	(298)	(182)	(93)	(94)	n.a.
BMW	n.a.	(630)	(661)	(466)	(891)	(820)	(698)	(730)	48

Source: Stern Stewart Research, *Best of Times, Worst of Times*, Stern Stewart & Company, December 2000.

TABLE 4.2. US motor vehicle production

	Passenger cars	*Trucks and buses*	*Total*
1900	4,192	n.a.	4,192
1905	24,250	750	25,000
1910	181,000	6,000	187,000
1915	895,930	74,000	969,930
1920	1,905,560	321,789	2,227,349
1925	3,735,171	530,659	4,265,830
1930	2,787,456	575,364	3,362,820
1935	3,273,874	697,367	3,971,241
1940	3,717,385	754,901	4,472,286
1945	69,532	655,683	725,215
1950	6,665,863	1,337,193	8,003,056
1955	7,920,186	1,249,105	9,169,292
1960	6,674,796	1,194,475	7,869,271
1965	9,305,561	1,751,805	11,057,366
1967	7,436,764	1,539,462	8,976,226
1970	6,546,817	1,692,442	8,239,257
1975	6,712,852	2,272,160	8,985,012
1977	9,200,849	3,411,521	12,642,370
1980	6,400,026	1,667,283	8,067,309

1985	8,002,259	3,464,327	11,466,586
1990	6,049,749	3,718,781	9,768,530
1991	5,407,120	3,375,422	8,782,542
1992	5,684,221	4,042,486	9,726,689
1993	5,981,046	4,883,157	10,864,203
1994	6,601,223	5,648,767	12,249,990
1995	6,350,367	5,634,742	11,985,091
1996	6,083,000	5,749,000	11,832,000
1997	5,927,000	6,169,000	12,096,000
1998	5,554,390	6,451,689	12,006,079
1999	5,637,949	7,387,029	13,024,978
2000	5,542,217	7,228,497	`12,770,714

Source: *Ward's Automotive Yearbook*.

TABLE 4.4,World motor vehicle production (passenger cars and commercial vehicles)

Total (mil.) as % of total		*US and Canada*		*Total (mil.) as % of total*	*US and Canada*
1950	10.58	79.4	1990	48.35	24.2
1955	13.63	70.9	1991	46.50	23.0
1960	16.49	50.4	1992	47.69	24.5
1965	24.27	49.4	1993	46.40	28.3
1970	29.40	32.1	1994	49.69	29.4
1975	33.00	31.4	1995	49.93	28.8
1980	38.51	24.8	1996	52.50	28.2
1985	44.81	30.3	1997	54.15	28.0
1986	45.30	29.1	1998	53.50	27.3
1987	45.90	27.4	1999	55.74	28.7
1988	48.21	27.3	2000	57.43	27.4
1989	49.10	26.2			

Source: American Automobile Manufacturers Association (AAMA).

TABLE 4.3.Average age of passenger cars in the US (years)

	Mean	*Median*
2000	8.8	8.3
1998	8.7	8.1
1996	8.5	7.4
1994	8.4	7.4
1992	8.1	7.0
1990	7.8	6.5
1988	7.6	6.8
1984	7.5	6.7
1980	6.6	6.0
1976	6.2	5.5
1972	5.7	5.1
1968	5.6	4.7
1962	6.0	5.7

1958	5.6	5.1
1952	6.8	4.5
1948	8.8	8.0
1941	5.5	4.9

Source: R.L. Polk & Co.

TABLE 4.5.Pounds of material in a typical family automobile

	1978	*2001*
Steel	2,128	1,781
Iron	512	345
Plastic and plastic composites	180	253
Aluminum	112	257
Copper and brass	37	46
Zinc castings	31	11
Glass	86	99
Rubber	146	146
Other	337	371
Total	3,569	3,309

Source: *Ward's Automotive Yearbook*.

TABLE 4.6. From option to standard: convergence in automobile features

Feature	*Introduction*	*General adoption*
Speedometer	1901 by Oldsmobile	Circa 1915
Automatic transmission	First installed 1904	Introduced by Packard as an option
	1938. Standard on Cadillacs and	
	other luxury cars early 1950s	
Electric headlamps	GM introduced 1908	Standard equipment by 1916
All-steel body	Adopted by GM 1912	Becomes standard early 1920s
Steel enclosed body	Dodge 1923	Becomes standard late 1920s
Radio	Optional extra 1923	Standard equipment 1946
Four-wheel drive	Appeared 1924	Only limited availability by 1994
Hydraulic brakes	Introduced 1924	Become standard 1939
Shatterproof glass	First used in cars 1927	Standard feature in Fords 1938
Power steering	Introduced 1952	Standard equipment by 1969
Anti-lock brakes	Introduced 1972	Standard on GM cars in 1991
Air bags	Introduced by GM 1974	Standard in most new cars by 1994

Source: *Washington Post*.

TABLE 4.7. New car development costs during the 1990s

Ford Mondeo/Contour	$6 billion
GM Saturn	$5 billion
Ford Taurus (1996 model)	$2.8 billion
Ford Escort (new model)	$2 billion
Chrysler Neon	$1.3 billion
Renault Clio (1999 model)	$1.3 billion

Honda Accord (1997 model)	$0.6 billion
Rolls Royce Silver Seraph	$0.33 billion

Source: Assembled from various newspaper reports.

TABLE 3.8. The world's leading auto manufacturers

Production ('000s of autos and CVs)

		1992	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*
GM	US	6,764	8,254	8,619	8,176	8,310	8,155	8,236	8,114
Ford	US	5,742	6,679	6,462	6,611	6,943	6,850	6,665	7,206
Toyota	Japan	4,249	4,565	4,465	4,794	4,850	4,643	5,496	5,897
Daimler-Chrysler	Germany	--	--	--	--	--	--	4,822	4,666
Chrysler	US	1,983	2,880	2,808	3,080	3,051	3,120	--	--
Daimler-Benz	Germany	799	884	930	1,002	1,149	1,442	--	--
Volkswagen	Germany	3,286	2,436	3,299	3,977	4,325	3,320	4,786	5,106
Nissan	Japan	2,963	2,702	2,839	2,712	2,801	2,610	2,457	2,698
Peugeot	France	2,437	2,027	1,890	1,975	1,146	1,294	2,515	2,879
Renault	France	1,929	1,881	1,761	1,755	1,868	2,234	2,345	2,515.
Fiat	Italy	1,800	1,967	2,143	2,545	2,486	2,341	2,624	2,639
Honda	Japan	1,762	1,725	1,765	2,021	2,269	2,298	2,425	2,469
Mitsubishi	Japan	1,599	1,504	1,529	1,452	1,529	1,353	1,555	1,613
Mazda	Japan	1,248	1,215	974	984	1,052	1.030	967	972
Suzuki	Japan	888	1,076	510	1,387	1,458	1,450	1,521	1,434
Hyundai	S. Korea	874	1,153	1,255	1,402	1,370	889	1,970	2,488
AutoVAZ	Russia	674	528	585	562	575	n.a	680	756
Fuji	Japan	648	434	419	525	542	n.a.	578	581
Daihatsu	Japan	610	554	606	691	683	724	--	--
BMW	Germany	598	573	563	641	672	706	1,147	835
Kia	S. Korea	502	675	691	847	750	498	648	735
Isuzu	Japan	473	487	456	462	481	461	520	572
Rover	UK	405	485	503	510	479	502	400	345
Volvo	Sweden	365	439	448	446	466	487	504	n.a.
Daewoo	S. Korea	179	419	523	710	819	758	569	834

Volkswagen's production for 1996 and 1997 includes Skoda and Seat.

Sources: *Ward's Automotive Yearbook*, *Fortune*.

TABLE 4.9.Mergers and acquisitions among automobile manufacturers, 1986-2001

2001	GM (US)	Daewoo (S. Korea)	
2000	GM (US)	Fiat (Italy)	20% of equity acquired
2000	DaimlerChrysler (Germ.)	Hyundai	10% of equity acquired
2000	DaimlerChrysler (Germ.)	Mitsubishi Motors	34% of equity acquired
1999	Renault (France)	Nissan (Japan)	38.6% of equity acquired
1999	Ford (US)	Volvo (Sweden)	Car business acquired from Volv
1999	Ford (US)	Land Rover (UK)	Acquired from BMW
1998	Daimler Benz (Germany)	Chrysler (US)	
1998	VW (Germany)	Rolls Royce Motors (UK)	
1998	Hyundai (S. Korea)	Kia (S. Korea)	
1998	Daewoo (S. Korea)	Sssangyong Motor (S. Korea)	

1998	Daewoo (S. Korea)	Samsung Motor (S. Korea)	
1997	Proton (Malaysia)	Lotus (UK)	
1997	BMW (Germany)	Rover (UK)	
1996	Daewoo (S. Korea)	FSO (Poland)	
1996	Daewoo (S. Korea)	FS Lublin (Poland)	
1995	Fiat (Italy)	FSM (Poland)	
1995	Ford (US)	Mazda (Japan)	
1994	Daewoo (S. Korea)	Oltcit/Rodae (Romania)	
1991	VW (Germany)	Skoda (Czech Republic)	
1990	GM (US)	Saab-Scandia (Sweden)	50% of equity acquired
1990	Ford (US)	Jaguar (UK)	
1987	Ford (US)	Aston Martin (UK)	
1987	Chrysler (US)	Lamborghini (Italy)	
1986	VW (Germany)	Seat (Spain)	

TABLE 4.10. Major motor vehicle manufacturers in China, 2000 (companies producing more than 100,000 vehicles annually)

Manufacturer	*Production*	*Notes*
First Auto	322,687	Includes 110,005 vehicles produced by First Auto–VW joint venture.
Shanghai-VW	221,524	Mainly VW Santanas.
Changlan Machine	195,432	
Dongfeng Auto Co.	157,038	Includes Dongfeng-Citroen joint venture producing Citroen ZX under "Fukang" badge
Beijing Automobile	124,824	Includes joint venture with Chrysler to build Jeep Cherokees
Hafei Company	122,007	
Liuzhou Auto	111,908	
Tianjin Auto	101,763	License agreement with Daihatsu.

Source: *Ward's Automotive Yearbook*, *Financial Times*.

TABLE 4.11.Leading suppliers of automotive compone nts ($ billion)

Revenues

	1994	*1996*	*1998*	*2000*	*ROE 2000*
Delphi Automotive	--	--	--	29.1	28.2%
Robert Bosch (Germany)	19.6	16.3	17.8	29.1	16.7%
Visteon (US)	--	--	--	19.5	n.a.
Denso Corp. (Japan)	11.0	13.9	11.7	18.2	4.7%
Johnson Controls (US)	7.1	6.3	12.6	17.2	17.9%
TRW (US)	7.9	6.5	11.9	17.2	17.3%
Dana (US)	5.5	7.7	12.5	12.7	13.0%
Eaton (US)	4.4	7.0	6.6	8.3	10.2%
Lucas-Varity (UK–US)[1]	3.9	7.2	6.6	--	--
Aisin Seiki (Japan)	7.3	7.8	6.5	8.9	12.5%
Lear Corp (US)	3.1	6.2	9.0	14.1	17.0%
Valeo SA (France)	3.8	5.0	5.7	8.9	n.a.

Magna International (Canada)	--	--	--	10.5	14.3%

[1]Acquired by TRW

Sources: *Ward's Automotive Yearbook*, *Business Week* "Global 1000."

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TABLE 4.12. Capacity utilization in motor vehicle manufacturing (%)

	2000	*1998*	*1996*	*1994*	*1992*	*1990*
United States	81.2	76.8	77.4	83.5	69.9	71.6
Western Europe	71.8	71.5	72.0	69.8	75.8	77.8
Asia	64.5	61.2	68.5	69.8	75.1	76.7

Sources: AAMA, *The Economist*, economagic.com

TABLE 4.13. Japanese and European "transplants" in North America

Company	*Parent(s)*	*Location*	*Production of cars and lt. trucks 2000*
Honda of America	Honda	E. Liberty and Marysville, OH	677,090
Toyota USA	Toyota	Georgetown, KY	995,000
NUMMI,	Toyota & GM	Fremont, CA	
CAMI Automotive	Suzuki and GM	Ontario	113,000
Toyota Canada	Toyota	Ontario	186,000
Honda of Canada	Honda	Ontario	152,000
Diamond-Star Motors	Mitsubishi/Chrysler	Normal, IL	223,000
Subaru-Isuzu Auto	Fuji and Isuzu	Lafayette, IN	207,000
Nissan Motor Mfr. USA	Nissan	Sryrna, TN	475,898
BMW	BMW	Spartanburg, NC	78,000
Mercedes-Benz	DaimlerChrysler	Vance, AL	119,462
AutoAlliance International	Mazda/Ford	Flat Rock, MI	108,000
Volkswagen	Volkswagen	Puebla, Mexico	440,000

Source: *Ward's Automotive Yearbook*, *Ward's Auto World*

TABLE 4.14. Automobile market shares in individual countries (%)

Japan	*2000*	*1997*	*1994*	*1992*	*1988*
Toyota	28.5	30.6	33.7	35.3	43.9
Honda	16.2	10.1	8.5	10.5	10.8
Nissan	11.8	14.0	18.0	19.9	23.2
Suzuki	10.0	8.6	n.a.	n.a.	n.a.
Mitsubishi	6.9	7.9	9.2	7.5	4.9
Mazda	6.0	4.3	6.3	7.3	6.7
*Korea**	*2000*	*1997*	*1994*	*1992*	*1988*
Hyundai	50.3	46.6	46.5	46.7	55.9
Kia	19.7	23.0	26.5	25.8	25.0
Daewoo	24.8	30.2	16.0	15.5	19.1

*Domestic producers only (excludes imports)

Australia	*2000*	*1997*	*1995*	*1992*	*1988*
GM-Holden	22.0	17.7	21.3	19.6	20.9
Toyota	16.8	13.4	19.0	15.5	15.3
Ford	15.9	19.6	24.4	23.3	28.1
Mitsubishi	9.6	11.9	10.1	11.5	12.2
Hyundai	8.1	11.1	8.9	n.a.	n.a.
Nissan	4.7	3.6	3.8	11.5	9.9

Taiwan	*2000*	*1997*	*1994*	*1992*
Ford	13.9	16.2	17.8	23.0
Toyota	23.8	18.1	20.0	15.9
Yulon/Honda	13.3	17.3	11.8	14.5
Nissan	22.6	17.2	n.a	n.a

France	*2000*	*1997*	*1994*	*1992*	*1988*
Renault	28.2	27.4	30.0	29.4	29.1
Peugeot	30.9	28.8	31.1	30.1	34.2
VW	11.2	11.4	8.0	9.7	9.2
Ford	6.2	8.0	8.1	8.2	7.1

Italy	*2000*	*1997*	*1994*	*1992*	*1988*
Fiat	35.5	43.0	46.0	43.0	59.9
VW	11.8	9.9	10.4	14.8	11.7
Ford	8.8	9.3	9.6	10.8	3.7
Peugeot	7.6	6.3	n.a.	n.a.	n.a.
Renault	7.0	6.8	7.0	7.6	7.1

UK		*2000*	*1997*	*1994*	*1992*	*1988*
Ford	20.7	18.7	22.2	22.5	26.3	
GM	14.2	14.3	16.9	17.6	13.7	
Peugeot	12.3	11.4	12.1	11.8	8.7	
VW	9.8	7.9	n.a.	n.a.	n.a.	
BMW/Rover	7.7	12.9	12.8	13.5	15.0	

Germany	*2000*	*1997*	*1994*	*1992*	*1988*
VW	27.8	25.0	20.9	26.4	28.3
GM	12.5	15.6	16.5	16.7	16.1
Ford	7.6	11.0	9.9	9.3	10.1
Mercedes	12.8	8.5	8.2	6.5	9.2
Japanese	11.7	12.3	12.5	13.4	15.2

Source: *Ward's Automotive Yearbook*.

TABLE 4.15.World motor vehicle production by countries and regions (% of world total)

	1960	*1989*	*1992*	*1994*	*1997*	*1998*	*2000*
United States	52.0	23.8	20.6	24.5	22.0	23.0	22.2
Western Europe	38.0	31.7	32.5	31.2	32.6	32.6	29.9
Russia and E. Europe	2.0	4.8	—	4.3	5.6	4.3	4.6
Japan	1.0	18.2	26.7	21.2	20.5	19.2	17.7
Korea	—	1.8	3.7	4.6	4.8	3.4	5.0
Other	7.0	19.7	16.4	14.4	14.5	17.5	20.6
Total units (millions)	12.8	49.5	47.5	50.0	55.0	53.3	57.4

Products for E. Europe and USSR included in "Other" for 1991 and 1992.

Source: AAMA, *Automotive News*.

TABLE 4.16. Automobile production by country (thousands of cars)

	2000	*1998*	*1997*	*1995*	*1994*	*1992*	*1990*	*1987*	
US	5,542	5,554	5,884	6,338	6,601	5,664	6,077	7,099	
Canada	1,551	1,481	1,374	1,339	1,215	1,020	1,072	810	
Mexico	1,130	958	833	710	840	778	346	266	
Total N. America	8,223	7,993	8,091	8,387	8,657	7,463	7,496	8,176	
Germany	5,132	5,348	4,678	4,360	4,040	4,864	4,805	4,604	
France	2,883	2,582	3,326	3,051	3,175	3,320	3,295	3,052	
Italy	1,442	1,378	1,580	1,422	1,341	1,477	1,874	1,701	
UK		1,641	1,748	1,868	1,532	1,467	1,292	1,296	1,143
Spain	2,445	2,216	1,961	1,959	1,822	1,799	1,679	1,403	
Sweden	260	368	373	390	353	294	336	432	
Total W. Europe	14,853	14,790	14,687	14,350	13,844	13,520	13,672	13,471	
Japan	8,363	8,055	8,494	7,664	7,801	9,379	9,948	7,891	
Korea	1,881	1,434	2,088	1,893	1,805	1,307	987	793	
Australia	324	349	323	284	286	270	361	225	
China	620	543	543	356	313	208	n.a.	n.a.	
India	541	406	380	n.a.	n.a.	n.a.	n.a	n.a..	
Taiwan	265	285	258	271	263	283	277	175	
Former USSR	967	836	1,066	834	798	1,050	1,260	1,329	
Poland	533	574	426	260	250	212	256	301	
Brazil	1,348	1,223	1,680	1,312	1,249	816	663	789	

Sources: Japan Automobile Manufacturers Association, Korean Automobile Manufacturers Association, *Marketing Systems*.

TABLE 4.17. Hourly compensation for motor vehicle workers (US$ per hour including benefits)

	1975	*1981*	*1984*	*1986*	*1988*	*1990*	*1992*	*1994*	*1998*
US	9.55	17.03	19.02	20.09	20.80	22.48	25.12	26.56	27.49
Mexico	2.94	5.27	2.55	2.03	1.96	2.79	4.35	4.05	2.94
Japan	3.56	7.61	7.90	11.80	16.36	15.77	19.97	26.36	23.38
Korea	0.45	1.33	1.74	1.84	3.20	5.78	7.05	8.83	7.75
Taiwan	0.64	1.86	2.09	2.23	3.50	5.72	6.57	6.76	6.68

France	5.10	9.11	8.20	11.06	13.54	15.94	17.42	17.66	19.32	
Germany	7.89	3.34	11.92	16.96	23.05	27.58	32.61	36.10	36.70	
Italy	5.16	8.21	8.00	11.03	14.51	17.97	20.48	16.74	18.56	
Spain	—	7.03	5.35	7.74	10.85	15.00	17.52	15.17	14.72	
UK		4.12	8.10	7.44	9.22	11.95	13.87	16.80	15.07	19.63

Source: US Dept. of Labor, Bureau of Labor Statistics

TABLE 4.18. The cost of producing a compact automobile, US and Mexico, 1992 ($)

	US	*Mexico*
Parts and components	7,750	8,000
Labor	700	140
Shipping costs	300	1,000
Inventory	20	40
Total	8,770	9,180

Source: US Office of Technology Assessment, October 1992.

APPENDIX. The World's Major Automobile Producers, Sales and Profitability 1980-2000.

Sales ($ billion)

	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1985-89	1980-84
GM	185	167	161	178	168	169	155	134	113	124	125	110	68
Ford	170	163	144	154	147	137	128	109	100	59	98	77	42
DaimlerChrysler	152	151	142	--	--	--	--	--	--	--	--	--	--
Chrysler	--	--	--	61	61	53	52	44	37	29	31	28	13
Daimler Benz	--	--	--	70	72	72	64	59	62	57	54	34	12
Toyota	121	120	113	84	109	111	88	85	95	78	65	42	18
VW	79	70	60	64	67	61	50	46	54	46	44	28	16
Honda	58	57	60	43	47	44	40	36	39	31	27	18	8
Fiat	53	45	56	51	51	46	41	35	40	47	48	27	18
Nissan	55	61	54	47	59	63	59	54	59	43	40	26	16
Peugeot	41	38	39	31	34	33	30	26	29	28	29	19	13
Renault	37	35	43	35	36	37	32	30		29	31	31	15
BMW	33	33	35	34	35	32	30	18	20	18	17	10	5
Mitsubishi	30	32	27	n.a	33	37	34	27	26	19	17	14	12
Hyundai Motor	29	21	15	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Mazda	16	20	17	15	17	19	22	20	25	19	17	12	n.a.

Return on Equity (%)

	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1985-89	1980-84
GM	14.8	29.9	19.7	37.1	21.2	29.5	39.2	44.1	(46.0)	(16.3)	(6.6)	11.8	11.4
Ford	18.6	26.3	94.3	22.9	16.6	16.9	24.5	16.2	2.6	(10.0)	3.7	21.8	0.4
DaimlerChrysler	18.3	15.9	15.9	--	--	--	--	--	--	--	--	--	--
Chrysler	--	--	--	24.6	30.5	18.5	34.7	(37.3)	6.6	(12.9)	1.0	20.8	66.5
Daimler Benz	--	--	--	12.0	10.5	43.8	5.0	3.6	7.7	9.4	9.0	18.3	24.3
Toyota	7.5	6.5	6.8	8.0	7.5	5.4	2.4	3.3	5.0	9.5	10.8	10.6	12.6
VW	18.0	13.2	6.2	14.6	5.9	3.4	1.3	(19.0)	1.2	7.2	7.2	6.3	1.6

Honda	11.8	14.9	17.3	18.8	17.5	6.8	5.3	2.3	3.5	7.0	8.3	11.8	18.1
Fiat	4.9	3.4	4.8	10.6	9.7	9.7	5.1	10.6	3.5	4.8	9.1	18.7	10.9
Nissan	39.2	(3.8)	(2.2)	(8.0)	6.3	7.2	10.2	(5.2)	3.1	2.7	7.2	4.68	10.3
Peugeot	13.8	9.5	5.7	(4.7)	1.3	3.1	5.6	18.4	10.4	9.8	18.4	36.7	(15.2)
Renault	11.0	6.5	17.0	12.6	14.2	4.8	8.2	3.3	18.1	8.5	6.7	51.1	(152.4)
BMW	20.6	11.3	(63.2)	14.1	9.4	8.5	8.5	8.0		11.1	11.0	10.4	14.8
Mitsubishi	(123.2)	(26.8)	0.2	n.a.	2.6	2.9	2.3	1.3	2.2	10.3	6.9	7.9	10.0
Hyundai Motor	8.9	7.7	1.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Mazda	(110.7)	11.6	10.9	(1.0)	5.6	4.3	11.2	(12.9)	14.4	6.4	6.6	4.8	n.a.

NOTES

[1] "Merger agreement signed: Daimler-Benz and Chrysler combine to form leading global automotive company," Press Release, Chrysler Corporation, May 1998.

[2] *Business Week* "Autos: The Global Six," January 25, 1999

[3] *Business Week*, February 24, 1997, p. 89.