In Coase's Footsteps

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Retracing famous journeys is a time-honored and worthy tradition. Great explorers necessarily leave some terrain unsurveyed when they visit new territory for the first time. As we mark the Law School's Centennial, there is one journey especially worthy of our attention. When he was a 20-year-old undergraduate, Ronald Coase spent the better part of a year visiting the great industrial plants in the United States. Out of this research emerged *The Nature of the Firm*,[1] *The Problem of Social Cost*,[2] and much of modern law and economics. Coase solved many mysteries that year, but, happily for the rest of us, not all of them. One of the most intriguing arises out of the relationship between General Motors and Fisher Body, one of GM's principal suppliers.

Coase was primarily interested in what drove managers to produce something inside a firm rather than acquire it in the marketplace. GM's acquisition of Fisher was therefore a subject of particular interest to him.[3] Fisher began as an independent firm that supplied GM with all of its closed car bodies. In 1926, GM acquired Fisher and thereafter produced all of its car bodies internally, along with the two other major components of its cars (the chassis and drive train), both of which it made largely in-house.[4] Hence, while interviewing GM executives in 1932, Coase naturally asked about the firm's acquisition of Fisher. They told him that the need to build body plants next to GM's assembly plants drove the decision. The conversation, however, seems

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1 R.H. Coase, *The Nature of the Firm*, 4 Economica 386 (1937).

2 R.H. Coase, *The Problem of Social Cost*, 3 J L & Econ 1 (1960).

3 See R.H. Coase, *The Nature of the Firm: Origin*, in Oliver E. Williamson and Sidney G. Winter, eds, *The Nature of the Firm: Origins, Evolution, and Development* 34, 45 (Oxford 1991) ("I should investigate long-term contracting between firms. This may in many instances be considered as an alternative to actual operating integration, and [it] seems well worth the trouble to get any information.") (quoting from a letter Coase wrote in 1932).

4 Coase has returned to the question of GM's acquisition of Fisher Body, and his most recent account sets out the basic facts. See R.H. Coase, *The Acquisition of Fisher Body by General Motors*, 43 J L & Econ 15, 21–27 (2000).

to have stopped here.[5] Coase did not learn why they wanted body plants next to assembly plants, or why doing this required the vertical integration of the two firms. As it happened, other bits of evidence led him to a new understanding of the nature of the firm, and this line of inquiry was left untouched.

In this Essay, I return to Coase's brief conversations with these GM executives. I attempt to discover why they answered Coase's question the way they did, and what they might have said had they been pressed further. My reasons are two-fold. First, economists in recent years have come to use the merger of GM and Fisher as the paradigmatic example of vertical integration.[6] Reexamining what the managers thought they were doing has something to offer to this ongoing debate. Second, the inquiry itself casts some light on what gives firms value as going concerns. Understanding going-concern value—the value that assets have if kept together inside an existing firm (and hence what will be lost if a firm is shut down)—is central to my own work in the law of corporate reorganizations.[7] Only to the extent that going-concern value exists can we justify a legal regime designed to preserve firms as going concerns.

I.

By 1910, the automobile had taken the shape it was to have for many decades. It consisted of three principal components. First, there was the chassis, a rigid frame on which was attached the front wheels and steering mechanism. The second major component was the drive train. It consisted of the engine, transmission, and a drive shaft connected by a differential gear to the rear wheels. The third component, the car body, was mounted on the chassis. In the early part of the century, the car body could be anything from an upholstered seat anchored on wooden floorboards to a closed body made of sheet metal. GM acquired different types of bodies from different sources. Closed

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5 See Coase, *The Nature of the Firm: Origin* at 43 (cited in note 3):

> I wish I could now repeat what I was told by General Motors officials about their reasons for acquiring Fisher Body.... My recollection is that I was told that the main reason for the acquisition was to make sure that the body plants were located near General Motors assembly plants.

6 See Robert F. Freeland, *Creating Holdup through Vertical Integration: Fisher Body Revisited*, 43 J L & Econ 33, 34 (2000) ("The GM-Fisher case is ... the most widely cited example of vertical integration reducing problems of physical and human asset specificity, and it serves as an empirical cornerstone for hold-up explanations of unified ownership."). This literature begins with Benjamin Klein, Robert G. Crawford, and Armen A. Alchian, *Vertical Integration, Appropriable Rents, and the Competitive Contracting Process*, 21 J L & Econ 297, 307–10 (1978).

7 See generally Douglas G. Baird and Robert K. Rasmussen, *The End of Bankruptcy*, 55 Stan L Rev 751 (2002).

bodies, which Fisher supplied to GM, were the most substantial and the most expensive. Each body consisted of welded pieces of stamped sheet metal that enclosed the passenger space and made the car suitable for travel in all seasons and weather.

In 1919, only about 10 percent of cars had closed bodies. By 1927, 85 percent had them.[8] Closed bodies accounted for a much larger part of the cost of the manufactured car than open bodies. Hence, over the course of a few years, Fisher became the supplier of a major component on the vast majority of cars that GM made. As closed bodies became more common, General Motor's relationship with the Fisher brothers became closer. In 1919, GM acquired 60 percent of Fisher's equity, entered into long-term contracts with the Fisher brothers, and established a voting trust giving each a voice in the affairs of the firm. In 1926, Fisher was dissolved and folded into GM.[9]

The increasing importance of closed bodies alone does not explain why GM acquired Fisher. In many industries, a manufacturer turns to a third party to produce an expensive component. The power plant of the modern jetliner accounts for a large part of its value, and aircraft makers rely on others for engines.[10] Airbus acquires its components from many sources.[11] GM, however, relied on Fisher to a greater extent than aircraft manufacturers rely on their suppliers. Aircraft manufactures have multiple vendors of crucial parts such as engines and build relatively few planes slowly. Moreover, the most capital intensive components (such as engines) can be used in the aircraft of more than one manufacturer. By contrast, GM relied on Fisher exclusively for a continuous flow of goods and the parts Fisher made for GM could not be sold to anyone else. In short, as long as Fisher remained independent, each was exposing itself to a risk of hold-up by the other. If Fisher closed or merely threatened to close its doors, GM would be forced to close its production lines down as well, at least for a time. Similarly, GM could threaten to seek other vendors once Fisher invested in dies and other machinery that could be used only for GM cars. The ability of each to hold the other hostage seemed to

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8 See Alfred P. Sloan, Jr., *My Years with General Motors* 152 (Doubleday 1963) (describing the increase in percentage of sales of closed body cars for each year between 1919 and 1927).

9 See Coase, 43 J L & Econ at 22, 25 (cited in note 4).

10 See Aerospace Industries Association, *Aerospace Facts and Figures 2000/2001: Percent of Civil Turbojet Engine Market by Manufacturer and Aircraft Model*, online at http://www.aia-aerospace.org/stats/facts_figures/ff_00_01/Ff00p086.pdf (visited Dec 2, 2002) (providing a table showing that 100 percent of Airbus's engines are outsourced).

11 For a general discussion of the many firms that build Airbus's A320, see Tim Laming and Robert Henson, *Airbus A320* 32–37 (MBI 2000).

make vertical integration desirable once car bodies became so important to GM's operations.[12]

Coase quickly saw that this explanation could not withstand close scrutiny. GM as well as other firms in the automobile industry routinely relied on outside vendors for critical parts. One could not assert that a hold-up potential led to GM's acquisition of Fisher unless one explained why it did not create the same problem for the other critical vendors as well. The unsoundness of the hold-up explanation became manifest to Coase when he visited A.O. Smith. It had one of the most heavily automated plants in the United States. Filled with expensive and highly specialized machinery, A.O. Smith supplied GM with car frames. If GM could solve the potential hold-up problems that A.O. Smith presented without bringing it inside the firm, GM should have been able to solve them with Fisher.[13] Moreover, Coase found that ways of solving the hold-up problem existed apart from vertical integration.[14] GM, for example, could retain ownership of the dies that Fisher used to stamp sheet metal. Fisher would not have to make a capital investment only to have GM turn to another supplier, and GM's ownership of the dies would allow it to retrieve them in the event that Fisher try to take advantage of it. Rejecting hold-up as the explanation for vertical integration, Coase had to look elsewhere.

The explanation that Coase ultimately developed for vertical integration began with the idea that transaction costs, rather than advantage-taking or private information, drove the organization of production. To present his argument in *The Nature of the Firm*, however, he did not draw on the example of GM and Fisher. Nor did Coase unpack the explanation that GM executives offered—that they wanted Fisher body plants to be next to GM assembly plants. In other words, he did not squarely confront the question of what made Fisher different from A.O. Smith. Why did the executives at GM acquire Fisher and build their own car bodies, but never acquired A.O. Smith or build its own automobile frames? This is the question that Coase did not pursue and that I revisit here. The answer begins with the strategy GM's leader, Alfred Sloan, put in place when he took the helm of GM in the early 1920s.

Sloan was convinced that crucial to GM's success was expanding the market share of Chevrolet, its lowest priced car.[15] Ford held over

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12 This explanation was the justification for the merger put forward by Klein, Crawford, and Alchian, 21 J L & Econ at 308–10 (cited in note 6).

13 See Coase, 43 J L & Econ at 18 (cited in note 4).

14 See id at 45 ("[C]ontractual arrangements can be made to avoid this risk.") (quoting from a letter written in 1932).

15 See Sloan, *My Years with General Motors* at 152 (cited in note 8).

half of the domestic automobile market and, among low-price cars, dominated both the Chevrolet and all other rivals. No one could compete with the Model Ts in either durability or in price. Sloan believed that competing effectively against the Model T was crucial to GM's long-term success. GM developed a new Chevrolet, the K Model. It featured a longer body, increased leg room, an improved clutch, and a superior rear-axle housing.[16] The K Model met with only modest success initially. The price gap between it and the Model T was still too large. The Model T continued to enjoy 70 percent of the low-priced car market. To be successful, GM had to find a way both to improve the quality of the K Model and produce it more cheaply.[17]

Central to bringing this about was replacing the person in charge of production in the Chevrolet division with "the best production man in the United States,"[18] a man named William Knudsen. Knudsen was empowered to make dramatic changes at Chevrolet, and he did exactly this. Knudsen divided the production of automobiles into two largely separate operations. First there was the manufacturing of the basic components, such as the engine, the transmission, the wheels, and so forth. Second, there was the question of assembling the component parts. Knudsen was convinced that efficient production required a dramatically different approach to each.[19]

Knudsen insisted that each individual component, such as engines and transmissions, be manufactured in only one location. Motors were to be made in Flint. So too the axles had to be made in one place (Detroit); the transmissions as well (Toledo). Chevrolet had long used outside vendors and acquired parts from other divisions of GM (including radiators, steering wheels, and ball bearings). Knudsen did not object to continuing relationships with outside vendors, provided that they redesign components along the lines he demanded.[20] The car had performance criteria that it needed to meet. In particular, it had to outperform the Model T. Hence, the parts had to be at least as good as those on the Model T. One could not use cheap steel merely because it

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16 See id at 153–54.

17 The story set out here can be found in David A. Hounshell, *From the American System to Mass Production 1800–1932: The Development of Manufacturing Technology in the United States* 263–301 (Johns Hopkins 1984).

18 See Robert Lacey, *Ford: The Men and the Machine* 274 (Little, Brown 1986) (quoting Henry Ford).

19 Knudsen's work at GM is described in Hounshell, *American System* at 263–301 (cited in note 17). For Knudsen's own account, see William S. Knudsen, *"For Economical Transportation": How the Chevrolet Motor Company Applies Its Own Slogan to Production*, 74 Indus Mgmt 65–68 (Aug 1927).

20 See Knudsen, 74 Indus Mgmt at 68 (cited in note 19).

was cheap, especially not where the Model T used vanadium steel alloys.

Knudsen was content, at least initially, to leave Fisher's manufacturing operations untouched. The principal change Knudsen brought about in GM's relationship with Fisher grew out of his approach to assembly of automobile components, not the manufacture of individual components.[21] Automobile components are easy to ship in bulk, while finished cars are not. Moreover, while economies of scale exist in manufacturing automobile components such as engines and frames, there are relatively fewer in assembling cars once a model is produced in sufficient volume and the method for assembling the car has been refined and documented. Assembly plants consist of large open factory floors with conveyers and pulleys that bring the pieces to the correct place. They were not expensive to build or replicate.[22] Moreover, as long as the delivery of components was properly coordinated, the assembly of the cars required little in the way of skilled labor. The basic philosophy of mass production is the manufacture of component parts to high tolerances. If this was done properly, the assembly of the car itself required no special expertise.[23] Assembly of automobiles did not depend upon expert fitters who assembled the parts to shape them so that they worked together. "In mass production there are no fitters."[24] The costs associated with building assembly plants and the costs of hiring and supervising the largely unskilled workforce were lower than the cost of transporting finished cars across long distances.

Capturing these savings at Chevrolet, however, required Knudsen to change GM's relationship with Fisher. Fisher could continue to stamp the different pieces of sheet metal at its own factories. These stamped parts, like other auto components, could be shipped at low cost. But assembling the pieces into the automobile body was a differ-

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21 Again, after Knudsen himself, Hounshell provides the best account of the transformation of Chevrolet during the 1920s. See Hounshell, *American System* at 266 (cited in note 17) (describing Chevrolet under Knudsen in the 1920s).

22 See James M. Rubenstein, *Making and Selling Cars: Innovation and Change in the U.S. Automotive Industry* 18–23 (Johns Hopkins 2001). The failure to understand the dramatic difference between the capital costs (including human capital) of manufacturing of components on the one hand and their assembly on the other is the primary failing of those who have studied GM's acquisition of Fisher. A conspicuous exception is Ramon Casadesus-Masanell and Daniel F. Spulber, *The Fable of Fisher Body*, 43 J L & Econ 67 (2000) (emphasizing that coordination of production and not asset specificity drove the merger).

23 The parts of the Model T were engineered and milled to such fine tolerances that the motor itself was not run until the car was completely assembled. There were not even test drives to ensure the car worked. See Fred H. Colvin, *Building an Automobile Every 40 Seconds*, Am Machinist 757, 761 (May 8, 1913); Hounshell, *American System* at 234 (cited in note 17) (discussing the Ford plant's assembly workers).

24 See Henry Ford, *Mass Production*, in 30 Encyclopedia Britannica 821, 822 (1926), online at http://memory.loc.gov/ammem/coolhtml/coolbibTitles03.html (visited Jan 24, 2003).

ent matter. Like a finished car, a completed car body is expensive to ship and subject to dents and other damage en route. Moreover, storing an inventory of assembled car bodies was a nontrivial problem. Stamped pieces of sheet metal can be stacked; welded car bodies cannot be. Every eyewitness to these assembly plants marveled not at the physical plant itself, but rather the level of organization needed to ensure the steady flow of more than a million pounds of material each day that kept the assembly line in operation.[25]

Knudsen insisted that Fisher adopt the same practices for assembling car bodies as he instituted for the different components of the chassis and drive train. Fisher could stamp the sheet metal anywhere, but the bodies themselves had to be welded together at a factory adjacent to the auto assembly plant. The two plants were to be connected with a system of dollies and conveyers. The cost of making this change was modest. The cost of shifting the location in Fisher's car body assembly plants required a capital investment of about $5 million.[26] This was a trivial sum compared with Chevrolet's annual operating expenses of half a billion dollars.[27] Body assembly plants, like auto assembly plants, require little more than open factory space and a conveyor system. There is almost no asset specialization.[28] Moreover, it was easy enough for GM to pay for building the facility and then lease the space to Fisher.[29] In short, with Knudsen's arrival at Chevrolet what changed was not asset-specific investment by Fisher in Chevrolet, but rather the way Fisher conducted its day-to-day operations.

Knudsen brought to Chevrolet a production strategy that resulted in a world in which a large part of Fisher's operations were physically joined with Chevrolet's. Controls had to be put in place to ensure that each day the proper number of engines, transmissions, and frames were delivered to the assembly plant. At the same time, a corresponding assortment of stamped sheet metal (as dictated by Knudsen) had to arrive at the adjacent Fisher assembly plant. At the same time the components for the chassis and the drive train were brought together at the Chevrolet plant, the pieces of sheet metal forming the body of the relevant model had to be rolled on a dolly from the Fisher

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25 See Colvin, *Building an Automobile Every 40 Seconds* at 759 (cited in note 23).

26 See Coase, 43 J L & Econ at 29 (cited in note 4).

27 See Sloan, *My Years with General Motors* at 154–55 (cited in note 8).

28 See Rubenstein, *Making and Selling Cars* at 101 (cited in note 22).

29 See Coase, 43 J L & Econ at 28 (cited in note 4) ("[I]t was normal for the expenditures for capital equipment dedicated to the use of one customer to be borne by that customer."). With regard to GM and Fisher specifically "it was agreed that . . . it would be better for General Motors Corporation to own the assembly plants, leasing them to the Fisher Company." Id at 29 (quotations omitted).

plant and deposited at the appointed place in the Chevrolet assembly line.

Completely central to Knudsen's view of production was the idea of central planning and engineering. The center directed each of the managers as to how many cars to make each month and ensured that the necessary components were shipped. Changes or alterations were cleared through the center. One central authority decided how many of which model would be made at each Fisher/Chevrolet assembly location each month. At each location, Fisher and Chevrolet had to coordinate minute-by-minute operations. A stranger visiting any site would likely not see any separation between Fisher's operations and Chevrolet's. In short, Knudsen's decisions about how to produce the Chevrolet required seamlessly integrating Fisher's body assembly operation with GM's own auto assembly operation.

Knudsen's scheme did not require the creation of a single entity as a legal matter. It is possible to imagine that Fisher and GM could have continued to coordinate through contract even if the acquisition had not taken place. In the nineteenth century, for example, it was common for factory owners to hire independent jobbers who supplied the labor force.[30] An assembly line with two separate owners is like a railroad between two cities with half the track being owned by one firm and half by another. Such things have precedent. (The Central Pacific and the Union Pacific being the most obvious example.[31]) All the issues of coordination can (and indeed for some period of time were) solved through contract. Nevertheless, one suspects that once the two operations became so closely integrated, GM's complete acquisition of Fisher was the logical next step.[32]

From the perspective of an economist interested in how goods are produced and the extent to which operations take place in the market or through command and control inside the firm, the integration of Fisher and Chevrolet took place *before* acquisition. GM's acquisition of Fisher Body in 1926 was not the main event. Indeed, the acquisition may have had almost no effect on the way in which Chevrolet interacted with Fisher at the plant level. Many of the decisions,

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30 The use of jobbers seems to have declined only when increasing economies of scale also required greater control over each detail of the assembly process. See Hounshell, *American System* at 120 (cited in note 17) (discussing outside contracting of manufacturing products).

31 For an account of the political forces that allowed these two firms to run the first transcontinental railroad, see David Haward Bain, *Empire Express: Building The First Transcontinental Railroad* 104–18 (Viking 1999).

32 Sloan himself thought of the merger in exactly this way. See Sloan, *My Years with General Motors* at 161 (cited in note 8) ("There were operating economies to be gained by coordinating body and chassis assemblies, and with the closed body becoming dominant in the industry, it seemed sensible to bring the body operation entirely under the General Motors roof.").

such as the way in which the managers of any two assembly operations coordinated their work, were unaffected.

II.

We can return then to the puzzle that Coase left unanswered: How was Fisher different from A.O. Smith? The answer is straightforward: Completed car bodies (which Fisher supplied) were expensive to ship and hard to store, but automobile frames (which A.O. Smith supplied) could be shipped and stored easily. Efficient manufacture required coordination of the assembly of the body with the assembly of the rest of the car. The assembly of the frame required no such coordination. The reasons for bringing Fisher within GM's orbit had nothing to do with asset-specificity and everything to do with minimizing production costs. Even when one retraces old journeys many decades later the basic landscape does not change.

GM, and more specifically Chevrolet, reorganized its production in the 1920s with a view to capturing the same efficiencies as Ford. Doing this required a dramatic increase in the level of cooperation between GM and Fisher, to the extent of building factories next to one another and ensuring production in each were seamlessly coordinated. Indeed, relocating Fisher's assembly operation made Fisher more integrated with Chevrolet than suppliers inside GM itself, even before the merger in 1926. Chevrolet's source of radiators provides a good illustration.

In 1925, Chevrolet used radiators from Harrison, a wholly-owned division of GM. As a matter of legal form, interactions with Harrison were inside a single legal entity, while those with Fisher were not. Chevrolet could have acquired its radiators as easily from a third-party vendor as from Harrison. Moreover, it could readily switch from Harrison to another source of supply at little cost or acquire its radiators from multiple sources. Nothing in the way Chevrolet organized its production required close cooperation from Harrison. Neither Knudsen nor anyone else at Chevrolet had the control over Harrison's operations that remotely resembled the control they had over Fisher's. The control rights Chevrolet acquired by both contract and its long-term relationship made Fisher's assembly operations much more a part of the Chevrolet "firm" than Harrison ever was even before vertical integration occurred.

III.

The distinction between activity inside a firm and outside is useful. But drawing a line between the two is often hard. Moreover, drawing this line by identifying the different legal entities engaged in a par-

ticular economic activity is often misleading. Vertical integration may bring no change at all in the way two entities interact with each other. The firm-market boundary can be unaffected. The question of how economic activity is organized is separate from the question of which legal entities own which assets. Vertical integration in the case of GM and Fisher had only a modest effect on the way in which Fisher actually built its car bodies. Another merger in the early history of the Ford Motor Company points to the same conclusion.

In 1903, Henry Ford was a failure. He formed the Detroit Motor Company in 1901 and ran it into the ground. He then founded the Henry Ford Company and was thrown out when he proved incapable of bringing his car designs into production. He started the Ford Motor Company, his third company, on a shoestring. He had little money of his own and, given his track record, little ability to raise it from anyone else. He started with only $28,000[33] and had only $223 left before selling his first car.[34] Nevertheless, by 1909 Ford was rich and poised to become rich beyond dreams of avarice.[35] What did Ford do between 1903 and 1909 to acquire so much wealth? And, crucial for our purposes, how much of this value was embedded in the Ford Motor Company?

Henry Ford had three qualities that separated him from the hundreds of others who formed car companies at the start of the twentieth century. First, Ford was a great designer of cars. In the first years of the century, no one else designed cars so well. Whatever other failings he had (and there were many), no one doubted his ability to design cars. The car he designed at the Henry Ford Company (his second company) was among the best of its time. The car the company ultimately produced (renamed Cadillac) was successful in large measure because Ford was its designer.[36]

But Ford's greatest car design was the Model T. Before the Model T, cars were still wagons with engines attached. The Model T consisted of a single rigid metal frame, to which the drive train was affixed in only three places. The car was at once light, flexible, and durable. Ford used exotic alloys to reduce the weight of the car further still. The engine, transmission, and magneto were enclosed within a single housing that protected them from the elements. Every part of the car was de-

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33 See Horace Lucien Arnold and Fay Leone Faurote, *Ford Methods and the Ford Shops* 13–14 (Engineering Magazine 1919). The Ford Motor Company started with a capital stock of $100,000 but only $28,000 cash was paid in at the beginning.

34 See Lacey, *Ford: The Men and the Machine* at 74 (cited in note 18) (discussing Ford's early finances).

35 See id at 94, 147–48.

36 See Arthur Pound, *The Turning Wheel: The Story of General Motors Through Twenty-Five Years 1908–1933* 103 (Doubleday 1934) ("[The] chief guide and mainstay in the mechanical department [was] no less a person than Henry Ford.").

signed to be assembled, operated, and maintained easily.[37] Many cars of the time were much more expensive, but, putting "extras" such as lavish appointments to one side, it was the finest car ever made.[38] It was the first modern automobile, a durable, efficient machine that took people on rugged dirt roads wherever they wanted to go.

Ford's second extraordinary quality was his willingness to bet big. Before the Model T, the Ford Motor Company's cars had been successful and had made Ford a millionaire. At the start, the company farmed out all of its manufacturing operations. Ford oversaw a small assembly operation. He spent $384 on parts for each car, but only $20 on the labor needed to assemble each car,[39] and he could have comfortably remained on that course. Instead, he took all the money he had made to date and risked everything on the Model T. He gambled that he could take this car, produce it for much less than anyone thought possible, and persuade millions to buy it. At a time when most thought cars were merely playthings for the rich, Ford believed that a car could be built that was so useful that ordinary people would give up the greater part of a year's salary to own one.

The Model T was a huge success, and the patent protection Ford won for some crucial elements of Model T design made it hard for others to follow his lead.[40] Hence, Ford had several years to enjoy the benefit of designing the Model T and betting that it would find commercial acceptance. But Ford's willingness to bet big and his design do not explain how Ford came to dominate the automobile industry between 1912 and 1925. The Model T was a revolutionary car in 1908, but it was essentially unchanged in 1912. Nothing prevented others from producing a car much like the Model T. The patents did not foreclose other low-cost designs. Nor did Ford possess any secret manufacturing techniques. Ford allowed anyone to visit his plant and see exactly how he produced the car.[41] Anyone who wanted to could design a

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37 For a comprehensive account of the Model T, its components, and how to repair and replace them, see Victor W. Pagé, *Model T Ford Car: Including Fordson Farm Tractor* (Henley rev ed 1925).

38 See Lacey, *Ford: The Men and the Machine* at 95 (cited in note 18) ("There was scarcely a component of the Model T which did not contain some fresh development to excite automotive enthusiasts, but the guiding theme of all of them was simplicity . . . .").

39 See id at 73 (discussing the Model T's production costs).

40 There were eight patents covering the Model T. The most important was the U.S. Patent No 1,012,620, which covered the way in which the drive train was connected to the chassis. For a discussion of the advantages of this connection, see Arnold and Faurote, *Ford Methods and the Ford Shops* at 20–21 (cited in note 33).

41 See *Ford Factory Facts* 5 (Ford 1915) ("The Ford Motor Company is pleased to extend to all visitors the privilege of an inspection of its plant."). The *American Machinist* carried a series of articles on Ford's manufacturing techniques in 1913. See, for example, Colvin, *Building an Automobile Every 40 Seconds* at 757 (cited in note 23). Another series that appeared in the En-

car like the Model T and copy Ford's production methods. Nor did manufacture of such a car require investments of capital that were out of reach of the many others in the industry in 1913. Indeed, at this point, Ford's entire capital investment in his physical plant and equipment was less than $10 million, at a time when his annual operating expenses were $74 million and his revenues were more than $89 million.[42]

What prevented others from competing with Ford after they saw the Model T and the success it enjoyed? Why did it take fifteen years before someone like Knudsen came along to reorganize the production of the K Model Chevrolet and produce a competitive alternative to the Model T? Ford's gifts as a designer and his willingness to gamble do not explain this part of the story. Ford enlisted others to help him in designing the Model T. One of the revolutionary features of the Model T (encasing the drive train) was not his or his employees', but rather that of a team of engineers at a sheet metal stamping firm in Buffalo called Keim Mills.[43] Ford himself had little expertise in sheet metal stamping. Moreover, at this period, the presses used to stamp sheet metal and the dies needed to fabricate any given part were hard to replicate. Ford had greater reason to ensure that he had control over the assets dedicated to the production of the Model T than those at Chevrolet fifteen years later.

But the value Ford derived from Keim Mills stemmed only in small part from the specialized assets. More important was the help he enjoyed from the engineers who worked there. Ford's success between 1909 and 1925 came from the team of engineers who surrounded him. They devised thousands of ways to produce the Model T more efficiently, more cheaply, and in greater volume. Most of the production innovations Ford's team put in place came from organizing the flow of production. The Ford team took each step and each part and figured out how to rearrange the work and redesign the component to make it better and cheaper.[44] The moving assembly line (put in place in 1913,

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gineering Magazine in 1915 was later published as a book. See Arnold and Faurote, *Ford Methods and the Ford Shops* (cited in note 33).

42 See Arnold and Faurote, *Ford Methods and the Ford Shops* at 25 (cited in note 33) ($3.575 million on buildings, tanks, and fixtures through February 1914 and $2.8 million on equipment); id at 3 (revenues of $89.1 million in 1913); id at 1 (profits of $15 million per year).

43 See Lacey, *Ford: The Men and the Machine* at 94–95 (cited in note 18).

44 The idea that the Model T never changed is an illusion. A practiced eye can tell the date of manufacture of any particular Model T within a few years at a glance. With only a little more study, one can narrow it down to a few months. See Bruce W. McCalley, *Model T Ford: The Car that Changed the World* 11 (Krause 1994).

fully five years after the Model T entered production[45]) was the most striking innovation, but it was only one of many.

Ford became rich in large part because his team worked unusually well together, and they created efficiencies in mass production that had never been seen before, both by refining old production techniques and putting in place new ones. Ford's design gifts, his vision, and his patents gave him a head start over potential rivals. The team ensured that he kept his lead. Month by month they found small improvements in the car and especially its method of manufacture.

Imagine an entrepreneur who set out to build a car comparable to Ford's Model T. With a modest amount of capital and good design skills and a competent production team, he could reverse engineer the car, design around the patents, and imitate Ford's production practices. Within six months or a year's time, he might bring to market a car that was as good as the one Ford produced the year before. But it would be too late. He would discover that he was competing against a slightly better Model T, the price of which had fallen by 10 percent. To be more precise, the Model T (Touring) had a factory price of $600 in 1913, $550 in 1914, $490 in 1915, $440 in 1916, and $360 in 1917.[46] The Ford Motor Company, as a collection of physical assets, was not worth much. As long as Ford had his engineering drawings, the necessary gauges, his patents, and his team, little else mattered. His factory could burn to the ground, all but a handful of employees could quit, and the value of what Ford owned would be remarkably unaffected.

The Ford Motor Company owned the Model T design and the information needed to build it. But the corporation did not own the team. Indeed, some of the most important members of the team worked for Keim Mills and not for Ford at all.[47] For a period of time, the contracts and relationship between Ford Motor and Keim Mills and between Keim Mills and its engineers were satisfactory. Ultimately, Ford acquired Keim Mills, and it became a wholly-owned subsidiary of Ford. But the major event (and the one that had the greatest consequences for the long-term success of Ford) came after Ford acquired Keim Mills.

The unskilled workers who ran the stamping presses at Keim Mills thought that they had the ability to hold-up Ford. They were sadly mistaken. When they went on strike, Ford promptly shut the en-

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45 See id (the first Model T was manufactured in 1908); Rubenstein, *Making and Selling Cars* at 18–19 (cited in note 22) (describing the first moving production line in 1913).

46 See McCalley, *Model T Ford: The Car that Changed the World* at 141, 171, 193, 195, 231 (cited in note 44).

47 See Hounshell, *American System* at 234 (cited in note 17) (describing the Keim Mills team).

tire firm down. Just as a contract could have been written that vested title in the stamping presses in Ford, Keim's status as a wholly-owned subsidiary gave him the same power. Ford immediately dissolved Keim Mills and moved all the stamping presses to Detroit. More importantly, he was able to persuade the senior team at Keim Mills to move to Detroit as well. Here what mattered was not whether Keim Mills was independent or wholly-owned, but whether Henry Ford's powers of persuasion were sufficient to keep his team together. The value of an enterprise resides in large measure in the team that runs it.[48] The most important contributions of the Keim Mills team came from their skill in organizing automobile production, not from their expertise with respect to stamping metal parts or any other specialized skill. It was, for example, one of them that created the incentive compensation system that allowed Henry Ford to boast that he paid his workers $5 a day.[49]

The value of a team, however, is independent of the legal entity that employs them. Ford became rich because he was able to assemble a great team and keep it together. It is not surprising that ultimately the team became Ford employees, just as it is not surprising that GM ultimately acquired Fisher. But again the formal legal event did not coincide with the events that mattered. The members of the Keim Mills team designed the Model T well *before* vertical integration, and their later contributions came only when they moved from Buffalo to Detroit, an event that took place *after* vertical integration and that did not depend on it.

IV.

The production of the Model T Ford and the K Model Chevrolet are two important events in the early history of the automobile industry. They were both great success stories in which Keim Mills and Fisher Body played crucial roles. They also present two instances in which an upstream supplier ultimately became a wholly-owned subsidiary of its principal buyer. In the case of GM, efficient production required command and control over a large part of Fisher Body's operations. The assembly of car bodies from individual pieces of sheet

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[48] For an account of this episode, see Lacey, *Ford: The Men and the Machine* at 106 (cited in note 18). It may be no accident that Ford Motor lost its primacy as the Keim Mills team deserted Henry Ford. Its members included William Knudsen, the production man Ford himself thought the best in the business. See note 18 and accompanying text.

[49] Faced with extraordinary employee turnover, one of the Keim Mills team (John Lee) instituted a new wage structure. He maintained a base pay of $2.34, but a worker could earn $5 a day if they worked for 6 months and qualified in other respects. See Lacey, *Ford: The Men and the Machine* at 117–18 (cited in note 18) (describing Ford's employee pay rates).

metal requires little in the way of specialized assets or capital, but the control the automobile assembler has over the operation in mass production ensures that the two operations are part of the same firm in the economic sense. In the case of Ford, vertical integration is one part of a story connected with acquisition of human capital. Vertical integration helped Ford keep the Keim Mills team, but the team existed before vertical integration, and its full value came after vertical integration only when the team moved to Detroit. That vertical integration as a legal matter occurred in each case is unsurprising, but logically distinct from the events that brought assets inside the "firm" in the economic sense.

The formal event that marks vertical integration as a legal matter corresponds only imperfectly with whether activity takes place inside or outside the firm. As costs of doing business in the market and in the firm fall, however, we should expect the stakes involved in locating production inside or outside a firm should fall as well. As we retrace Coase and then ask about the implications of his work in the issues we confront today, we might well conclude that the boundary between firms and markets will become increasingly permeable. For economists, the lesson is straightforward. They should resist, to a much greater extent than they have, the temptation to turn to the law to identify the firm.

For lawyers, the lesson is more subtle and the challenge harder. As we regulate economic activity, we must resist the idea that the locus of economic activity rests with a discrete legal entity. A lawmaker charged with ensuring that those who assembled Chevrolets complied with applicable law had to ensure that the rules worked equally well when the same configuration of assets was run by two legal entities as by one. Thinking about legal regulation of economic activity has too readily assumed that one can solve problems by imposing legal duties on firms. In a world in which the boundaries of the firm become less clear and the identity of those who control the firm becomes more fluid, regulations that focus on the conduct of specific firms is at best incomplete and often misguided. We are likely to encounter even greater problems in regulating behavior. No longer are the entities providing the goods or services long-lived, atomistic firms with a readily identifiable governance structure. When we want to use legal rules to advance some broader social goal inconsistent with the interests of those who own the enterprise, we shall be increasingly less able to do it by imposing obligations and duties on firms and those who invest in them. To the extent that it is still possible in a global economy, effective legal rules will increasingly focus on regulating economic activity, rather than on regulating distinct legal entities.