

BRANDS AND SUPPLY CHAINS

GOVERNANCE BEFORE AND AFTER CHANDLER

Paul Duguid

University of California, Berkeley

Copenhagen Business School

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Loosely coupled networks of firms increasingly draw research attention away from the vertically integrated organization that formed the centre of Chandlerian business history. This shift of attention has numerous causes. From the 1980s, small firms began to make an increasingly large contribution to national economies around the world (Sengenberger, Loveman, & Piore, 1990); outsourcing became increasingly popular in both old and new industrial sectors (Womack, Jones, & Roos, 1990; Sturgeon, 2002); "commodity chains" supplied evidence of globalization (Gereffi & Korzeniewicz, 1994); disaggregated "value chains" were used to explain the "competitive advantage of nations" (Porter, 1990); development of loosely coupled commercial networks seemed to reflect new digital information networks (Castells, 1994-6); and the global reach of both commercial and communication networks became increasingly significant economically (Kenney & Florida, 2000). Piore and Sabel (1984) had presciently described a major structural shift underway in economic organization, and some researchers can now be heard arguing that the supremacy of the hierarchical Chandlerian corporations is fading before the rise of "supply chains" (Langlois, 2003; Lamoreaux, Raff, & Temin, 2003), which are similar in function but radically different in governance.¹

In conventional theories of the firm, supply chains sit between pure markets, at one extreme, and hierarchical organizations, at the other (Zuckerman, 2003). As

¹ Though see Whittington & Mayer (2000) for a dissenting voice.

such, it is perhaps unsurprising, that they have occasionally been idealized as an economically efficient and socially benign means to escape the anonymity and amorality of the one and the authority of the other. Indeed, a casual reading of the supply chain literature can lead to the conclusion that, rather as it has been suggested that communications networks dissipate political control (Castells, 2001), so these commercial networks will equitably spread organizational control. And because supply chains embrace "complementary activities" (Richardson, 1972) or complementary assets (Teece, 1986), it can seem that they will also dissipate power and spread complementary rents. Equilibrium and equity, it is not hard to believe from the literature, live happily together in network relations (Gould, 1993). The neoclassical economists' optimism about the ultimately equitable outcome of market activity seems occasionally to be on loan to network and supply chain theorists.

Certainly supply chains can seem loosely enough coupled to balance exit, voice, and loyalty (Hirschman, 1970) in sufficient quantities to prevent any abuse of power. Consequently, perhaps, issues of power and control in supply chains have thus far received relatively little attention.² Indeed, even the notion of governance, coming over from studies of hierarchical organizations, can seem odd in this context, where the ideology of "self-organization" has more appeal. It is clear, however, that coordinating these increasingly distended chains is a complex matter and self-organization alone is unlikely to be sufficient. Modern supply chains are becoming in terms of formal governance more independent and in terms of geography more distant (Storper & Walker, 1989). Yet many nonetheless require ever-tighter coordination, synchronizing, for example, a fine-grained division of labour and division of knowledge now spread among continents, ever more precise coordination of

² Though see Gereffi, Humphrey, and Sturgeon (2003) and Fields (2004) for important analyses of power in networks.

activities, and to-the-moment deliveries of globally outsourced components.³ Links in such supply chains need to be both flexible (Sabel & Piore, 1984) and yet coordinated (Fruin, 1992). Paradoxical--indeed, almost magical--though this combination of both loose and tight coupling, of close coordination and geographical distance may appear in theory, it does seem to be achievable in practice. The continued willingness of major brand names in high technology such as Apple, Ericsson, Hewlett-Packard, and NEC to spin off production facilities that they once owned to intercontinentally dispersed suppliers (Sturgeon, 2002, Curry & Kenney, 2003) indicates that firms remain confident that they can devolve critical activities and assets without losing control over their manufacturing.

This control is conventionally explained in terms of cooperation and mutual or enlightened self-interest of the links in the chain. Yet some supply chains appear to be sites less for enlightenment than grim struggles to assert control and resist subordination. For though assets may be complementary, profits often are not. Consequently, firms within a supply chain may be forced, as we shall see, to battle for those profits as aggressively with their vertical companions--companions with whom they must also cooperate--as they would with their horizontal competitors. The first goal of this paper, then, is to draw attention to this tension between cooperation and competition in certain supply chains.

Conflict has the potential to destabilize cooperation. Nevertheless, supply chains evidently manage to achieve functional stability. Numerous factors contribute--some specific to particular chains and particular sectors; others, perhaps, more generalizable. In this admittedly speculative argument, I attempt to draw attention, with the help of both contemporary and historical examples, to the role of

³ Hayek (1945) argues that the market can coordinate the "division of knowledge," but in his argument markets allow people to recognize a change in supply or demand without having to know why it has occurred. In supply chains, long-term prices and other cooperative agreement often obscure such knowledge *that*, and make it more important to know *why*.

branding. This is certainly not the only factor and it is unlikely be the most important factor in stabilizing and controlling chains.⁴ Its only claim to significance may be that it is one of the most overlooked. Discussions of supply chains often mention the presence of brands, but do not examine their significance. For their part, discussions of brands generally have little to say about supply chains.⁵

For a modern example, I use the personal computer [PC] supply chain. For the historical example, I use the supply chain of alcoholic beverages in the nineteenth century. The contrast is stark--some would even call it absurd. PCs are among the great technological innovations of the twentieth century.⁶ In many parts of the alcohol trade, the most innovative technology may still be the bottle. There are some advantages to the comparison, however. First, it helps emphasize that both brands and supply chains are older than is generally acknowledged. Contrary to the assumption that brands arose in the hierarchical firm (Wilkins, 1992, 1994; Chandler, 1962), and that supply chains succeeded these hierarchies, the argument acknowledges that both brands and supply chains antedate the Chandlerian moment and, indeed, appear historically connected. Second, the comparison helps emphasize the limits of technological explanations of modern supply chains, suggesting that winning in the PC chain may not be quite as technologically determined or meritocratic as it can seem.⁷

⁴ As Gereffi et al. (2003) argue, "A parsimonious theory cannot explain and predict all outcomes. Institutions, geographic and social contexts and path dependence have profound effects on governance and change in global value chain theory."

⁵ Branding discussion tend to look at relations between branding companies and their competitors and between branding companies and their customers. They say relatively little about relations between branding companies and their suppliers, though Klein's (2002) attack on brands has begun to generate some reflection on this relationship. See "The Case for Brands" (2001).

⁶ Fields (2004), however, makes a very useful comparison between comestibles and computers, using the meat packer G.F. Swift and the computer firm Dell. Given the affects of Moore's Law on the computer industry, both, Fields suggests, can be regarded as perishable goods.

⁷ Despite arguments that nineteenth-century trade was predominantly "face to face," the wine business was--and as readers of Herodotus know had long been--global. Throughout the nineteenth century, alcohol went from South Africa to London, from the Charente to Australia, from Portugal to South America. Indeed, South-East Asia is one of the few regional markets not receiving port wine in the 1830s.

Third, it draws attention to the role of trademarks even in the most knowledge-based sectors of the "knowledge" economy and invites reflection on the remarkable protection--which calls for little by way of responsibility--trademarks receive under current intellectual property [IP] regimes.

The argument proceeds by indicating first the inequitable distribution of profits in the PC chains. It then looks for explanations for this inequity. Next it argues that brands have a particular role to play with regard to "knowledge" goods before exploring the role of brands in the development of the PC supply chain, and the way particular firms (IBM, Intel, Microsoft, and Dell) have used their brands to accrue power over others in the chains in which they are involved. In its second part, the paper then turns to explore the development of brands in nineteenth-century supply chains. It notes that many of the struggles in the modern PC chain have echoes in this nineteenth-century story and that brands have played an important role in both. In conclusion, it argues that trademarks, the essence of brands and the underappreciated third leg of modern IP platforms, are powerful, quasi-monopolistic means of control and that in certain circumstances, it may be wise to demand responsibility as a return for granting this power.⁸

I. NEW CHAINS

Virtual Domination?

The PC industry provides rich example of modern, extended supply chains. Dell Computers' chain, for example, stretches from Texas to Thailand and is tightly coordinated throughout. Order a Dell computer and Federal Express may assemble

⁸ Trademarks, as with copyrights (Hesse, 2002), recent legislation and judicial decisions have contributed to a significant shift in power away from public towards private interests. The sunny belief in greater intellectual property rights (Hardin, 1968) is looking increasingly dubious (Boyle, 1996; Heller and Eisenberg, 1998; Lessig, 2001).

major components at an airport near you from parts that have been built in different countries by different firms, some which may not have been seen or touched, let alone owned, by anyone at Dell. The firm likes to refer to its organization as one of "virtual integration." This phrase reflects the contribution of the new technologies of the "virtual," and also hints that, with these technologies, advantages of integration may selectively and virtually have been separated from the disadvantages. Fruin (1992) describes this separation more directly, arguing that Toyota's supply chain offers "the benefits of vertical integration without the disadvantages" (p. 259). Contemplating this rather idyllic picture, we need to ask whether such supply chains have simply made disadvantages disappear and, if not, where do they go?

That there may be disadvantages seems particularly likely in the personal computer (PC) supply chain. For example, McKendrick (2003) describes the hard disk sector as "among the most technologically innovative industries of the last fifty years" and the disks themselves as "among the most valuable and technologically dynamic" (p. 142) components of the computers that Dell and other PC manufacturers make. In 2000, before the boom collapsed, the six suppliers who manufacture most of the discs for the in the PC supply chain made 196 million disks. More remarkably, they also made no profit. Yet, even after the downturn in the PC market, Dell reported profit margins of 7 percent. Intel and Microsoft, other major players in the same chain, had margins of 13 and 31 percent respectively. (As Curry & Kenney (2003) note, Microsoft and Intel "capture as much profit as all the other firms in the PC industry do" (p. 132).) Similarly, in 2001, while Microsoft reported 33 percent revenue growth as a result of its Windows XP operating software, its "channel providers"--the businesses that carry Microsoft into the marketplace--reported no growth and survived, as one report put it "on scraps" (Rooney, 2002, p. 16).

Disadvantages, it would seem, are less likely to disappear than to be displaced along the chain to weaker partners.⁹

For supply chains as for integrated firms, major disadvantages are likely to include idle capital in the form of idle inventory or idle capacity. The first of these--idle inventory--is particularly worrying in the PC chain, where one of the implications of Gordon Moore's prediction that prices for chips halve every 18 months (enshrined as "Moore's law," but see Tuomi, 2002) is the startlingly rapid depreciation of chip-based inventory. Indeed, several hi-tech firms have been caught carrying inventory that severely damaged their profitability (and their reputation for being "new economy" firms). Dell, for example, barely survived disaster when it found itself overstocked with underperforming chips in 1989 (Koehn, 2001). Cisco, a poster child of the network organization (Castells, 2002) was forced to face down embarrassment and write down \$2.25 billion dollars of excess inventory in 2001. The same year, AMD, a chip-making rival to Intel, was similarly caught holding depreciating inventory. "Any strategy decreasing the holding period for inventory," Curry & Kenney (2003) write about the PC sector, "makes an immediate and significant contribution to profitability" (p. 124). One strategy, if you can do it, is to make others hold inventory for you. Dell is now obsessive about not holding inventory itself. Koehn (2001) enthusiastically praises Dell's approach but does not pause to ask who then does hold inventory for Dell or why.¹⁰

As with inventory, so with capacity. The PC market can move fairly quickly from expansion to contraction. Firms may easily be caught with too much or too little

⁹ Fields (2004) shows that while Dell's business model allows it to receive payment before it orders supplies or build products, in the period 200-2002 it increased the suppliers' average wait for payment from 58 to 71 days (p. 201).

¹⁰ Fields (2004) notes that while Dell's inventory holdings have dropped from 32 days to four over the past decade, this has been achieved in good part by forcing suppliers to increase their holdings (pp. 166 and 198)

capacity.¹¹ As Sturgeon (2002) argues, "By using contract manufacturers, brand-name firms gain the ability to ramp the volume of their production upward or downward on short notice, *without* the need to install or idle in-house plant and equipment" (p. 462). Emphasis (in the original) falls rightly on the word *without*. It is by outsourcing--by transferring the need to install or idle plant to some other entity--that the brand-name firms gain this flexibility. More generally, the ability to hold down inventory or to avoid idle capacity relies in good part in making others in your supply chain do it for you.¹² Virtual integration, however magical it may sound, does not make the problems of vertical integration completely disappear. It merely puts them out of sight and off the balance sheet.

It might be argued (it sometimes seems to be assumed) that in distributed supply chains, these costs and risks are equitably distributed among the different links. The disproportionate profitability of certain links in the PC chain noted above suggests that this may not so. Indeed, it may almost be that those who end up with the most risk--by holding inventory and industrial plant--paradoxically make the least profit. But even were it true that risk and rewards are equitably distributed, we need to understand the mechanism. Chains by definition are not, after all, perfect markets, a standard mechanism for apportioning risk. Often, they seem closer to conventional hierarchical control.

Chain of command

Indeed, despite recent egalitarian, distributive views, it is worth remembering that the notion of supply chains--like logistics more generally--comes from the world of

¹¹ Although overcapacity is the more usual problem, Apple's decision to outsource production followed its inability to meet surging demand for a particular line of its computers.

¹² Undoubtedly, subcontractors that work with multiple OEMs, each of which has access to distinct markets are in a better position than in-house facilities in a single OEM to ride out market fluctuations. They are also in a position to drop wages and lay off workers without damaging the OEM brand.

command and control.¹³ The phrase arises in the military. Its earliest newspaper occurrences coincide with the arrival of U.S. troops in Europe in World War I.¹⁴ The phrase lies dormant between wars but returns with U.S. entry into World War II, Korea, and Vietnam.¹⁵ Non-military, academic uses come much later. Operations research adopts it in the 1980s, economists and management scientists only in the 1990s, though in these fields it is not particularly widespread until the technology boom, when the notion of controlling supply through technology as opposed to hierarchy becomes particularly attractive.¹⁶ Indeed, despite the heritage of the notion, logistics researchers seem unwilling to contemplate concentrated authority in distributed supply chains as anything other than a transient imperfection that technology itself might fix.¹⁷ Lee, Padmanabhan & Whang. (1997) argue that supply-chain inequity arises from signal-processing distortions and perhaps assume that Moore's Law will help to purify these. Systems such as Dell's valueline.com can then appear as a transparent means to "level the playing field" among supply chain participants.

¹³ I am grateful to Nathalie Fabbe-Coste and Jean Charroin for helping me understand the close, parallel association between logistics and the military.

¹⁴ *New York Times*, 1917, December 7, p. 17.

¹⁵ *New York Times*, 1942, February 11, p. 1. *Wall Street Journal*, 1942, April 6. *New York Times*, 1950, August 4, p. 2; *New York Times*, 1966, June 12, p. 4.

¹⁶ These data about scholarly use, undoubtedly crude, comes from the JSTOR database (www.JSTOR.org), which I assume to be fairly representative of the fields. Between 1700 and 1980 only two articles in business and economics journals--both in the field of operations research--use the term *supply chain* in anything like the modern sense. The 1980s show seven uses; the 1990s, 108. After 1997, usage explodes and the term starts to turn up in article titles.

¹⁷ The U.S. government, too, has proved resistant to investigating distortions within supply chains. One of the earliest non-military uses of *supply chain* in the U.S. press concerns anti-trust litigation to prevent price fixing in vertical chains (*New York Times*, June 5, 1980, p 10). Evidently, the U.S. Federal Trade Commission recognized that disaggregated chains could be used for "vertical price fixing," as they called it. The Reagan administration, however, acted swiftly to limit this litigation. It removed the offending head of the Federal Trade Commission and replaced him with a more compliant figure who assured the U.S. Congress that in future antitrust behaviour would not "concentrate on arrangements between companies along a supply chain, but rather on anticompetitive acts by companies in the same industry." (*Wall Street Journal*, 1981, July 27, p. 10.)

Technological fixes

Technology undoubtedly plays a role shaping modern supply chains. But, despite optimism that networked technologies can create "frictionless" markets (Gates, 1999), there is no reason to believe that social institutions such as hierarchies can be dissolved by technological fixes or that unequal power will be magically and equitably reapportioned in the information age (Brown & Duguid, 2000; Henwood, 2004). Innis (1951) long ago pointed to the capacity of communication technologies to centralize control rather than to dissipate it; after their important analysis of "virtual" organization, Fukuyama & Shulsky (1997) strongly resisted "talk about modern computer technology being necessarily democratizing"; and Zuboff, who wrote a path-breaking book on the potential of information technology to distribute industrial power (Zuboff, 1988), later confessed that time was making her increasingly pessimistic.¹⁸ Meanwhile, Bar (2001), echoing Innis's notion of "bias" has shown a worrying tendency for technologically supported markets to become "proprietary," imperceptibly but deliberately tilting control towards one particular participant. In all, technology is more likely to be an expression of power relations already established between the links in a chain than the source of those relations.¹⁹ In general, it seems wise to look beyond technology to understand why, from certain perspectives, the supply chain can look a little like a chain gang.

Beyond technology

Richardson (1972) provided an insightful and early insight into the relations found in interfirm networks. Trying to understand patterns of interfirm affiliation, Richardson proposed a range of types of coordination stretching from markets, at one end, through cooperation in the middle, to direction, at the other. The extremes have been

¹⁸ "The Network Computer as the PCs Evil Twin," *New York Times*, November 4, D1.

¹⁹ Hence, perhaps, the struggles over the Covisint market for U.S. auto parts had less to do with the nature of the platform in the abstract than with the allegiances of the CEO who would oversee the platform.

long and well theorized (Coase, 1937, Williamson 1981) but the middle ground, where firms form networks, remains comparatively undertheorized (Hennart, 1993). Yet, the "make or buy" distinction is rarely as sharp-edged as that aphorism may suggest. Firms, as Richardson notes, "are not islands but are linked together in patterns of cooperation and affiliation" (p. 895).²⁰ Richardson mentions in passing that "Co-operation may come close to direction when one of the parties is clearly predominant" (p. 896). Unfortunately, he gives little advice about what sorts of cooperative relations are likely to lean towards "direction" and what the mechanisms of predominance are.²¹

Cooperation may lean towards direction when transactions include, among other things, goods or services that, on the one hand, are modularized and so can escape the embrace of hierarchies, but that, on the other, are in some way sufficiently difficult to commodify or specify that they cannot escape too far. To put this hypothesis another way, a supply chain that relies heavily on activities or assets that are complementary, and yet that from the perspective of markets are sufficiently complex that they create market failure, may offer certain members of the chain opportunities to dominate their partners and through dominance extract rents.²² Among such goods and services and of particular interest in the modern economy are those that involve knowledge in one way or another, where the rents are often given the more acceptable name of "increasing returns" (Arthur, 1994; Teece, 1996).

²⁰ Granovetter (1985) and Polanyi (1957) offer related arguments. Polanyi assumed that the "embeddedness" he described was fading. Modern supply chains suggest, to the contrary, that interfirm interdependences endure.

²¹ Or as Gereffi et al (2003) note, "value chains can be transformed in response to the competitive strategy of the leading firms." (ms p. 24).

²² Boyle (1996) presents a useful insight into the contradictory demands that markets place on information, calling for perfect information to help the market clear but imperfect information to make the good on offer excludable and rivalrous.

Knowledge goods, it is widely recognized, are sufficiently more complex than the idealized "widget" to induce market failure (Arrow, 1984).²³ Consequently, hierarchical firms have hitherto played a critical part in their development and marketing (Nelson & Winter, 1982). Yet modern networks have shown themselves capable of dealing with the sort of innovation that once seemed the prerogative of firms (Powell, 1996; Powell, Koput & Smith Doerr, 1996). Innovative "design chains" of independent contractors now develop around sophisticated information technologies such as Apple's iPod (Sherman, 2002). In a variety of ways, society has learned how to modularize innovation, with "open source" software as a central example (Tuomi, 2001). The remarkable centrifugal trend away from hierarchical firms, and so the disaggregation of these chains has rightly been well noted. It remains important, nonetheless, to note and explain, when they don't readily collapse into pure

markets, their residual centripetal tendencies .

Brands for knowledge

Arrow's (1984) argument about information and knowledge goods helps explain why some assets and activities in a complementary chain--and particularly knowledge-related assets and activities--may be able to gain distance but not complete independence of others. Echoing the argument in the *Meno*, Arrows argues that, aside from the nonrivalrous, nonexcludable difficulties that knowledge goods present to markets, they uniquely presents buyers with a dilemma. Echoing Socrates conundrum about new knowledge--if it is new, how will we understand it, and if we understand it, how can it be new--Arrow argues that if buyers are capable of assessing the value of the knowledge at they seek to buy, they probably don't need to buy it; conversely, if

²³ Though in general I believe it is important to distinguish knowledge and information (Brown & Duguid, 2001), for the purposes of this paper I accept the standard elision found in the economics literature.

they need to buy it, they probably are not able to assess it. For example, if you have the ability to assess the competence of a doctor or lawyer adequately, you are probably sufficiently adept at medicine or law not to need his or her services. On the other hand, if you need these services, you are probably not in a position to assess them. Consequently, Arrow suggests, markets for such goods rely on some sort of "nonprice signaling,"—what I call "warrants"—that, in one way or another, endorse the goods and so signal reliability to buyers in a way that price alone cannot. Warrants come in the form of imprimaturs, hallmarks, certificates of origin, university degrees, medical or bar association membership, and so forth. These socially recognized marks of institutional approval provide a proxy assessment and so help create markets for the complex goods professors, doctors, or lawyers have on offer. Inevitably, in return, these warrants tie sellers to the institution that warrants-- university professors to universities, barristers to the bar, surgeons to hospitals, etc. For the same reason, they give the institution, the holder of the warrant, significant power over these partially independent, but equally partially dependent complementary assets or activities.

Warrant holders can thus collect rents through the power of their endorsements, particularly if they hold a monopoly on particularly important warrants. Guilds are early examples of institutions providing warrants for knowledge and have been vilified for abusing the power this gave them. No doubt, much of this criticism is well justified.²⁴ But their power was not very different from the power all

²⁴ Grafton and Jardine (1986) criticize the university along these lines. Despite their proclivity for corruption, guilds did support markets for knowledge, on the one hand warranting masters to aspiring apprentices, and then later warranting newly qualified apprentices to those who needed skilled labour. Recent work by Epstein (1998) and Richardson (2001) has helped put the monopolistic practices of guilds in perspective, while highlighting their ability to promote learning and the dissemination of innovation. In the struggle to balance the positive and negative potential of controlling knowledge provision, intellectual property, with its monopolistic character, presents a similar dilemma. English common law resisted the acknowledgement of trademarks in part because of their monopolistic nature. Trademarks nevertheless did develop as explicit forms of warranting--more liability than asset to those that held them. Rose (1993) notes that the French system of copyrights also developed around attempt to warrant the reliability of almanacs. His book establishes an implicit link between brands and copyrights on the first page but, unfortunately, the connection is left implicit for the remainder of the

professional associations exercise over members who need certification--and much of the warranting of learning provided by guilds in the *ancien regime* has been appropriated today by educational institutions. Institutional endorsements are, essentially, a kind of brand that helps purchasers evaluate what is on sale. In all, then, though it may pain academics to acknowledge it, the warrants that come with knowledge goods and services are only special cases of the broader process of branding. We may not like to think of those elaborate, gothic-scripted Latin certificates we receive as academics in the same light, but in the way they work, these are not conceptually very different from the gothic-scripted label that Coca-Cola permits its bottlers to put on their bottles.

Given the role such endorsements play in markets for information and knowledge, it is not surprising to see brands play a critical role in creating markets for sophisticated knowledge goods of the modern economy (McLaren, 1999).²⁵ While its ideologues can suggest that information technology levels playing fields, with the good driving out the bad in a kind of meritocratic inversion of Gresham's law, David (1985) has already shown that path dependency and network effects prevent the race going to the swift (there can, of course, be a relationship between brands and network effects). Because the quality of such goods can be very hard to judge (see, for example, those debates about whose gigahertz is swiftest), brands and reputation play a highly significant part in markets for these goods, and though related to merit, they are not an exact proxy for it. Not only do brands contribute to the commercial market for information goods; they even to have a role in the noncommercial sector.

O'Mahony (2003) insightfully notes how even "Open Source" software has its brands.²⁶

book. .

²⁵ Brands also contribute to the acceptance of what Giddens (1990) calls "expert systems" in which, to his surprise, people place remarkable trust.

²⁶ It may even be that the predominance of Linux over rivals such as the various BSD systems or even over GNU, on which Linux is in other ways dependent, is in part a function of the success of the Linux

So, although Chandler (1962) and Chandlerian historians of brands (Strasser, 1989; Wilkins, 1992, 1994; Koehn 2001) associate brands with hierarchical organizations and horizontal competition, I suggest that brands intriguingly allow hierarchies to disaggregate without losing control or interdependent chains to form that have within them a hierarchy of power. As brands are asymmetrical--that is, the complementary assets are likely to be much more dependent on the central brander than the brander is on unbranded complementary assets--the brander in such a chain can end up with disproportionate power and hence can collect rents from the chain.²⁷ Consequently, while some see supply chains as relatively equitable, others see fights not only to concentrate power, but also to retain the advantages that Fruin mentioned while passing the unmentioned disadvantages on to others in the chain. Watson (2001) thus describes these chains as "complex structures of dyadic power," while Bresnahan and Richards (1999) use the intriguing notion of "vertical competition" to describe struggles that arise within rather than between information technology supply chains.

Stretching out the chain in the computer industry

The PC supply chain exemplifies this vertical competition within chains--and brands help both to reveal it and to explain it. Where conventional accounts of brand wars draw on celebrated battles such as Ford versus General Motors, Pepsi versus Coke, or Nike versus Adidas, brand struggles in the PC sector are, intriguingly, better illustrated by, for example, Microsoft versus Intel or Microsoft versus Dell. These are the major brands in the PC chain and, as noted above, distinctly more profitable than any of their partners. But their war, unlike the other brand wars mentioned takes

brand. It would take great naiveté, bravery, or religious enthusiasm to argue that Linux is objectively better than BSD--or Microsoft than Macintosh (Eco, 1994)

²⁷ In response, the unbranded asset holder may try to find an alternative, less dominant brander or to develop a brand of its own and subordinate the original brand holder. Both strategies are quite common elements of the struggle for dominance in supply chains, old and new.

place in good part along the chains that they inhabit and against opponents with whom they must also cooperate. The rise of these brands and the development of this struggle follow, as we shall see, the disaggregation of the chain.

The IBM PC

The history of the PC chain in the United States shows this vertical competition developing as the former hierarchical system dominated by IBM separated by stages into the modern chain following IBM's failure to respond to new technological possibilities created, in particular, by the microprocessor.²⁸ Between 1970 and 1990, IBM's former dominance of almost the entire computer sector crumbled. The 1970s saw first signs of serious competition in the U.S. with the rise of the minicomputer sales from firms like DEC. Though a competitor, DEC, like IBM, nonetheless still worked with an integrated chain, bundling its own operating system (VMS) and central processing unit (CVAX) in its celebrated VAX machines.

This sort of integration was destabilized in part as a result of the U.S. Department of Justice supervision of AT&T. Prevented by the department from manufacturing computers, AT&T began licensing its powerful and innovative Unix operating system to universities and other manufacturers in the 1980s, in the process pushing computer manufacturers on the road to the sort of modularization on which supply chains thrive (Langlois, 1992; Sturgeon, 2002). In the early 1980s, Sun created the "workstation" using its proprietary Sparc chip as its central processor [CPU] but a version of AT&T's Unix for its operating system. Solaris (Sun's Unix variant) gave users access to the numerous third-party software packages written for Unix. At about the same time, small firms like Apple were developing the personal computer. While Apple chose (and still chooses, despite a brief experiment in the

²⁸ This description of the disaggregation of the PC chain in this section is heavily indebted to West (2003) and Kenney & Curry (2003).

1990s) to retain proprietary control over the hardware and the operating system, its CPU came from third parties and Apple and Macintosh computers ran third-party software. Apple dominated the early PC market as Sun dominated the early workstation market through their minimally disaggregated supply chain. With IBM's inadvertent help, however, a more disaggregated chain became the norm.

Industry insiders like Gordon Moore of Intel at first regarded the PC as little more than a "toy," the rapid growth of a market for these cheap and relatively versatile machines made many, including both Intel and IBM, reconsider. A latecomer to this market, IBM decided to accelerate its entry by outsourcing the processor (to Intel) and the operating system (to the fledgling Microsoft).²⁹ More used to doing everything in house, IBM management nonetheless presumed that its arrangements with its partners and intellectual property it held in the ROM-BIOS chip--the critical link between the operating system and the hardware--and in its brand would allow it to develop dominance in the sector and to retain control of its supply chain. At first the strategy was heralded as a remarkable success (Teece, 1986). IBM's PC was not particularly innovative or powerful, but the firm's corporate brand (as opposed to Apple's more laid-back California brand) helped push the IBM PC into firms that would otherwise have been suspicious of the "home-brew" hobbyists and garage-bred entrepreneurs behind rival small computers. American folklore said that "nobody every lost their job by buying IBM," and certainly sales managers seemed willing to buy IBM PCs where they were unwilling to buy the PCs of IBM's rivals. Moreover, a powerful advertising campaign helped make the terms *IBM PC* and *PC* interchangeable. By the mid eighties, for all but enthusiasts and hobbyists, the "PC" was branded by IBM.

²⁹ IBM actually outsourced more than this, including the power supply, the disk drive, and the circuit board (Curry & Kenney, 2003).

The rise of the clones

Having projected its PCs into modern offices and modern parlance with great success, IBM was eventually far less successful with its control of its PC supply chain. In 1982, Compaq, using "virgin" programmers and "clean room" design, famously reverse engineered IBM's BIOS without infringing the company's critical copyrights.³⁰ When IBM failed to prevent alternative BIOS from being reproduced, the door was left open for manufacturers to make "IBM clones." In principle, these computers worked as an IBM PC--using the same operating system and running the same software. The necessary ingredients of a "PC" no longer included anything from IBM--not even its brand. Thus clone makers managed to some extent to appropriate the IBM warrant while excluding the warrantor. Cloned computers became known as "IBM compatible" PCs, suggesting that anything an IBM could do, a clone could do too. With this shift came a remarkable transfer of warranting power. The Microsoft DOS and the Intel 8086 chip, previously subordinate to IBM's brand, now became the essential ingredients of a PC, while the term *PC* itself became "semi-generic". Intel and Microsoft, who had built up their reputation in the shade of IBM's warrant, became by the second half of the 1980s the principal guarantors of what was "compatible " and hence of the PC supply chain.³¹ To know whether a particular PC was reliable, the critical names became Microsoft and Intel.³² This shift gave these two firms extraordinary, quasi-monopolistic powers, which both learned to wield over others in the supply chain.

³⁰ Franklin Computers had successfully reverse engineered Apple's Apple II computer, but was held guilty of infringing Apple's copyright. To get around the judgement in *Apple v. Franklin*, Compaq cleverly separated the reverse engineering of IBM BIOS from the designers of the new BIOS and so claiming that the latter was independently created, not copied.

³¹ It has been darkly hinted that Microsoft may have had a hand in circumventing IBM's BIOS--it certainly had an interest in doing so. See <http://www.pbs.org/cringely/pulpit/pulpit20011122.html>

³² As Grove (1997) himself acknowledges, " by choosing to base [the PC] on Intel's technology, [IBM] made Intel's microprocessors preeminent" (p. 14).

Critical links

With the arrival of the clones, the supply chain of the PC disaggregated. At the heart of the chain were the CPU manufacturers, where Intel soon faced competition from Advanced Micro Devices (AMD), Chips and Technologies, NextGen, Cyrix, and Integrated Information Systems, and more recently Transmeta; the operating system designers, where Microsoft stood almost alone until IBM tried to undo its control with the OS/2 system; and the computer original equipment manufacturers [OEMs], where IBM was soon joined by Compaq, Hewlett-Packard, Dell, and Gateway among others.³³ Throughout the 1990s, the blessing of Microsoft and to a lesser degree of Intel were so widely recognized by consumers that they became essential to anyone trying to establish a reliable identity in the PC market.

A look at this chain from the perspective of the major branders in it helps understand the resulting distribution of control and the fights--in the marketplace and in the courts--to retain it.

Intel

While Microsoft had an important technological lock on the chain through its proprietary operating system, the other half of the "WINTEL" duopoly, Intel, faced competition. Others could manufacture x86 chips for PCs. In 1991, AMD broke Intel's relative lock on the supply chain when it introduced its 386 microprocessor, which many regarded as a highly competitive chip. Intel responded in part by pushing out newer and faster chips (the 486, the Pentium I & II and the Itanium). But it took a second route to maintain its power in the chain--it deployed the "Intel" brand. It had developed this first in 1989, when the company introduced its own 386 chip. Intel had worried that consumers and hence computer makers lacked an incentive to

³³ There were also numerous manufacturers of other essential components--including monitors, disk drives, motherboards, and so forth. These remained about as powerless as they were anonymous.

upgrade. To create interest among consumers and pressure on its supply chain partners for its new chip, Intel introduced an advertising campaign. At the time, the idea that chips could have a brand struck many as absurd. Chips were too abstruse for anyone to give them an identity. Indeed, the campaign's ultimate success was a surprise even to Intel itself. Reflecting on this campaign, Denis Carter, Intel's vice-president and director of marketing told the *Financial Times* that at the time,

I didn't really know what a brand was. But it became evident that we had created a brand and that it made a difference in consumers' purchase plans.³⁴

In 1991, faced with a significant challenge from AMD and the smaller CPU producers (as well as from IBM and DEC chips), Intel redeployed this "accidental" brand in the celebrated "Intel Inside" advertising co-campaign, which invited OEMs to advertise their use of Intel's microprocessor, with the OEM and Intel sharing the costs of the advertising campaign. Again, many were skeptical; some were actively resistant: Compaq initially refused.³⁵ Nevertheless, for most computer makers, this campaign, applying Intel's valuable warrant to otherwise relatively inscrutable boxes, was in the short term in their interest. People who couldn't tell one maker from another were reassured by Intel's warrant. In the long run, however, the campaign was very much in Intel's interest. Computer makers became Intel dependent: Once you have persuaded customers that "Intel Inside" is a guarantee of the quality of your product, it becomes hard to take the label off. Or, as Andy Grove, then CEO of Intel, put it, the campaign, "established a mindset in computer users that they were, in fact, Intel's customers, even though they didn't actually buy anything from us."³⁶

Furthermore, it diluted the relative power of the OEM's own brand in the process of

³⁴ Accidental Advertising Campaigns. *Financial Times* Oct 17, 1997: 12.

³⁵ Intel Isn't Taking this Lying Down. *Business Week* Sept 30, 1991: 32.

³⁶ Grove, 1997, p. 67. Grove, too, acknowledges that several of the beneficial consequences of this campaign were unintended—"an attitude change ... we actually stimulated, but one whose impact we at Intel did not fully comprehend," as Grove put it (*loc. cit.*). (This particular asset turned quickly into a liability when problems arose with the IBM chip and OEM customers began to act as if indeed they were Intel's customers.)

strengthening the brand power of Intel. In 1994, after his company had joined the campaign, a Compaq executive acknowledged that the Intel inside advertising campaign was, "promoting the semiconductor company at the expense of Compaq's brand."³⁷ Not only had Intel placed a rope around Compaq's neck; it had beguiled Compaq into helping to pay for the rope.

The Intel brand remains sufficiently powerful that newcomers must put it on, and even established old timers have difficulty taking it off.³⁸

While deploying its brand to control the OEMs, Intel inevitably had to resist being controlled by the other major brander in the PC supply chain, Microsoft. The fabled WINTEL entente is not necessarily a particularly cordiale. Over the years, Intel has tried to promote other operating systems (such as Linux, which was originally written for the x86 chip), to appropriate some of Microsoft's domain (by including some signal processing capabilities in its chips), but above all by promoting its brand ferociously, spending \$3.4 billion in the first five years of the campaign alone. It needed a strong brand to compete with Microsoft, but by 1993, Intel was one of the strongest corporate brands in the world. The magazine *Financial World* ranked it behind only Marlboro and Coca-Cola, and ahead of Kellogg, Nestle, and Kodak. Considering the age of those brands and the relative youth of Intel, the achievement was remarkable. Within the technical explanations for Intel's dominance (Gawer & Cusumano, 2002) it would seem wasteful. Yet the value of this brand becomes apparent whenever Microsoft tries to intimidate and subordinate Intel.

³⁷ Computer Giants Clash Over Strategy: Compaq Attacks Intel Over Advertising Campaign. *Financial Times* 1994 Sept 12. p. 1.

³⁸ In early 2004, more than twelve years after the campaign was introduced, the "Intel Inside" logo could still be found on Dell and even IBM PC and server sites.

Microsoft

Microsoft has a particularly potent combination of intellectual property [IP] including its copyrights, patents, and trademarks. This gives it extensive warranting power-- which it uses--and consequently a powerful hold on the PC supply chain (reflected in its remarkable, disproportionate margins in a chain that is continually being squeezed ever tighter). Indeed, though it was billed in terms of conventional anti-competitive behavior, the celebrated "Microsoft trial" must be seen in the light of its dominance over the supply chain and stranglehold over complementary assets that Microsoft does not own.³⁹ It was to a significant degree Microsoft's partners within the PC supply chain that persuaded the U.S government (and later the European Union) to try to limit Microsoft's power.⁴⁰

From the trial documents came abundant evidence of Microsoft using any means at its disposal to maintain tight control over the PC chain (Auletta, 2001). Early in its history, Microsoft licenses insisted that the OEMs must pay a licensing fee for each machine sold, whether or not it used Microsoft's OS. This made it almost inevitable that OEMs would include that OS and made it expensive to include a rival. Though it was later abandoned, this licensing strategy helped establish Microsoft's monopoly status and project its brand to all PC users. With the development of Windows 95, Microsoft increased its control over whose brand would appear on the desktop by designing their software to prevent users "booting" multiple OSs. (This was aimed in particular at IBM's competing OS/2 (Scannel, Trott, & Bailes, 1996).) The company also exerted itself to prevent OEMs from interfering with the appearance of the Microsoft desktop and its Internet Explorer logo, in particular--even though many computer makers had clients who preferred either an alternative web

³⁹ There have, of course, been numerous other prosecutions of Microsoft in the United States and Europe.

⁴⁰ The original resolution of the U.S. anti-trust prosecution--the break up of Microsoft into two companies, one responsible for operating systems and the other for software applications--in effect tried to open units of Microsoft to the sort of "vertical competition" Microsoft had inflicted on others.

browser or none at all. Though Microsoft had no hierarchical authority over these OEMs, because they needed its software on the inside and its logo on the outside of their boxes, they complied.

Microsoft's pressure went up and down the chain. To weaken the rival warranting power of Intel's brand, Microsoft provided warrants for competing CPUs to make it clear that a computer could still be a PC without Intel inside (Curry & Kenney, 2003). It also fought to prevent Intel from incorporating into its processors, as noted above, some of the functionality that was previously carried out by Microsoft's operating system. Microsoft achieved its end in part by threatening Intel directly and in part by using its control over the OEMs to persuade them not to buy chips with the new signal processing capability.

This direct and indirect attack on Intel reflects long-term strategic endeavors by Microsoft, which prides itself on supporting third-party software, to control very carefully what software gets written, by whom, where in the chain, and how it appears to the user. In these confrontations, Microsoft will use the power of its trademark and its copyrights as appropriate.⁴¹ Once it had responded to the Netscape web browser with its Internet Explorer, Microsoft's seemed primarily concerned to prevent another dominant brand on the desktop diluting Microsoft's own brand: Its deliberate efforts to "break" Netscape software and to dissuade OEMs and others from including Netscape's browser were principally aimed at the Netscape brand. Microsoft appears to have feared AOL, a content provider, for the same reason. Microsoft needed

⁴¹ Microsoft uses the power of its proprietary OS when faced with an established software package, such as Netscape or Real Audio, that threatens to gain enough market share to disrupt its control of the supply chain. Microsoft does not want to beholden to others. Faced with these particular competitors, Microsoft built rival products--Explorer and Media Player--which it bundled this into the operating system, thus using its monopoly power to make market entry and certainly market dominance by competitors almost impossible. Hence Internet Explorer and Media Player Whereas Explorer was the focus of the U.S. fight against Microsoft's bundling, Media Player has become the focus of European prosecutors.

software and content providing partners in its supply chain, but it wanted partners weak enough to do its bidding.

Microsoft wields its brand most effectively when a company proposes a new software package that Microsoft dislikes. In such conditions, Microsoft has a history of announcing that it is building something similar. Given the extraordinary recognition of Microsoft's brand, such announcements tend to scare support away from fledgling projects of less well-known software providers (and none is better known) before they can build either reputation or even software. If the rival software has been built, Microsoft will use the threat of a competing package to buy out the rival project cheaply (Ferguson, 1999). The announced Microsoft software is often never built (and has thus acquired the name "vaporware").

Unsurprisingly, then, the Microsoft trial was remarkable for the number of witnesses that the government called against Microsoft who were less direct competitors than cooperating partners in Microsoft supply chains. Witnesses came from major partners: Intel, who provide CPUs designed around Microsoft OSs; Apple, who relies on Microsoft to provide the "Office" suite for Apple's OS; and HP and IBM, both OEMs relying on the Microsoft OS. Given Microsoft's power and ruthlessness, of course, many up and down the supply chain who had been wounded from the way Microsoft wielded its IP, including its brand, would not testify. As David Boise, the lead attorney prosecuting Microsoft joked, "It has been very difficult to convince an OEM to appear in court without a hood" (Auletta, 2002, p. 254).

OEMs

OEMs, though unwilling to testify in court, find other ways to skirmish against their more powerful partners. Some offer AMD's processors as well as Intel's to keep Intel in its place. Some have flirted with alternative operating systems, though these have

generally failed to find a market among the general public. And all--but Dell in particular--have tried to make their brand and not Microsoft's or Intel's the sign of quality in the PC market.

Indeed, of the big three branders in the PC world, Dell is perhaps the most interesting. Intel has copyright and patent protection. Microsoft gains significant protection from copyright in the code of its OS. Dell, however, has almost no IP protection for its technology (as opposed to its business processes) and several major rivals, including IBM, Hewlett-Packard-Compaq, Sony, and Gateway, as well as numerous "white box" assemblers. What it trades on, to a significant degree, its trademark and brand (Koehn, 2001). This is always diluted by the need to carry Intel and Microsoft logos on its products. Nevertheless, Dell has trimmed itself down so that--a little like Nike--almost all it owns is a brand and reputation, which, supported by remarkably efficient business processes, manages to keep it from being completely subordinated by the WINTEL duopoly. And while keeping those at bay, the Dell brand subordinates suppliers along its Texas-to-Thailand chain (Fields, 2004).

Lesser links

Of course, the chain and its internal struggles extend well beyond these three (though reasonable profits do not). At one end, the US retailer Wal-mart has tried to use its remarkable brand to endorse cheap computers. The first came with no OS installed. Later models came with a direct affront to Microsoft in the form of "Lindows" (which claims to offer "the stability of Unix with the ease of Windows"--and the ability to run all Microsoft software). Wal-Mart also offers both Intel and AMD microprocessors--it clearly doesn't want to escape Microsoft only to find Intel's fingers on its neck. More radically, xSides, a software company, is considering ways to bypass the

operating system of a computer and tap directly into the video stream "pour échapper à Windows" as the French technology magazine *Journal du Net* put it, recognizing that "le régence de telle ou telle icône sur un bureau constitue désormais un enjeu crucial."

In all, I hope it is possible to see that the PC supply chain contains internal competitive battles that are as fierce as or fiercer than the external, horizontal competitions in which the links must also engage. (Microsoft, after all, retains comparatively cordial relations with Apple, its major, though in market share insignificant, OS competitor.) The aggressiveness of the competition suggests that it take some power to keep this chain relatively stable. In considering how IP figures in this fight, it is important not to underestimate the power of copyrights and patents held by Microsoft and Intel, but, given that Dell has little of either, it is equally important not to overlook the role that their trademarks and brands play too. Some of the power in the PC chain comes from the various brands that compete to warrant the PC.

Further, the importance of brands in this chain helps emphasize two points about modern chains. First, even in technology supply chains, meritocracy alone does not win the day. Gawer and Cusumano (2002) trace "platform leadership" to persistent and impressive research. But Intel holds off AMD in part through its "Intel Inside" campaign, with which it grasps OEMs like Dell and Compaq while keeping Microsoft's embrace from turning to suffocation. Microsoft dominates the chain and holds off vertical competitors and even the U.S. government by projecting an image as a major innovator, though so many of its "innovations"--DOS, Word, Windows, NT, Frontpage, Explorer--originated elsewhere and many are remarkably buggy. Second, in newly developing supply chains, such as the PC chain, not only who brands, but also where in the chain dominance can arise is not predetermined.

Overtime, it may be that one position will typically dominate--much as the OEMs dominate the automobile chains--but where that will be, whose brand will count probably cannot be determined in advance.⁴²

II. OLD CHAINS

The PC chain exemplifies the sort of "vertical competition" that occurs within modern supply chains, where the powerful can, it seems, acquire rents while shedding costs. Bresnahan and Richards (1999) suggest, "The origins of vertical competition arise out of the structure and technology of ICT." That judgement is, I suspect, blinded by a number of factors. In the first place, information technology has a tendency to persuade commentators that almost everything associated with it is completely unprecedented and that the digital future is irrevocably separated from the analogue past (Duguid, 1996). Second, supply chains appear to many to be themselves a new phenomenon that has arisen as the dominance of Chandlerian firm has fallen. The crumbling of hierarchically organized IBM computer production into the PC supply chain described above seems thus an image for the age. And third, brands, which I have made a significant feature of vertical competition, are generally agreed to arise with the Chandlerian corporation. Each of these position strikes me as mistaken. The first and second can be addressed quickly by pointing to Gary Fields (2004) comparison of Swift, the nineteenth-century American meat packer and Dell. Fields traces similar "control" and "corporate power" in the networks involving both Swift and Dell and in so doing demands a certain precision in defining what exactly is new about the new networks and the competition that they embrace.

Swift was, of course, a classically Chandlerian firm, so it might still be plausible to accept Fields's argument without disturbing the Chandlerian chronology

⁴² Closeness to the ultimate customer is, no doubt, a great advantage, one that Dell has used very creatively. I am grateful to Nathalie Fabbe-Coste for helping me see this.

that we are used to. The Chandlerian era, however, is starting to look less like an irrevocable break from a benighted past--part of the Whiggish history told by U.S. business and economic historians such as Chandler (1962, 1977, 1990; see also Chandler & Cortada, 2000) and North (1981)--and more like a curious aberration in the nonlinear history of networks. For if contemporary times can be characterized by networks, so too can the era preceding the Chandlerian firm. Casting this argument in American terms, Langlois (2003) notes that "the population of [interfirm] arrangements today begins to look a lot more like the antebellum one" (p. 15)--the *bellum* Langlois has in mind being the U.S. Civil war from 1860-1865. Looking more broadly, of course, we can see that the world of commerce described by Braudel (1985) is inescapably one of widespread inter-firm networks. Furthermore, contrary to the standard histories of brands, modern branding actually seems to have developed not within the integrated Chandlerian corporation, but in attenuated supply chains.⁴³ There, in the past much as in the present, brands played a part in the struggle for dominance. A brief illustration of this history can be informative.⁴⁴

The "modern" brand

While acknowledging that some branding practices have a very long history, Wilkins (1992, 1994) makes a useful distinction between the "modern" brand--an alienable intellectual property asset, protected by courts, and used to generate recognition in the marketplace--from the pre-modern brand, a common-law liability allowing customers and regulators to hold producers responsible for defects in their products. She then traces the modern brand to the U.S. trademark legislation of 1870 (acknowledging its antecedents in English law of 1862). It was this law that made trademarks available

⁴³ Though I have argued that the term *supply chain* did not arise until World War I, I use the term anachronistically to describe the nineteenth-century networks.

⁴⁴ The argument that follows is based on Duguid (2003).

for deployment as quintessentially modern brands by the developing Chandlerian firms, who used them against their horizontal rivals, Wilkins argues.⁴⁵

There are two problems with this argument. First, trademark law in the English-speaking world developed not in parliament but through common law, which had struggled with the concept of trademarks for at least 100 years before the legislation of 1862 was enacted. The legislation thus marks as much the end of an era--the point when common law was codified--as a beginning.⁴⁶ To understand the development of modern trademarks, then, we need to look at what brought the legislation into being as much as what followed from it. Second, apart from the common law, one of the critical influences on trademark legislation in both England and the U.S. was France. The Merchandize Mark Act of 1862 was in part the fulfillment of a commitment made in the Cobden-Chevalier Treaty between England and France of 1860. Similarly, the U.S. law of 1870 was in part a response to pressure exerted by the French in the treaty of 1869. Indeed, through its treaties France was a major influence on intellectual property legislation throughout Europe and around the world.

Once we look at France, we see that, English common -law tradition aside, trademark legislation has a much longer history than Wilkins and Chandlerians allow. Any historical account must include critical laws of 17 Mars 1791, of 22 Germinal XI, of 28 Juillet 1824, and of 23 Juin 1857. The first of these reflects the revolution's critical break with the *ancien régime* and the controversial attempt to replace guild control of makers' marks with legislation. The last prompted the internationalization of trademark law, granting a foreigner intellectual property protections in France on the condition that French citizens were granted similar protections in the foreigner's

⁴⁵ Vertically integrated, these firms didn't have all that much by way of vertical competition.

⁴⁶ One reason for codification was that common law cases were becoming prohibitively expensive. The case of *Rodgers v. Nowill*, for example, lasted seven years (1846-1853), cost the plaintiff £2,211, and resulted in an award of £2 against the defendant.

country of origin. As France was an important market for many foreign countries, this pushed firms exporting to France to pressure their home governments to provide reciprocal protections. The pressure exerted by France was transmitted not only through diplomatic treaties, but also and in great part through private firms.

The case of wine

The heavy industry sectors that were so significant in nineteenth-century growth were undoubtedly significant too in the development of trademark law, and certainly, industrial firms put direct and indirect pressure on the English government: the members of parliament pushing hardest for a bill came from industrial districts in the north of England.⁴⁷ Nonetheless, a look at the influential cases in English-language courts (in Britain, its colonies, and the United States), where common law developed and statutory law was interpreted, shows industry was not the most active sector in trademark matters. Analysis of "reported" trademark cases before 1880 (Cox, 1881)--these are essentially the most precedent-setting cases of the period--shows that the most aggressively litigious sector was "medical preparations" with 46 cases (table 1). A distant second is the class of "spirits" with 25 cases. If alcoholic beverages--spirits, beer, and wine--are combined, however, they come in a close second, with 42 cases. (Furthermore, it should also be remembered that many medical preparations and "cordials" were little more than thinly disguised alcoholic drinks.)

⁴⁷ The two MPs who led the legislative process were John Roebuck, MP for Sheffield, and Thomas Gibson, MP for Ashton-under-Lyne

Table 1: Product classes with more than five reported trademark cases in British, Colonial, and U.S. courts prior to 1880

Class	Total cases
Medical Preparations	46
Spirits	25
Publications	23
Toiletries	22
Tobacco	16
Newspapers	15
Sauces	13
Iron	12
Bottles	10
Beer	9
Sewing Machine	8
Wine	8
Soap	7
Oil	6
Pens	6
Mineral Water	5
<i>Alcoholic beverages</i> [Spirits, Beer, Wine]	42

Source: Rowland Cox, *A Manual of Trade-Mark Cases, Comprising Sebastian's Digest of Trade-Mark Cases* (Boston, 1881)

The significance of alcoholic beverages in the development of trademark law in British, Colonial, and American courts is even more prominent when we look at the most litigious brands in these "reported" cases. The Cognac firm Hennessy is first with six cases. Wolfe (schnapps) is next with five. Apollinaris, a water company founded by a vintner, is one of several companies with four. Moët (champagne), Guinness and Bass (beer), and Hostetter (bitters) are also among the brands with two or more "reported" cases.

If we want to understand the development of brands, then, we need to understand the contribution of alcohol firms. Their role is not entirely surprising. Good alcoholic drinks were often quite complex products. Moreover, tied to land (wine), water (beer⁴⁸), or secret recipes (liqueurs), these products had certain monopolistic properties, so direct comparison and open competition was not always possible. As a result, the quality of these goods--particularly those that would change

⁴⁸ Bass was produced with water from the Trent, Guinness from the Liffey

with age--was not easily inspectable. Furthermore, throughout the nineteenth century, the spectacular success of certain vintners and brewers made falsification and adulteration rampant. Imitators were adept at making up products that in the short term were indistinguishable from the genuine article, but over the long term deteriorated drastically. What appeared palatable and safe at the time of purchase often turned out to be undrinkable and even poisonous by the time of consumption (and wine, in particular, was often sold to age). Simultaneously, the liberal economics and politics of the period dismantled the regulatory bodies of the *anciens régimes* of Europe, making markets more chaotic.⁴⁹ The port region, where the dominant wine in the English market in the early nineteenth century was produced, had been demarcated and tightly controlled since 1756, but between 1834 and 1860 controls were removed just as new products were pouring into London from other regions eager to take some of port's market share one way or another. Part of the same process of liberalization, Gladstone's reformation of the retail trade brought many new customers into the high-end sector of alcoholic drinks. In markets for wine, then credulity regularly confronted cupidity and reliable warrants of quality became critically important to the health of the trade.⁵⁰ The trade needed the sorts of warrants that Arrow believes institutions provide for information goods. In the absence of institutions, these came, as in the PC supply chain, from firms and their brands. In particular, firms used brands to project and protect their products overseas, where attenuated supply chains were particularly hard to control.

Table 2 Most frequent plaintiffs in alcohol trademark cases before British and Colonial courts prior to 1880⁵¹

⁴⁹ As noted above, the dismantling of the guilds in France, institutions that had previously controlled marks, led to the legislation of 1791.

⁵⁰ They still do today: where would the FDA or Robert Parker be were this not so?

⁵¹ The data in this table come from table 3 in Duguid (2003), though that table did not include the Chartreuse cases. For these, see *Annales de la Propriété Industrielle, Artistique et Littéraire*, articles 2354 and 2460. These cases were heard in the Court of Chancery in London.

Plaintiff	Number of Cases
Guinness	12
Hennessy	11
Bass	6
Ponsardin (Clicquot)	3
Martell	3
Moët	3
Grande Chartreuse	2

Table 2 reflects this aspect of branding. It is taken from a selection of some 60 trademark cases involving the alcohol trade in British and Colonial courts. Here the most litigious is Guinness, an Irish firm trying principally to control distribution in England. It is followed closely by Hennessy, which sought to control from France distribution not only in England, but also in Australia. Also present with multiple cases are Ponsardin (the owner of the Clicquot brand), Martell, Moët, and the Convent of the Grande Chartreuse, each seeking action at a distance through the courts and the property rights accruing to brands.