

**Leading Without Followers:
the Political Economy of Japan's ICT Sector**

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Kenji E. Kushida*
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PhD Candidate, Department of Political Science,
Graduate Researcher, Berkeley Roundtable on the
International Economy (BRIE)

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Abstract

Despite global leadership by Japanese firms in sectors such as automobiles, precision equipment, and various high tech components, Japanese firms in the ICT sector have followed a persistent pattern of *leading without followers*. While leading the domestic market to ever-high levels of sophistication, sometimes beyond that of most other advanced industrial countries, Japanese ICT companies have retreated dramatically from international markets. Moreover, in technology after technology, Japanese ICT firms invest heavily, undertake extensive R&D, and for network technologies, deploy infrastructure rapidly, only to find that global technological trajectories shift in a different direction. While globally successful Japanese industries were able to use their domestic market as a springboard into international markets, Japan's ICT sector became decoupled from global markets, trapping Japanese firms in the domestic market.

This chapter contends that this persistent pattern of Japanese ICT firms *leading without followers* was not simply the result of unfortunate technological choices, ill-informed corporate strategies, or insular government standard-setting processes. Rather, a set of distinctive characteristics of Japan's ICT markets, shaped by specific policies and political processes, combined to create dynamics of competition which led the sector to become decoupled from global markets. These dynamics of competition ultimately shaped the technological choices and business strategies pursued by Japanese ICT firms, trapping them in the domestic market. Although these distinctive characteristics have changed considerably since the late 1990s and early 2000s, many of the market dynamics persist, raising the real possibility that Japan will continue to be a *leader without followers* in landline and wireless Next Generation Networks.

Introduction

Japan's ICT sector presents an intriguing puzzle. Over the past thirty years, Japanese firms in industries such as automobiles, consumer electronics, precision equipment, semiconductors, and various high tech components have been successful in international markets. Indeed, despite the country's economic malaise of the 1990s, many Japanese firms continue to be world leaders in particular technological and product areas; Toyota's hybrid automobiles, Sharp's LCD panels, and Murata's condensers, to name a few.

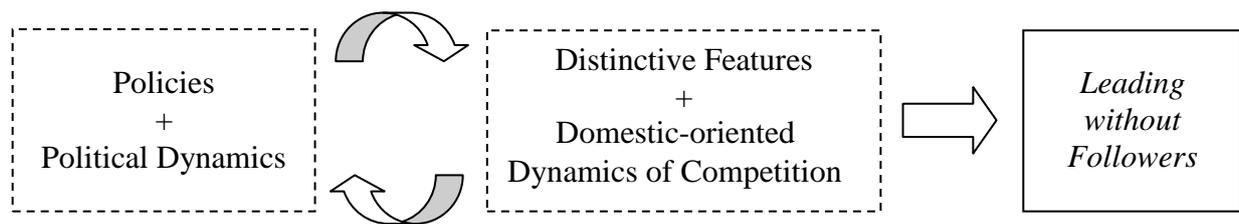
In the ICT sector, Japanese firms have been also leaders in many technologies, products, and markets, but with a critical difference. They lead the domestic market towards ever-high levels of sophistication in products and services, but their presence in global markets is negligible. While they have invested heavily and moved quickly to become world leaders, global markets moved in different directions. In short, they are often *leading without followers*. Examples range from: competencies in ATM (Asynchronous Transfer Mode), a set of networking technologies eclipsed by TCP/IP (Internet Protocol) as the basis for the Internet; the deployment of ISDN (Integrated Services Digital Network) networks for voice and data rendered obsolete by DSL (Digital Subscriber Line); highly sophisticated and advanced mobile handsets confined to Japan, and; a 1 billion dollar content ecosystem built on top of cellular Internet platforms, also confined to Japan. The list goes on.

What accounts for Japanese firms in the ICT sector following a persistent pattern of leading without followers? Will Japan continue to pursue this pattern in ICT as it moves rapidly to deploy both landline and wireless Next Generation Networks?

This chapter contends that the roots of Japan's repeated pattern of leading without followers in ICT lie deeper than simple technological choices by the government, ill-informed strategies pursued by individual firms, or insular standard-setting processes that created domestic proprietary standards. I contend that a set of *distinctive features* in the

political economy of Japan’s ICT sector, the products of particular policies driven by Japan’s political processes, combined to create a *specific set of market dynamics*. These market dynamics shaped the choices of technology, standards, and strategies which isolated Japan’s domestic ICT market from global markets and led Japanese firms to lead without followers. (see figure 1)

Figure 1: How Japan’s Political Economy of ICT De-Coupled the Domestic Market from Global Markets



The distinctive features of Japan’s ICT industry include: 1) the government strategically “managing” competition in the sector; 2) technological trajectories set by the incumbent carrier and government rather than manufacturers; 3) the incumbent carrier as the source of most domestic business models; 4) the sector characterized by a stable set of actors with patterned interactions; and 5) Japan-specific relationships in the wireless sector between carriers, manufacturers, and other actors. These characteristics stem from early policy decisions and subsequent political dynamics that shaped the policymaking organizations and market actors in Japan’s ICT sector. The characteristics were most prominent through the mid-1990s, and they combined to create an insular, domestic-oriented logic of competition, which decoupled the domestic market from global markets. An apt and vivid metaphor compares Japan’s telecommunications sector to the Galapagos Islands, in which isolation led to a unique evolutionary trajectory.

From the late 1990s, this set of distinctive characteristics began to change significantly. Regulatory reforms and new market dynamics led to more open and competitive markets

with new actors, new business models, and new links between Japan's domestic market and global markets. However, the government retained substantial capabilities to shape technological trajectories, and the vast resources of the incumbent carrier raise the very real possibility that many segments of the domestic market will continue along their isolated Galapagos-like evolution, with Japanese ICT firms continuing to lead without followers. (See Table 1 for an overview of the argument).

Table 1: Distinctive Features of Japan’s ICT Sector, Changes over Time

Distinctive Features	Historical Origins	How the domestic market became decoupled from international markets	Changes since the late 1990s
Government Managing Competition	- MOC orchestrating competing manufacturers (1920s), rise of MPT as a “policy” bureaucracy, micromanaging competition (mid 1980s)	- Government only focused on domestic market development, market segmentation and micromanagement of business decisions focused firms on domestic market	- Regulatory regime shift from <i>ex ante</i> informal, to <i>ex post</i> competition enhancing regulations.
Technological Trajectories Set by NTT and MPT/MIC	- Government-led domestic production of switches (1920s), NTT’s spearheading extensive procurement budgets subsidizing manufacturers (postwar)	- NTT’s R&D leadership in technologies (eg., ATM, ISDN, PDC) pulled domestic firms in directions orthogonal to global markets. MPT’s industrial policy (eg., PHS) focused solely on domestic market.	- New entrants, new technologies, and new business models. NTT increasingly a follower in setting technological trajectories and business models. New patterns of interactions with price wars, administrative litigation, and Dispute Resolution Commission.
NTT the Source of Business Models	- NTT’s procurement shaping manufacturers’ business models (1920s -) Lock-step price decreases with competitors (1985 – late 1990s)	- Business models of manufacturers and competing carriers reacting to NTT’s decisions in Japan-specific dynamics of competition	
Stable Set of Actors with Patterned Interactions	- NTT “family” firms (1920s), government carefully orchestrated new carriers (1985-)	- Little entry or exit, patterned price decreases, interconnection disputes mediated by MPT, foreign participation restricted, leading to insular, domestic logic of competition	
Japan-Specific Relations Betw. Carriers, Manufacturers, and others	- NTT’s R&D leadership, R&D division given to DoCoMo	- Manufacturers insulated from price competition, competed on sophisticated features, hostage to carriers’ specifications – different logic from international markets.	- Competitors driving new revenue models, government policies to shift carrier manufacturer relationships and terms of competition.

A Political Economy Approach to Understanding International Competition in ICT

As a starting point, we must recognize that in any country, domestic politics and government policies can shape the configuration of markets and the range of strategic choices available to firms.¹ Telecommunications is a sector in which this is particularly true. Government policy shapes *who the actors are*, such as through policies dealing with incumbent carriers who own legacy infrastructure, and through broader policies towards M&A and foreign direct investment, since telecommunications is a sector with large multinationals operating globally. Governments often influence *what actors compete over*, such as wireless standards, spectrum allocation, and interconnection rules, since regulators decide when and how to allocate wireless spectrum, issue operating licenses, and set the terms for which firms can connect to incumbents' infrastructure networks. Policies also shape *how firms compete with one another*, since mechanisms for dispute resolution, prices for some services such as cable or rural telephony, and the arrangements for competitors to lease incumbents' networks as virtual operators, are all matters of policy.

The deep government involvement in telecommunications sectors, combined with the diversity of political systems and governmental structures across the world have led to a wide variety of regulatory regimes and policy choices. These differences directly affect the composition of firms, their business model options, and the nature of their competition across different national economies – hence, the diversity across countries in patterns of innovation, competition, business models, and incumbent carriers' activities.

“Global markets” are therefore usually interactions between distinct national economies on a global stage, sometimes mediated by international organizations. Major market

¹ This perspective is derived from the recognition that markets inherently require sustained governmental intervention to function. They are embedded in social norms and rules, not necessarily more so for Japan than the US. Steven K. Vogel labels this the “market-institutional perspective.” Karl Polanyi, *Great Transformation: The Political and Economic Origins of Our Time* (Boston, MA: Beacon Press, 1944), Neil Fligstein, *The Architecture of Markets : An Economic Sociology of Twenty-First-Century Capitalist Societies* (Princeton, N.J.: Princeton University Press, 2001), Naazneen Barma and Steven K. Vogel, *The Political Economy Reader : Markets as Institutions* (New York: Routledge, 2008)..

disruptions and discontinuous technological breakthroughs are usually the result of concrete developments within a particular national context which spring onto this global stage.² It is in this context that Japan's domestic developments are of interest to a broad audience. Are the current trajectories of development within Japan's domestic ICT market, still the second largest economy in the world, likely to spring onto a global stage? Or will it continue to be a "Galapagos," or even provide new opportunities for non-Japanese firms to enter or take advantage of its sophisticated market?

Roadmap of This Chapter

This chapter unfolds in three parts. Part I provides an overview of Japan leading without followers in ICT, before elaborating on the five distinctive characteristics and their historical origins. Part II examines the interactions between the distinctive characteristics, market dynamics, and firm strategies through the 1990s as Japan's domestic ICT market became decoupled from global markets. Part III analyzes how the distinctive characteristics have been changing since the early 2000s. The chapter concludes by sketching the current trajectories along which the relationships between Japan's domestic market ICT market and global markets are developing.

Part I: Leading without Followers

Japan's Changing Relationship with International Markets

The performance of Japan's ICT firms in global markets was never as spectacular as its automobile, consumer electronics, or semiconductor firms (though the meteoric rise of the latter two ended in the 1990s). Nonetheless, the push of Japanese ICT firms towards

² John Zysman, "Creating Value in a Digital Era: How Do Wealthy Nations Stay Wealthy?," in *How Revolutionary Was the Digital Revolution? : National Responses, Market Transitions, and Global Technology*, ed. John Zysman, and Abraham Newman ed. (Stanford, CA: Stanford University Press, 2006).

supercomputing in the 1980s drew global attention,³ and their presence in global telecommunications equipment, including landline communications infrastructure and cellular telephony equipment, was substantial. By the mid-1990s, however, Japanese firms' telecommunications equipment market shares began dropping precipitously, and the dominant technological trajectory for computers shifted from mainframes to microcomputer platforms.⁴

The decline of Japanese firms in global telecommunications equipment markets, however, did not necessarily represent a weakening of technological strengths for all firms involved in ICT, as evidenced by the continuing global prominence of mobile handset components producers.⁵ It instead represented a de-linking of the domestic market for complete products and finished goods from international markets – an ever-increasingly sophisticated domestic market losing spillover effects into international competition. Three prominent examples, by no means exhaustive, suffice to illustrate the persistent pattern of Japanese domestic ICT firms leading without followers.

Leading without Followers

First, Japan developed high levels of competency in ATM (Asynchronous Transfer Mode) technology, hailed worldwide as the future of data networking until the mid-1990s. Japan was also a world leader in nationwide ISDN deployment. However, the advent of the

³ For example, see Edward A. Feigenbaum and Pamela McCorduck, *The Fifth Generation : Artificial Intelligence and Japan's Computer Challenge to the World* (New York: New American Library, 1984).

⁴ For example, Japanese manufacturers accounted for almost 80 percent of the US analog mobile phone market between 1986 and 1989, declining to approximately 20 percent by 1996. Jeffrey Funk, *Global Competition between and within Standards: The Case of Mobile Phones* (New York, NY: Palgrave 2002), 151. See also Robert E. Cole, "Telecommunications Markets in World Markets: Understanding Japan's Decline," in *How Revolutionary Was the Digital Revolution? : National Responses, Market Transitions, and Global Technology*, ed. John Zysman, and Abraham Newman (Stanford, CA: Stanford University Press, 2006).

This paper will focus on the telecommunications segment of ICT rather than computers.

⁵ Japanese firms leading global cellular component markets include: Omron for display backlights, Murata for capacitors (40%), Kyocera for Temperature Compensated Xtal Oscillators (50%), Nihon Densan for vibration motors, Rohm for energy-saving integrated circuits, and Daiichi Seiko for connectors between motherboards and LCD screens "Buhin Sangyo Sekai Riido [Components Industries Leading the World]," *Nihon Keizai Shimbun*, November 26 2007..

Internet, based on Internet Protocol (IP) technology, and the development of broadband DSL, rendered these efforts obsolete. The Japanese were not alone in being blindsided by the advent of the Internet – almost all global incumbent telecommunications firms were caught unprepared as well, enabling Cisco Systems and Juniper Networks to capture dominant global shares of Internet routers and IP-based switching equipment (an estimated \$39 billion market as early in 2000).⁶

Second, from the mid-1990s, Japanese cell phone handsets became increasingly sophisticated, leading the world in terms of miniaturization and features.⁷ However, even as the domestic market became more sophisticated, Japanese manufacturers' international presence was disappearing. In the late 1990s, Japan developed commercially successful cellular Internet services, with a series of innovative business models that enabled an open (but owned) platform for innovation and experimentation.⁸ Yet, the entire business ecosystem consisting of handset manufacturers, carriers, and content providers, was trapped in the domestic market. To reconnect the domestic market with global markets, Japan rushed to deploy high-speed, third-generation (3G) mobile networks, adopting global standards. (It had learned a lesson from deploying a proprietary second-generation standard which helped isolate Japan's domestic cellular market, as will be seen later.) However, the collapse of the global IT investment bubble in 2001 left Japan hanging, with domestic high speed 3G networks and an array of 3G-enabled services half a decade ahead of significant deployments elsewhere. Japanese services were not carried abroad, and hardware was not suited for other

⁶ Cole, "Telecommunications Markets in World Markets: Understanding Japan's Decline."

⁷ Jeffrey Funk documents this trend with data on the precipitous drop in handset size and weight between 1995 and 1998, with Japanese manufacturers' models miniaturizing faster than those of Nokia. Funk, *Global Competition between and within Standards: The Case of Mobile Phones*, 187. For an overview the proliferation of features and services by 2004, see Jeffrey L. Funk, *Mobile Disruption : The Technologies and Applications Driving the Mobile Internet* (Hoboken, NJ: Wiley-Interscience, 2004), Nahoko Mitsuyama, "Ntt Docomo: I-Mode Wireless Internet Services," (Gartner, 2003).

⁸ The term "open but owned" was coined by Steven Vogel and John Zysman Steven K. Vogel and John Zysman, "Technology," in *U.S.-Japan Relations in a Changing World*, ed. Steven Kent Vogel (Washington, D.C.: Brookings Institution Press, 2002).

markets. Meanwhile, competition in the domestic market for lead Japan to further pursue its own technological trajectory.

Third, Japan is currently running ahead of the world in deploying fiber optic networks to households nationwide, with 95% of metropolitan business and residential areas covered by 2001. Specific market dynamics led to Japanese consumers enjoying the highest price-performance of broadband worldwide since 2002.⁹ Initial government reports and the media coverage glowingly described Japan's broadband environment as a world-leader. However, this turned to concern and alarm as it became increasingly clear that innovations in services and applications taking advantage of this environment were slow to materialize, as new applications and services from abroad, ranging from Yahoo and Google to iTunes and Youtube, swept through the country.

Towards Leadership, but Will There be Followers?

With two new initiatives for "next generation" landline and wireless networks and services, Japan is once again attempting to put itself in a leadership position. The question is whether it is, once again, running in a direction that isolates its domestic market without becoming a significant player in global markets.

In late 2007, Japan's telecommunications ministry allocated spectrum and operating licenses to two carriers to provide "next generation" wireless services. Licenses were awarded to two operators. The first was committed to operate services based on WiMAX, a standard yet to be commercialized, though pushed strongly by Intel. The second, allocated to Wilcom, was to operate a proprietary "Next Generation PHS" service, a follow-on to Japan's proprietary PHS (Personal Handyphone System) service (more on PHS later).

⁹ Kenji Erik Kushida, "Japan's Telecommunications Regime Shift: Understanding Japan's Potential Resurgence" in *How Revolutionary Was the Digital Revolution? National Responses, Market Transitions, and Global Technology in the Digital Era*, ed. Abraham Newman, and John Zysman (Stanford, CA: Stanford University Press, 2006).

In landline services, Japan's dominant carrier, Nippon Telephone and Telegraph (NTT) began offering Next Generation Network (NGN) services in March 2008. The NGN consists of an entirely new fiber optic based network that replaces the existing Internet backbone and network at the infrastructure level. While the conventional Internet can run on top of the NGN, the NGN integrates telephony and Internet lines and provides several features enabled by the architecture of the network itself. These features include: guarantees on throughput (Quality of Service (QoS) – avoiding slowdowns when network traffic is high) to enable high resolution video conferencing; security measures enabling data packets to be traced to their origin, and; more secure Virtual Private Networks (VPN) for corporations. Speeds for both uplink and downlink are between 100mbps and 160mbps. As a platform, the NGN is closed and wholly owned by NTT, and content providers taking advantage of the features offered by the NGN network are required to enter into contacts with NTT. Approximately one fourth of NTT's capital investments, 4.4 billion yen (44 million USD at Y1 = \$1) in 2007, projected at 4.5 billion for 2008, were allocated to the NGN.

While some, mostly government participants and NTT, have been hopeful that these developments will advantage Japanese firms in international markets, many observers have been skeptical of these efforts. In short, in some areas, Japan still continues to run ahead along a particular technological trajectory, but it is unclear that it will reap the benefits in international competition.

The Five Distinctive Features

The five distinctive characteristics of Japan's domestic market and policy regime are not entirely unique in of themselves – other countries share one or more of these characteristics. However, it was the combination and interplay of these characteristics over the course of Japan's ICT sector development that created inward-focused market dynamics,

fostering technological leaders while de-coupling the domestic market from global markets. Here we briefly lay out the main elements of each characteristic, before showing in the next section how they interacted with specific technological choices and market developments over time.

1) The Government “Managing” Competition

Especially from the late 1980s to the late 1990s, Japan’s telecommunications sector was characterized by the government exercising a strong, strategic influence over the range of business strategies which could be pursued by individual firms.¹⁰ The government’s policy tools included formal regulatory tools rooted in law, as well as less formal authority it exercised by leveraging its regulatory power. Formal tools included licensing and approval of prices as spelled out in the Telecommunications Business Law, as well as rule-making through ministerial ordinances. Less formal authority was exercised through “administrative guidance,” ranging from orders to informal pressure against firms, often with the implicit threat of unfavorable regulatory treatment in the future or in different business areas. The principle government actor was the Ministry of Posts and Telecommunications (MPT), reorganized and renamed in 2000 as the Ministry of Internal Affairs and Communications (MIC).

2) Technological Trajectories Determined by NTT and the Government

The second major characteristic of Japan’s telecommunications sector is the dominant role played by Nippon Telegraph and Telephone (NTT), the former state-owned monopoly, and the government lead bureaucracy (MPT, then MIC), in setting the technological

¹⁰ Steven Vogel calls this “controlled competition,” as does Martin Fransman, though they point to a different mix of market dynamics and government policy regimes. Steven K. Vogel, *Freer Markets, More Rules: Regulatory Reform in Advanced Industrial Countries* (Ithaca, NY: Cornell University Press, 1996), Martin Fransman, *Japan’s Computer and Communications Industry: The Evolution of Industrial Giants and Global Competitiveness* (New York, NY: Oxford University Press, 1995).

trajectories. NTT's dominance of R&D resources, combined with the ministry's strategic initiatives, often pushed the efforts of Japanese firms towards particular business strategies and technological choices, as we will see in the next section. [Insert figures] NTT was not only one of the largest employers in Japan, with over 200,000 employees, but was also one of the largest regardless of whether measured by market capitalization or operating revenue. To give a sense of its scale, its operating revenues in 1998, at 91 billion USD, was greater than that of AT&T (62 billion),¹¹ dwarfing former incumbent national carriers Deutsche Telecom (37 billion), British Telecom, France Telecom, and Italia (29 billion each).¹²

3) NTT as the Source of Business Models

Partial liberalization of the telecommunications sector in 1985 gave rise to numerous telecom carriers competing against NTT (known as "NCCs" – New Common Carriers). However, NTT still strongly affected its competitors' business models. Through the mid-1990s, NTT often led rather than followed competitors in initiating rounds of price decreases, which followed a lock-step pattern. NTT, with its considerable R&D resources, also pioneered various services.

The business models of NCCs were therefore remarkably homogeneous. A contributing factor was the government's segmentation of the market into several subsectors, such as long distance, international, local, and cellular services, and its strict control over new entry, as well as prices. NCCs therefore had little necessity nor ability to pursue differentiating business models.

¹¹ The eventual merger between AT&T, SBC, and Cingular later surpassed NTT in operating revenue size.

¹² Sarah Randall and William Hahn, "The Top Telecommunications and Networking Companies Worldwide," *Gartner*, June 19 2000.

4) Stable Set of Actors with Patterned Interaction

Japan's telecommunications sector was also characterized by a stable set of actors with predictable patterns of interaction. NTT had close relations to a particular set of equipment manufacturers, often leveraging these relationships to gain competitive advantages over NCCs. The number of NCCs was limited and tightly controlled, with startup firms playing negligible roles in domestic markets until the late 1990s. The interactions between NTT and NCCs followed set patterns, with price competition managed by the government, interconnection negotiations and disputes orchestrated by MPT.

5) Japan-Specific Relationships in the Wireless Sector

In Japan's cellular services sector, NTT's vast R&D resources and its close ties to a set of manufacturers, combined with MPT's ability to determine technological trajectories, through standard setting and licensing, created a distinctive set of market dynamics. Unlike most other cellular markets, Japan's carriers rather than manufacturers dominated carrier-manufacturer relations. Carriers specified handset parameters to manufacturers, purchasing them outright before selling them to consumers. While this arrangement enabled the rapid deployment of carrier-led service innovations, it accelerated the de-coupling of Japan's domestic cellular market from global markets – towards what a 2007 government dubbed “Galapagos.”¹³

Part I: Historical Origins of the Distinctive Characteristics

These defining characteristics of Japan's telecommunications sector developed over the course of the industry's 100 plus year history. They were the product of early government

¹³ MIC, "Ict Kokusai Kyosoryoku Kondankai Saishu Torimatome [Final Report of the Ict International Competitiveness Study Group]," http://www.soumu.go.jp/s-news/2007/pdf/070423_1_1.pdf.

decisions which created actors and determined their interactions, leading to dynamics of telecommunication policymaking that led to particular outcomes.

State-Operated to Monopoly Public Company: late 1800s-1984

Three characteristics – the government managing competition, a stable set of actors with patterned interactions, and the government and NTT’s strength in determining the technological trajectories of the sector – were rooted in early government decisions as the sector was established.

Like many other countries, Japan’s telecommunications sector began with the government directly operating the networks and services – the Ministry of Communications (MOC). It began managing competition when it decided to rely on private enterprise to provide equipment (rather than producing it in-house as a government operation, or through a state-owned company), but implementing measures to prevent one firm from becoming dominant. In other words, rather than picking a “national champion” firm, the government architected a market for competition among several firms from early on.

The government actively participated in creating NEC as a joint venture with Western Electric, receiving technological expertise. NEC quickly grew to become the primary supplier of communications equipment, and it retained close ties with the government, taking former MOC bureaucrats into its management ranks. From the late 1920s, MOC moved to create competition among private equipment suppliers in order to avoid depending on NEC. It selected a closed group of suppliers, which eventually became the “NTT family” firms of NEC, Fujitsu, Hitachi, and Oki Electronics.¹⁴ The government aided each of these firms in creating complex equipment, while instituting a set of incentives and sanctions in which

¹⁴ Each of these firms initially relied heavily on foreign technology. For details, see Fransman, *Japan's Computer and Communications Industry: The Evolution of Industrial Giants and Global Competitiveness*, 29-31..

higher performing firms (in attributes such as product quality) received larger procurement orders, and disobedient firms could be left out of joint development efforts.¹⁵

This patterned relationship continued after World War II, when MOC was dissolved and its telecommunications labs and staff were transferred to Nippon Telephone and Telegraph (NTT) as a 100% government-owned monopoly. With massive budget allocations from the National Diet (Japan's Parliament), NTT in effect subsidized the R&D efforts of family firms in a variety of areas. Family firms were paid on a cost-plus basis, competing for shares of NTT's procurement based on quality rather than cost. By the late 1970s, one estimate puts NTT procurement budget at approximately 700 billion yen per year, accounting for up to 40% of the sales for "family" firms.¹⁶ Although foreign firms had been instrumental in the prewar origins of many of the family firms, and in establishing Japan's communications infrastructure, foreign firms were systematically kept out of NTT's procurement practices throughout much of the postwar era.

The government and NTT's ability to determine the sector's technological trajectories, directly influencing firms' business models and market decisions, date back at least to the 1920s. In the 1920s, the government spearheaded efforts to produce automatic switches domestically, rather than rely on imported equipment. It worked closely with NEC, aided other firms with their R&D efforts, and threatened to sanction firms who wanted to rely on imported equipment.¹⁷

In the postwar period, an early example of NTT's ability to set technological trajectories can be seen in its decisions over digital switches. By the 1960s, NEC had become a world-class producer of analog switches, enjoying global prominence in R&D in this area

¹⁵ Martin Fransman refers to this relationship as "controlled competition." Ibid. In this paper, we avoid this term in reference to NTT-supplier relationships to prevent confusion with the same term used by Steven Vogel referring to the relationship between the government and firms within the sector.

¹⁶ Kitti Prasirtsuk, "Reluctant Liberalization: Domestic Networks and Trade Policy Demands in Japan" (Dissertation, University of California Berkeley, 2001).

¹⁷ Fransman, *Japan's Computer and Communications Industry: The Evolution of Industrial Giants and Global Competitiveness*.

by the mid-1970s. However, NTT's delay in adopting digital switches for Japan's domestic market cost NEC dearly in international markets. Even as the US moved towards digital switches, opening an opportunity for NEC to move into a leadership position, NEC was slow to initiate the move to digital switches as it waited for NTT. Eventually, NEC and Fujitsu did move ahead of NTT to develop digital switches, but in attempting to serve two technologically very different markets, they could not attain scale and were unable to put the weight of their entire R&D resources behind digital switches for the US market. When NTT did eventually adopt digital switching, it chose a different system from the US market. In the end, the Japanese equipment manufacturers were unsuccessful in the US digital switching market.¹⁸ This one of the early cases in which Japan's domestic ICT market became unhinged from international markets.

NTT Privatized, MPT Empowered (1985 – mid-1990s)

MPT's power to manage competition and set technological trajectories was strengthened considerably in the mid-1980s, the result of political debates over reshaping the telecommunications sector. MPT's rise was a dramatic illustration of how liberalization – an increase in the level of competition – can lead to increased government powers.¹⁹

In the early 1980s, a political debate ensued over the breakup of NTT in the context of domestic economic reforms and international developments in telecommunications. The domestic reform debate circled around the privatization of state-owned monopolies in sectors including tobacco, railways, and telecommunications. This debate escalated with the breakup of AT&T in the US, finalized in 1982. A protracted political struggle ensued, involving a long list of actors including NTT, its labor union, a legion of telecom specialist politicians, a

¹⁸ Fransman notes that NTT's relatively late commitment to digital switches in the late 1970s caused NEC to have to enter the US market with equipment it had not been able to develop and test for the Japanese market beforehand. *Ibid.*, 67.

¹⁹ Steven K. Vogel's study, appropriately titled *Freer Markets, More Rules*, draws from this case among others. Vogel, *Freer Markets, More Rules: Regulatory Reform in Advanced Industrial Countries*.

strong prime minister's administrative reform council, the powerful Ministry of Finance, and MPT, hitherto a weak regulator. A compromise was reached in which NTT was partially privatized, limited competition was introduced, and the issue of a breakup would be delayed to subsequent debates.²⁰

MPT emerged from this political battle with an array of new policymaking powers. Before this, it had long acted as a rubber stamp for many of NTT's activities, since its institutional origins were in the pre-war Ministry of Postal Affairs. (Recall that the pre-war Ministry of Communications, which had operated communications infrastructure, became NTT after the war.) MPT had little expertise in telecommunications, with its technical specialists often consisting of NTT employees seconded to government. It also had few regulatory controls over NTT, which received its budgets directly from the government. Overall, MPT was considered a "regulatory" bureaucracy, lower in prestige than the elite "industrial policy" bureaucracies such as the Ministry of Finance and the Ministry of International Trade and Industry (MITI). It was largely through the efforts of an enterprising group of young MPT officials that MPT was able to seize the opportunity of liberalization and the NTT breakup debate to gain substantial regulatory authority. MPT's new powers included licensing regulation of existing and new competitors, strengthened powers over NTT, and budget allocations for R&D.²¹

MPT's institutional origins as the Ministry of Postal Affairs, and its decades of experience overseeing the domestic telecommunications sector led to a lack of focus on international markets. While it gained policy tools and authority to engage in industrial policy,

²⁰ Kenji Erik Kushida, "The Politics of Restructuring Ntt: Historically Rooted Trajectories from Actors, Institutions, and Interests " *Stanford Journal of East Asian Affairs* 5, no. 2 (2005), Vogel, *Freer Markets, More Rules: Regulatory Reform in Advanced Industrial Countries*, Chalmers Johnson, "Miti, Mpt, and the Telecom Wars: How Japan Makes Policy in High Technology " in *Politics and Productivity: How Japan's Developmental Strategy Works*, ed. Chalmers Johnson, Laura Tyson, John Zysman (Harper Business, 1989), Laura Tyson and John Zysman, "Developmental Strategy and Production Innovation in Japan," in *Politics and Productivity : The Real Story of Why Japan Works*, ed. Chalmers A. Johnson, Laura D'Andrea Tyson, and John Zysman (New York, NY: HarperBusiness, 1989).

²¹ Vogel, *Freer Markets, More Rules: Regulatory Reform in Advanced Industrial Countries*.

its efforts were focused on development of the domestic market and equity issues (such as equal prices and nationwide access to telecommunications services), rather than Japanese firms' global competitiveness. The contrast is with MITI, concerned about the performance of Japan's automobile and consumer electronics industries abroad, as well as in the domestic market.

Part II: Japan's Domestic Market De-coupled from Global Markets

Having examined the origins of Japan's distinctive characteristics in ICT, we now turn to analyze how they operated together over time to create the markets dynamics and business models causing Japanese firms to *lead without followers*. This section shows how each of the five characteristics created a domestic-oriented logic of competition that led to rapid technological advancement, but a de-coupling of the domestic market from international markets.

Liberalization – the introduction of greater competition and new competitors in the market – was actively managed by MPT from the mid-1980s until the late 1990s. The Ministry used its array of newly acquired policy tools to structure the market dynamics in the domestic market – a policy regime of “controlled competition.”²² It was, ironically, during this period of liberalization, in which new competitors entered the market and firms embraced new technologies and offered new services, that the logic of competition in Japan's domestic market turned inwards, causing it to become isolated from global markets.

The Government Managing Competition: Micromanaging Domestic Businesses

Through its policy regime of “controlled competition,” MPT micromanaged firms' business models while erecting barriers for market entry and exit. Barriers, both direct and

²² Ibid.

indirect, against foreign control over infrastructure and services helped to limit foreign influence and isolate the domestic market.

MPT took an *ex ante* approach to regulation, tightly orchestrating the entry of new firms, and controlling their business activities. It limited the composition of firms and scope of their businesses in two ways. First, it categorized telecom carriers into three types, with a different set of regulations over each. *Type I* carriers owned infrastructure and consisted of NTT and the competitors (known as New Common Carriers, NCCs), with foreign firms prohibited from becoming Type I carriers. *Type II* carriers, divided into two categories, leased facilities from Type I carriers. *Special Type II* carriers could provide services across prefectures, while *General Type II* carriers limited their operations to local areas. Foreign firms, mostly interested in providing international services, were limited to Special Type II carriers.

MPT controlled market entry and exit, as well as the prices charged by Type I carriers. A “Supply Demand Adjustment Clause” in the Telecommunications Business Law gave MPT wide discretion over the market entry of firms. The clause allowed MPT to cite factors such as “a mismatch between the business and existing demand in the proposed region of operation...” to deny an application, without needing to cite any specific criteria.²³ In the late 1980s, it used this clause to deny entry of a new cellular carrier, DDI, which wanted to use Motorola network infrastructure and equipment. DDI deemed that the Motorola equipment would enabled it to differentiate itself from NTT, which used a standard it developed itself with equipment procured from “family” firms, as well as a competitor, IDO, which also used the NTT standard and was beholden to equipment from NTT’s family firms. This led to a

²³ Hidenori Fuke, *Joho Tsushin Sangyo No Kozo to Kisei Kanwa: Nchibeiei Hikaku Kenkyuu. (Structural Change and Deregulation in the Telecommunications Industry)* (Tokyo: NTT Shuppan, 2000), 16.

bilateral dispute, with Motorola mobilizing US governmental pressure to allow DDI to enter the market.²⁴

Second, MPT compartmentalized competition by dividing the scope of business activities into long distance, local, and international service. There was no explicit legal basis for this division, but in the application form for carriers to enter the sector, MPT created a “business area” category that needed to be filled in. This led to an unwritten understanding that carriers were not to cross business lines – for example, NCCs engaging in long distance service were not to move into international service, and vice versa.²⁵ This led to domestic carriers specializing on one business area, narrowing their strategic focus away from not only global markets, but multiple market opportunities within their own domestic market.

This regulatory regime of “controlled competition” under MPT’s auspices, without significant foreign participation until the late 1990s, set the stage for the dynamics of competition focused on the domestic market.

Patterned Interaction among Stable Actors: Domestic Logic of Competition

Patterned interactions among a stable set of actors, highly controlled by the government, led the terms of competition to turn to factors applicable only to the domestic market context.

With a few exceptions, such as the case of DDI above, MPT restricted new entrants into the sector, especially those owning infrastructure (See chart 1). New entrants were mostly limited to small firms leasing infrastructure for private corporate lines, and later, regional ISPs. The main foreign firms, such as AT&T, were focused on providing international communications and private data lines, followed by Internet service from the

²⁴ For more on this Motorola episode, see Kushida, "Japan's Telecommunications Regime Shift: Understanding Japan's Potential Resurgence ".

²⁵ Fuke, *Joho Tsushin Sangyo No Kozo to Kisei Kanwa: Nchibeiei Hikaku Kenkyuu. (Structural Change and Deregulation in the Telecommunications Industry)*, 32.

early 1990s, to multinational companies.²⁶ Until a revision of the Telecommunications Business Law in 1998, foreign firms were restricted from majority ownership of infrastructure, limiting their activities to those based on leased network capacity.

Chart 1: Number of Carriers, 1985-2002

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Type I Total*	2	7	13	37	45	62	68	70	80	86	111	138	153	153	178	246	342	395
NTT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3
KDD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-	-
Long Distance/ Int'l	3	3	3	5	5	5	5	5	5	5	5	5	5	6	12	21	32	35
Regional	-	-	3	4	4	7	7	7	8	10	11	16	28	47	77	274	274	330
Type II Total	85	209	356	530	693	841	943	1036	1179	1589	2107	3134	4588	5871	6602	7345	9006	10555
Special Type II	-	9	10	1	25	28	31	36	36	39	44	50	78	95	88	101	113	113
General Type II	85	200	346	529	668	813	912	1000	1143	1550	2063	3084	4510	5776	6514	7550	8893	10442

Sources: MIC, TCA

* Categories of Type I carriers omitted from this chart include satellite carriers and mobile carriers

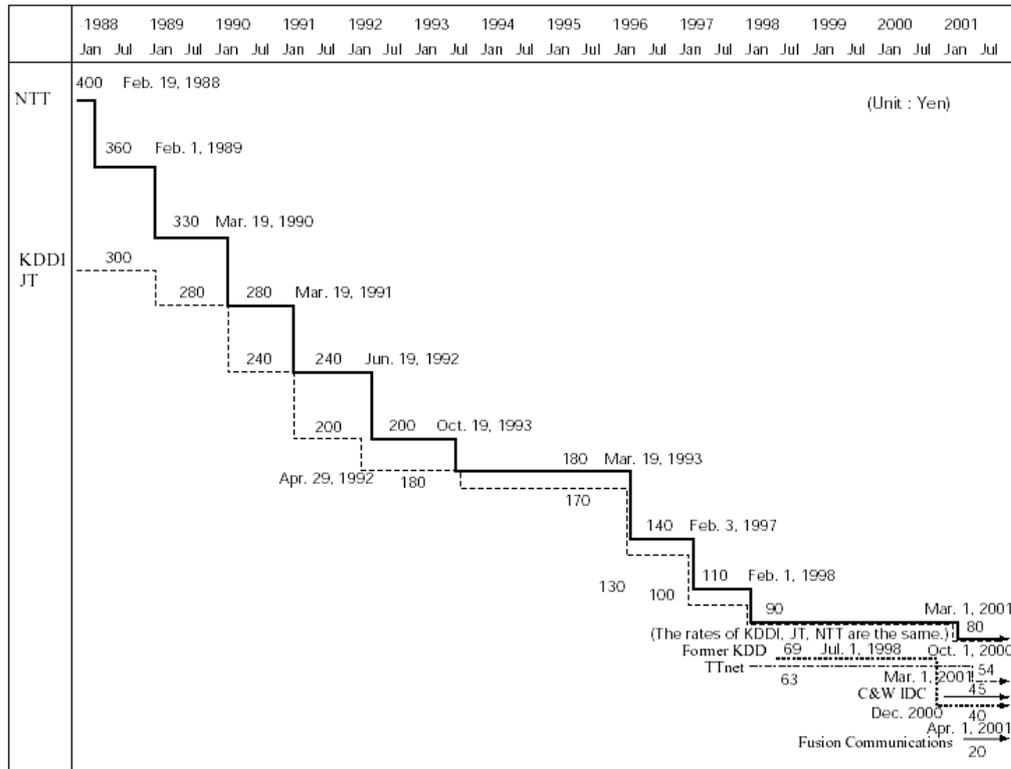
In the context of limited new entry and government control over the prices, interactions between NTT and its competitors followed stable patterns, and were not based on aggressive price competition. Prices decreased in a highly orchestrated lockstep fashion, with NTT-initiated (and MPT approved) price decreases just slightly undercut by competitors (See Chart 2).

Chart 2:

²⁶ Takahiro Yamada, "American Telecommunications in Japan," in *Winning in Asia, U.S. Style: Market and Nonmarket Strategies for Success*, ed. Vinod K. Aggarwal (New York, NY: Palgrave Macmillan, 2003).

• Changes of NTT's and NCC's Call Rates (weekday for 3 minutes)

(1) Tokyo-Osaka (daytime)



Disputes over interconnection fees, which pitted NTT's interests in keeping them high, against NCC's interests in seeing them lowered, occurred in annual negotiated (though often contentious) settlements orchestrated by MPT. Litigation, which would have thrust the judicial branch of government into telecommunications policymaking, was not pursued by any NCC, likely out of the fear that alienating MPT would have grave consequences in their ability to get approval for future licensing and price changes.

Stable patterns of interaction between NTT and its "family" firms also persisted. Despite its partial privatization, NTT still dominated R&D activities, with large procurement budgets.²⁷ On the one hand, large non-family consumer electronics firms including Mitsubishi Electric, Matsushita, Sony, and numerous small firms were able to gain some access to NTT procurement and joint development, which translated into their advantages in

²⁷ Martin Fransman, in exploring the competitive options for a competing carrier, DDI, compares DDI's 30 R&D employees with NTT's 8500. Fransman, *Japan's Computer and Communications Industry: The Evolution of Industrial Giants and Global Competitiveness*, 419..

international markets for fax machines and cordless phones. However, at the same time, the industry association for manufacturers – the Communications and Network Industry Association of Japan (CIAJ) – was dominated by “family” firms, with NEC and Hitachi rotating in its chairmanship.²⁸ The industry association was therefore never a strong advocate for terminating NTT’s preferential relationships with family firms.

In this context of patterned interaction, both between NTT and its competing carriers, and between NTT and its equipment manufacturers, Japanese firms’ business models did not prioritize international markets.²⁹ NCCs were busy busy negotiating for lower interconnection fees while enjoying protection from full-scale price wars, and NTT was legally prohibited from engaging in international operations. KDD, the former monopoly international carrier, faced limited competition, partly as a result of MPT’s restriction over foreign entry, resulting in KDD’s ability to charge higher fees for international calls compared to other advanced industrial countries. Thus, although Japan’s domestic telecommunications market undoubtedly became more competitive, with competition among a larger numbers of carriers and manufacturers, the terms over which domestic firms competed against each other were specific to the domestic market.

Technological Trajectories Set by NTT and MPT

NTT and MPT were responsible for setting several key technological trajectories which, when combined with the domestic-oriented logic of competition, further isolated Japan’s ICT markets. We have already briefly reviewed the examples of ATM, ISDN, and digital switches. Here let us examine three other examples: an industry-wide focus on

²⁸ Prasirtsuk, "Reluctant Liberalization: Domestic Networks and Trade Policy Demands in Japan".

²⁹ A study conducted in the late 1980s by a program supported by the US National Science Foundation found that Japanese firms were “dominant” only in cordless telephones and facsimiles. They were “strong” in “microwave equipment, key telephone systems, paging devices, communications components, and cellular telephones.” In digital exchanges and switches, their position was “moderate.” Fransman, *Japan's Computer and Communications Industry: The Evolution of Industrial Giants and Global Competitiveness*, 18-19.

miniaturization for analog cellular handsets; PDC, Japan's proprietary digital cellular standard controlled by NTT; and PHS, a proprietary wireless alternative to cellular technology.

The Trajectory Towards Cellular Handset Miniaturization/Sophistication at Any Cost

First, NTT led the technological trajectory for cellular handsets in Japan's domestic market to lead the world in miniaturization and sophistication. However, the particularistic dynamics of competition fostered by NTT led to a focus away from production cost and scale, unhinging domestic firms' business models from global markets.

NTT's relentless pursuit of miniaturization was actually sparked by foreign competition in the domestic market. In 1989, DDI, the cellular competitor to NTT involved in the US-Japan bilateral disputes to allow Motorola equipment in Japan, introduced Motorola's MicroTAC cellular phone to the Japanese market. The MicroTAC was significantly smaller and lighter than the model that NTT and its suppliers had rolled out earlier that year. The president of NTT was outraged that the company's prized R&D capabilities came up short, ordered the R&D division to work with suppliers to create a handset half its size within a couple years. NTT spearheaded this effort, while also increasing the level of competition between its suppliers by allowing them to make autonomous decisions on cosmetic designs. By 1991, the new handsets, smaller than the MicroTAC, were commercialized, and NTT continued to focus its suppliers on making ever-smaller and sophisticated handsets.³⁰ It prioritized those attributes over production cost, a practice sustained by its outright purchase of manufacturers' handsets, which it turned around to sell to consumers, recovering costs of the expensive handsets over time through communications charges.

³⁰ NTT DoCoMo, *Ntt Docomo Junenshi: Mobairu Furontia E No Chousen [Ntt Docomo Ten Year History: The Challenge Towards Mobile Frontier]* (Tokyo, Japan: NTT DoCoMo, 2001).

NTT handed down detailed specifications to the handset manufacturers, stipulating new functions, circuitry, and later, services that handsets needed to comply with. These dynamics of competition, in which the carrier spearheaded R&D, handing down specification to handset manufacturers, differed significantly from other national cellular markets, in which large equipment manufacturers such as Nokia, Motorola, and Ericsson had the upper hand vis-à-vis smaller national carriers. Thus, the entire Japanese cellular industry, led by NTT, whose rapid rollouts of new functions and services determined what carriers competed over, and how manufacturers' formulated their business strategies, embarked on its own trajectory of development.

PDC: The Domestic Proprietary Standard, NTT DoCoMo-Shaped Market Dynamics

Second, Japan's choice of PDC, a proprietary digital cellular standard, further isolated its domestic market. The isolation was not simply due to PDC being a different standard from others adopted broadly throughout the world, such as GSM and CDMA, but because it strengthened NTT's hand in dominating and sustaining the Japan-specific dynamics of competition.

The development and selection of the PDC standard was not an explicit attempt to isolate the domestic market. NTT had begun developing a digital standard in the late 1980s, before it became clear that nascent national cellular markets would be linked together through common standards to create global markets. Digital standards allowed more efficient use of wireless spectrum as the cellular market grew, and in the early 1990s, a shift from analog to digital standards became a policy issue. As MPT examined the issue, there were no significant home-grown alternatives, and GSM, the standard which was becoming popular in Europe, required more spectrum than was allocated to NTT's competitors. (GSM required 10MHz per carrier, while DDI and IDO were allocated only 5MHz each, while PDC only required 5MHz per carrier.) Given the US-Japan disputes over Motorola, MPT wanted to

avoid reopening issue. MPT did not want to open the issue of spectrum reallocation, which they feared could become politically contentious, as Motorola's use of US diplomatic pressure, was fresh in their minds. Thus, in 1992 MPT adopted the DoCoMo's PDC standard, which was commercialized from 1994.³¹

An outcome of the politics of restructuring NTT, ongoing since the early 1980s, gave NTT the R&D resources to dominate the PDC standard. As the result of a political compromise over breaking up NTT, its wireless division was spun out as NTT DoCoMo. DoCoMo received NTT's extensive wireless labs as part of the spinout, despite the concerns of some MPT officials about giving DoCoMo an overwhelming and unfair advantage in cellular markets.³² Along with the transfer of NTT's wireless labs came the expertise to set and modify the PDC standard.

DoCoMo's dominance of the PDC standard enabled it to directly shape the business models of all other cellular carriers and manufacturers. Although the specifications for PDC were made public and approved by the Association of Radio Industries and Businesses (ARIB), additional technical stipulations were required to commercialize PDC-based services. Equipment manufacturers were therefore hostage to information from carriers about their operational implementation of PDC. Moreover, since only DoCoMo had the resources to modify PDC, manufacturers received frequent updates from DoCoMo's engineers about upcoming updates. Updates were often timed so that DoCoMo rolled out new services and new handsets appeared on store shelves just when ARIB gave its approval and publicized the new specifications. Many of these modifications dealt with chipsets and circuitry, aimed at decreasing or miniaturizing components to enable smaller handsets. Preferential access to information therefore became a major source of the "NTT family" manufacturers'

³¹ Kenji Erik Kushida, "Wireless Bound and Unbound: The Politics Shaping Cellular Markets in Japan and South Korea," *Journal of Information Technology and Politics* 5, no. 2 (2008).

³² Ibid.

competitive edge over those without dealings with DoCoMo, including Kyocera, Toshiba, Sanyo, Sony, and Nokia.

In competing against other cellular carriers, DoCoMo further exploited this situation by requiring its manufacturers to obtain permission prior to selling the same handset to other carriers. DoCoMo often delayed the granting of such permission by several months, in a market where new models appeared almost every month.³³ Development projects between DoCoMo and its manufacturers also entailed non-disclosure agreements signed by components manufacturers, who were prohibited from disclosing details or selling new components to non-family handset manufacturers, typically for six months. Thus, size differentials between DoCoMo and non-DoCoMo handsets remained significant for several years until around 1998.³⁴

Equipment manufacturers' business strategies were further pushed away from lowering production costs and attaining scales of production due to industry business practices stemming from NTT's vast financial resources. NTT's historical procurement practices of buying equipment outright from manufacturers, sustained through its vast financial resources, became the standard industry practice. Carriers subsidized consumer purchases of handsets by buying handsets outright from manufacturers, then selling them to retailers with commission agreements. Competition between carriers led to ever-increasing commission sizes, reaching 70 plus percent of the handset cost for each subscription sale for top-of-the-line models, and virtually 100 percent for older models. Advanced handsets that would have cost over 400 dollars could be purchased for less than 100 dollars, without multiple year binding contracts. Combined with frequent updates to PDC, yielding frequent cycles of handset renewals. This in turn prevented handset manufacturers from attaining large scale production, focusing their competitive strategies squarely on obtaining procurement

³³ This practice led to an investigation by the Japan Fair Trade Commission in April, 1999 Izumi Yuasa, *Ntt Docomo No Chousen [Ntt Docomo's Challenge]* (Tokyo: Koushobou, 2000), 167..

³⁴ Funk, *Global Competition between and within Standards: The Case of Mobile Phones*.

orders based on design and new features rather than selling handsets to consumers at low prices.³⁵ For equipment manufacturers, the domestic market became a steady source of revenue that taxed their wireless R&D resources due to constant demands from carriers for new high-end features and frequent updates of handsets. As a result, manufacturers could not, and did not have strong incentives to attain economies of scale or penetrate international markets.

PHS: MPT's Industrial Policy Driving a Proprietary Technological Trajectory

The third illustration of NTT and MPT's technological trajectory setting is the Personal Handyphone System (PHS). It is arguably the most prominent example of MPT's bold industrial policy to set a technological trajectory. In the early to mid-1990s MPT assumed that conventional cellular subscriptions would be too expensive for the masses. Aiming to create a cheaper alternative, it proceeded to use its R&D resources to conduct field experiments and set the technical PHS standard. Technologically more similar to cordless phones than conventional cellular services, PHS handsets were relatively simple technologically, enabling long battery lives, low manufacturing costs, and relatively cheap base station infrastructure. Built on top of NTT's ISDN network, voice communications were clearer than conventional cellular services at the time, and carriers offered lower subscription and per minute fees to consumers. MPT orchestrated the entry of firms into the market by directing existing carriers to obtain licenses and offer PHS services, resulting in three consortia or joint ventures – NTT Personal Communication Network (a joint venture between NTT and its wireless subsidiary, NTT DoCoMo), DDI Pocket (a subsidiary of DDI), and Astel (a consortium including Japan Telecom and KDD). Foreign firms were strategically

³⁵ Kushida, "Wireless Bound and Unbound: The Politics Shaping Cellular Markets in Japan and South Korea."

kept out of the standard-setting process, gaining access to the PHS standard specifications only as the three services providers commenced their commercial operations in 1995.³⁶

As a strong competitor to cellular services, PHS services strengthened the technological trajectory pursued by cellular carriers' to focus relentlessly on handset miniaturization and sophistication, regardless of equipment manufacturing costs. PHS markets grew rapidly, becoming a major threat to cellular carriers, forcing the latter to concentrate their efforts on catching up to PHS-level prices and handset miniaturization and performance. In the end, cellular services and handsets caught up and overshadowed PHS, but this whole trajectory set dynamics of competition in Japan's domestic market further away from international markets.³⁷

Japan's Domestic-Oriented Cellular Business Ecosystem: Cellular Internet Services

Japan's cellular Internet services created commercially successful platforms for experimentation and innovation, giving rise to an entire business ecosystem. The very success of this domestic business ecosystem from the late 1990s pushed all industry participants' business strategies away from a focus on global markets.

The Emergence of Japan's Cellular Internet Services: Domestic Terms of Competition

The emergence of Japan's cellular Internet services platforms illustrate how the domestic dynamics of competition were taking their own course, almost independently from

³⁶ As Jeffrey Funk notes, although a consortium of domestic electronics firms was involved in the standard-setting process, foreign manufacturers were not given an opportunity to provide input or access information. Indeed, they were not given the specifications until immediately prior to PHS service commencement Funk, *Global Competition between and within Standards: The Case of Mobile Phones..*

³⁷ PHS services eventually declined in competitiveness vis-à-vis cellular handsets and services, as cellular carriers and manufactures closed the gap in size, usability, and price. Moreover, NTT was able to charge predatory prices to PHS carriers dependent on its public network infrastructure, squeezing the profits of PHS carriers. After peaking in 1998, the number of PHS subscribers declined, leaving only one in the market. Having essentially given up on PHS technology, manufacturers opened the intellectual property to Chinese carriers, which precipitated a boom in regional Chinese cities – an interesting story in of its own Takahiro Suzuki, Hisashi Kamio, and Junko Tanaka, *Gyakuten Senryaku: Uirukomu "Yowami" Wo "Tsuoyomi" Ni Kaeru Ishi No Keiei [Reversal Strategy: Wilcom, Management Will Shifting Weakness to Strength]* (Tokyo, Japan: Diamondo Sha, 2005), 152-63.

global markets. From the mid to late 1990s, Japan's three nationwide carriers were engaged in a race to commercialize cellular Internet services. While carriers and equipment manufacturers around shared expectations that cellular services would eventually connect to the Internet, only in Japan did the specific competitive pressures facing carriers, their R&D resources, and close carrier-manufacturer ties lead to commercially successful technological platforms and business models.

From the mid-1990s, DoCoMo's competitors, facing a playing field tilted in favor of DoCoMo due to its large customer base, dominance of the PDC standard, and vast R&D resources, were desperately searching for new business strategies. In the development of Japan's cellular Internet services market, most existing analyses credit NTT DoCoMo for pioneering a new business model, spawning a cellular content market of over 3 billion dollars by 2007.³⁸ However, almost all underappreciated is the fact that dynamics of competition in the entire sector focused all actors on a race to commercialize cellular Internet services.

The market context was as follows. In the mid-1990s, with the playing field tilted in favor of DoCoMo, which dominated the market by controlling the PDC standard and mobilizing R&D resources allowing it to lead new product development, the desperate competitors were pushed to look for alternative strategies. At the same time, PHS service providers, facing increasing difficulties from cheaper and improved cellular services, began marketing Short Message Services (SMS), revealing a significant latent demand for such message-based services.³⁹ The three nation-wide cellular carriers then took independent paths to develop cellular Internet technologies and business models. Tokyo Digital Phone (later J-

³⁸ For example, see John and Mitchell Wade Beck, *Docomo: Japan's Wireless Tsunami, How One Mobile Telecom Created a New Market and Became a Global Force* (New York, NY: Amacom, 2003), John M. Ratliff, "Ntt Docomo and Its I-Mode Success: Origins and Implications.," *California Management Review* 44, no. 3 (2002), Emily Murase, "Keitai Boom: The Case of Ntt Docomo and Innovation in the Wireless Internet in Japan" (Stanford University, 2003).. For estimates of the size of Japan's cellular Internet content market, see Mobile Content Forum website. <http://www.mcf.to/press/images/2007_MobileContents_market_scale.pdf>

³⁹ Suzuki, Kamio, and Tanaka, *Gyakuten Senryaku: Uirukomu "Yowami" Wo "Tsuyomi" Ni Kaeru Ishi No Keiei [Reversal Strategy: Wilcom, Management Will Shifting Weakness to Strength]*.

Phone, Vodafone and then Softbank) went to a research lab in Keio University known for its work on Internet-related technologies. IDO (later KDDI) joined the WAP forum assembled by the American firm Unwired Planet. DoCoMo strengthened ties to Access, a Japanese startup software company.

DoCoMo is often given credit by observers for pioneering Japan's cellular Internet services, but it actually lagged behind competitors during much of the development process. J-Phone was the first to roll out a cellular information service, *Sky-walker*, in late 1997, taking DoCoMo by surprise. DoCoMo's president at the time, Koji Ohboshi, was reportedly furious about falling behind in the race. When J-Phone rolled out an early, text-only version of its cellular Internet service in December 1998, DoCoMo was again behind.⁴⁰ DoCoMo introduced its famous *i-mode* service, with an innovative business model involving profit-sharing with third party content providers, in early 1999.⁴¹

Japan's Cellular Internet Platforms: Commercial Success Shaping Galapagos

DoCoMo's *i-mode* service was essentially an "open-but-owned" platform which connected to the Internet. It was open in the sense that third parties and users could create content, but owned in the sense that carriers controlled the gateway to the content, profiting from access.⁴² DoCoMo charged 300 yen (\$3 at 1 USD = 100 yen) for a monthly subscription *i-mode*, providing a portal menu which allowed easy access to "official" content

⁴⁰ Kontentsu kakumei no kishu tachi: "kokusaikijun" de dokomo ni taikou. 2003. *Nihon Keizai Shimbun*, October 8, 5.; Kontentsu kakumei no kishu tachi: shanai benchaa, nankan toppa. 2003. *Nihon Keizai Shimbun*, October 9, 5.; Kontentsu kakumei no kishu tachi: shameru de onnagokoro tsukamu. 2003. *Nihon Keizai Shimbun*, October 10, 5.

⁴¹ In DoCoMo's business model, *i-mode* was a portal, modeled loosely on AOL, rather than a channel for providing in-house content Takeshi Natsuno, *I-Mode Sutorageji : Sekai Wa Naze Oitsukenai No Ka [I-Mode Strategy: Why the World Cannot Catch up]* (Tokyo: Nikkei BP, 2001). The main innovation was that, for websites officially approved by DoCoMo, DoCoMo offered revenue sharing with content providers and billing services integrated with DoCoMo's own billing service Funk, *Global Competition between and within Standards: The Case of Mobile Phones*.

⁴² "Open but owned" is a term coined by Steven Vogel and John Zysman. Vogel and Zysman, "Technology."

approved by DoCoMo.⁴³ “Official” content providers could offer subscription-based services, with monthly fees ranging from 100 to 300 yen (1 to 3 dollar at 1USD = 100 yen), and get their subscription fees integrated with DoCoMo’s monthly billing statement for cellular services; this solved the problem of payment mechanisms for content providers. DoCoMo took a percentage of this monthly fee.⁴⁴ The open part of *i-mode* was that any Internet website could be accessed, even if it was not “official” content on the portal menu. A proprietary simplified form of html, name compact-html, optimized webpages to be displayed on *i-mode* phones. While DoCoMo’s initial lineup of “official” content included predictable sites such as news, weather, stock market information, and banking, “unofficial” content played a crucial role in popularizing the *i-mode* services. DoCoMo benefited from the popularity of “unofficial” *i-mode* sites, since it charged users according to the number of data packets they used.⁴⁵ Internet email quickly became the most popular use of *i-mode*, which, in the late 1990s, was most consumers’ first experience with “always on” Internet and email access.⁴⁶

DoCoMo pioneered this business model, which other carriers quickly adopted. Yet, few observers recognize the significance of the fact that, later that year, the other Japanese carriers rolled out competing services with similar features, but different underlying

⁴³ A cheap monthly fee of 300 yen was established at the behest of a successful magazine editor to appeal to mass consumers, against the wishes of the McKinsey consultants who wanted to aim for the high-end business market. Mari Matsunaga, *I Moodo Jiken [the I-Mode Incident]* (Tokyo, Japan: Kadokawa Shoten, 2000).

⁴⁴ DoCoMo took 9% as a handling fee Funk, *Global Competition between and within Standards: The Case of Mobile Phones*, 23.

⁴⁵ By early 2007, the number of official DoCoMo sites was approximately 8000. "Media No Hatou: Imoodo Ga Kieru Hi [the Wave Crest of Media: The Day When I-Mode Disappears]," *Nihon Keizai Shimbun*, March 7 2007.

⁴⁶ One should note that DoCoMo’s success with *i-mode* was not simply a matter of offering data-packet based transmissions. DoCoMo’s earlier attempts at offering data-based communications utilizing packet-switched technology were unsuccessful until it pioneered the *i-mode* business model. In early 1997, DoCoMo modified the PDC standard and began offering packet-based communications services. Packet communication allowed data communication to be transmitted in small pieces of data without tying up an entire line during times when data was not being transmitted. The packet services allowed users to be charged by the data sent rather than time spent online. DoCoMo’s packet service, named DoPa (DoCoMo Packet), was aimed at enabling computers and other mobile devices to engage in wireless data communications by connecting cellular phones to them. During 1997 and 1998, DoCoMo undertook major investments in infrastructure to install packet transmission equipment, and by late 1998, packet network coverage was equivalent to its digital circuit-switched network. However, *DoPa* did not take off in popularity, mainly because transmission speeds were relatively slow, limited to 28.8 kbps versus the 64 kbps attained by PHS services.

technologies and networks. After DoCoMo began *i-mode* services in February of 1999, KDDI introduced its *EZWeb* service in April, and J-Phone its *J-Sky* service in December. While DoCoMo used its considerable financial resources to build an entirely new, nationwide packet-switched network, its competitor KDDI used a CDMA-based network built with Motorola equipment, and J-Phone used a circuit switched PDC network. Therefore, although DoCoMo offered a pioneering business model, it was the product of competition in which all carriers were headed along the same technological trajectory. Handsets for all three carriers enabled with their respective cellular Internet services could be rolled out quickly, due to the tight carrier-manufacturer relationships. As cellular Internet services became popular, carriers' revenue sources shifted increasingly towards income from data packet transmissions.

Once cellular Internet services became an integral part of all carriers' business strategies, the terms of competition shifted towards producing new services and features taking advantage of them. While DoCoMo's *i-mode* was a resounding success as a platform service, several significant subsequent innovations taking advantage of cellular Internet platforms were made by competitors. For example, J-Phone was first to market with camera-embedded phones in 2001, with a service that allowed users to email the pictures. J-Phone had worked closely with Sharp, a manufacturer without strong ties to DoCoMo, to introduce the service. It took DoCoMo approximately a year to offer similar services and orchestrate the introduction of camera-embedded handsets from its manufacturers. KDDI commercialized downloadable songs, "chaku-uta," which recorded 5 million downloads 16 months after its introduction in late 2004, closing in on the number of CD singles sold in early to mid-2006.⁴⁷ DoCoMo was again a follower.

As carriers competed against each other to introduce ever-sophisticated services offerings embedded in hardware, including micropayments through IC card-embedded

⁴⁷ Daisuke Masuno, *Gyokai Kenkyu Shiriizu: Tsushin [Industry Analysis Series: Telecom]* (Tokyo, Japan: Nihon Keizai Shimbun Sha, 2006), 34.

handsets, downloadable Java applets to run small software applications, the capability to view digital television broadcasts, biometric scanner-enabled data security, and various GPS-enabled applications and services, Japan's domestic cellular market was charting its own evolutionary course.

Pressures for Change to Japan's Distinctive Characteristics in ICT

By the late 1990s, as a result of the prolonged pattern of leading without following, Japan was slipping rapidly in international indicators of ICT development and competitiveness. In the broader political context of Japan's prolonged economic stagnation through the 1990s and a banking crisis in the late 1990s, Japan's retreat from global ICT markets and its lag in ICT development created pressure for reform among the political leadership and elite bureaucrats.

Japan's slow adoption of landline Internet, and its retreat from international cellular equipment markets were the two most significant market pressures driving political change. The first pressure, the market disruptions caused by the advent of TCP/IP, the Internet, and the World Wide Web, blindsided incumbent telecommunications firms across the world. However, Japanese firms were hit especially hard, since NTT had been spearheading R&D efforts in ATM technologies in collaboration with manufacturers. NTT had set long range plans to offer a proprietary service that integrated telephony, video, and data through fiber optic backbone networks, and ISDN infrastructure deployed nationwide. (ISDN-enabled public telephones, even in remote areas, sported data uplink jacks, though few people ever used them.) TCP/IP employed an entirely different engineering paradigm from ATM, and NTT was slow to shift course to embrace TCP/IP, hindering equipment manufacturing firms' efforts to make the transition. Moreover, global standard-setting and governance organizations of the Internet, such as the Internet Engineering Task Force (IETF), evolved

from informal organizations, rather than through the International Telecommunications Union (ITU), part of the United Nations.⁴⁸

As the world moved quickly to embrace the Internet in the mid-1990s through dial-up modem connections, NTT and its family firms found, for the first time in postwar history, that they were unable to deliver what Japanese corporate consumers demanded. As Internet Service Providers (ISPs) began offering services, they were unable to purchase routers and other Internet Protocol (IP)-based network equipment from Japanese equipment firms. Indeed, this was precisely the pattern around the world which enabled Cisco and the likes of Juniper networks to dominate the exploding global Internet backbone equipment markets – incumbent carriers and equipment manufacturers were simply blindsided. As a Japanese executive at an ISP noted, they were more than willing to procure equipment from NTT family firms, with whom they had long relationships, and were often horrified at the low quality and high failure rates of some of the Cisco equipment, but Japanese firms simply did not make the appropriate routers and network equipment. When Japanese firms finally began making routers, they were not necessarily compatible with Cisco routers' software, which had already moved into the next generation.⁴⁹

Innovative services that changed how people use information, and the nature of commerce were introduced by Silicon Valley startup firms such as Yahoo, Amazon, and eBay, rather than incumbent telecommunications firms. As the investment bubble of the very late 1990s and early 2000s fueled excitement over the advent of the Internet as a platform for corporate activity, services delivery, and more, Japan was falling increasingly behind in landline Internet penetration. While the cellular Internet services were growing rapidly, relatively few people were connected at home, partly due to NTT's pricing structure of

⁴⁸ Cole, "Telecommunications Markets in World Markets: Understanding Japan's Decline."

⁴⁹ Interview with former executive of major Japanese ISP. May 2004, Berkeley, CA.

charging by the minute for local calls, making modem-based Web browsing relatively expensive.

Japan's lag in broadband access became even more pronounced as South Korea's broadband markets began growing rapidly at the end of the century.⁵⁰ Observers within Japan were also becoming increasingly aware that their cellular market was becoming isolated, with handset manufacturers retreating from global markets. Many, including government officials, put the blame on Japan's proprietary PDC standard.

Part III: Reactions and Adjustments

As Japan's politics, policies, and ICT markets reacted to the market disruptions of TCP/IP and the Internet, Japanese equipment firms' withdrawal from international markets, and Japan's decline in relative standing in ICT indicators, many of the distinctive characteristics began to change. The core driver of many of these changes was a policy regime shift, in which the government shifted from its ex ante, "controlled competition" policy regime to an ex post mode of regulation focused on increasing market-based competition.

Put simply, the government shifted away from micromanaging competition, as it gave up many of its policy tools and created new rules and institutions to promote competition. The sector witnessed a breakdown of the patterned interactions between a stable set of actors, as new actors, including foreign firms and startup firms, entered the sector, and a startup firm engaged in price wars. The logic of competition in cellular markets began to change, as new tight carrier-manufacturer groupings eroded, and services from abroad opened new business models and revenue streams for cellular Internet service platforms. Overall, the government and market participants became more aware of how domestic dynamics of competition could

⁵⁰ For details, see Kenji Erik Kushida and Seung-Young Oh, "The Political Economies of Broadband in South Korea and Japan," *Asian Survey* 47, no. 3 (2007).

promote or hinder their attempts to move abroad. However, attempts to reshape the dynamics of domestic competition faced difficulties, as the existing market dynamics were firmly entrenched. Moreover, the vast concentration of resources in NTT enabled it to continue pursuing its own technological trajectory with its NGN, and MIC's power to orchestrate next generation wireless services risk putting Japan on another proprietary technological trajectory.

Less Managing of Competition, but Strategic in Liberalization

From the late 1990s, the government began to incrementally dismantle much of the policy apparatus of the "controlled competition" ICT regime. This occurred in the context of a broader domestic regulatory transformation as the government moved from ex ante, informally-based regulation to a mode of ex post regulation rooted in legal accountability.⁵¹ The policy transformation entailed deregulation as well as the creation of new rules to facilitate competition.

Deregulation and Re-Regulation to Increase Market-Based Competition

In a series of deregulations from around 1997, MPT dismantled many of its policy tools to manage the sector. In 1997, Japan signed the WTO Telecom Agreement, removing most restrictions on foreign ownership of carriers and infrastructure, paving the way for unprecedented inroads by foreign carriers and service providers.⁵² The following year, MPT abolished most licensing requirements for market entry and price changes, while relaxing

⁵¹ Ulrike Schaeede, *Choose and Focus : Japanese Business Strategies for the 21st Century* (Ithaca: Cornell University Press, 2008).

⁵² A normative shift had occurred in the bureaucracy, which had previously fought to keep out foreign firms. They now regarded foreign firms as a valuable potential contributor to Japan's economic growth and technological development. Therefore, rather than being forced into accepting foreign entry as part of the WTO treaty, they entered the WTO Telecom negotiations with the intention of using the deregulation of foreign entry as a bargaining chip for other concessions. Yuko Suda, *Tsushin Gurobaru-Ka No Seijigaku : "Gaiatsu" To Nihon No Denki Tsushin Seisaku [the Politics of Globalization in Telecommunications : "External Pressure" On Japanese Policies]*, Shohan ed. (Tokyo, Japan: Yushindo Kobunsha, 2005).

restrictions over the scope of carriers' business activities.⁵³ These sets of deregulation were facilitated by overarching political support from the political leadership. A "Three year plan for deregulation" promulgated by the Cabinet Office encompassed several industries including telecommunications, giving MPT broad authority to amend the Telecommunications Business Law. In 2003, the Ministry (now renamed MIC after a government restructuring) went on to abolish most of the remaining classification, registration, and notification requirements.⁵⁴

The government strengthened several rules to enhance competition, also creating new institutions to facilitate ex post regulation. First, MPT created a new set of interconnection policies governing the terms under which competitors could lease NTT's last-one-mile of infrastructure. Until the late 1990s, few regulations governed interconnection, giving MPT wide discretion in determining interconnection rules and the prices charged by NTT, thus providing opportunities for political intervention by politicians mobilized by NTT.⁵⁵ With the new rules, NTT was required to lease its last-one-mile of infrastructure when requested, and MPT established a formula dictating the prices NTT was allowed to charge.⁵⁶ In 2000, this formula was revised to further favor competitors. Second, MIC established the Dispute Resolution Commission (DRC) in 2001. The DRC was located within the Ministry, but was, in principle, a neutral third-party deliberative organization. Complaint filings, deliberations,

⁵³ Specifically, MPT changed most requirements on Type I carriers to "notify" rather than "require permission." See Fuke, *Joho Tsushin Sangyo No Kozo to Kisei Kanwa: Nchibeiei Hikaku Kenkyuu. (Structural Change and Deregulation in the Telecommunications Industry)*.

⁵⁴ MIC removed the classification of Type I, Type II carriers altogether. Kushida, "Japan's Telecommunications Regime Shift: Understanding Japan's Potential Resurgence".

⁵⁵ Two issues are important in interconnection: the Point of Interface (POI) and price. POI refers to the level of the incumbent's network, such as regional, prefectural, and national, that competitors connect to. Initially, there were essentially no regulations governing how NTT arranged POI contracts with NCCs. Competitors wanted NTT to charge end-to-end fees in order to duplicate the least costly national infrastructure and connect only to the most lucrative prefectures. NTT, of course, wanted to charge NCCs according to the level of the POI they connected to. In 1991, MPT stepped in to restrict POIs to one per prefecture for each NCC, creating a competitive structure that increased competition between prefectures, but retained NTT's monopoly within each prefecture. In 1993, MPT promulgated regulations forcing NTT to charge NCCs on an end-to-end basis Fuke, *Joho Tsushin Sangyo No Kozo to Kisei Kanwa: Nchibeiei Hikaku Kenkyuu. (Structural Change and Deregulation in the Telecommunications Industry)*, 20, 35.

⁵⁶ *Ibid.*, 43, 45.

and results were made public, removing such decision-making from the government's discretion and potential political interference.

The Strategic Aspect of Liberalization: Towards High Speed Broadband

These sets of deregulatory measures and new rules were not simply the result of the government deciding to leave developments to the market alone, or to facilitate increased competition as a goal in of itself. The government was strategic in its regulatory reforms, focused in increasing the level competition, but also following an explicit strategy, driven by the political leadership, to facilitate high speed, low priced broadband access to a wide swath of the population. In July 2000, the Cabinet Office established an "IT Strategy Headquarters," which produced policy program called the "*e-Japan strategy*" that September. The *e-Japan strategy* identified Japan as lagging behind other advanced industrial nations in the development of IT, with a policy goal was to create "ultra high-speed network infrastructure and competition policies." It set a five-year timeline to establish "one of the world's most advanced Internet networks," aiming to provide low cost Internet access within a year.⁵⁷ To facilitate this, the Cabinet Office passed the "Basic IT Law on the Formation of an Advanced Information and Telecommunications Network Society (IT Basic Law)" that November. The Basic IT Law strengthened the position of MIC against NTT by creating a broad framework within which many specifics could be determined by Ministerial Ordinances.⁵⁸ It was under this regulatory framework that MIC strengthened rules over NTT governing interconnection, seen above.

The government's strategic thrust to facilitate market dynamics to create low cost broadband markets led to a set of new rules explicitly aimed to foster the spread of DSL.

⁵⁷ "Information Superhighway" initiatives by the US in the early 90s, and South Korea's cyber Korea strategy were among the international factors behind the political initiative. See Prime Minister's Office. 2001. IT Kakumei no Suishin ni Mukete: "e-Japan senrayku" kettei. *Tokino Ugoki*. Mark Tilton rightly identifies the e-Japan Strategy as a classic example of Industrial policy, with aims of catching up, quantitative goals, and concrete plans. Mark Tilton, "Neoliberal Capitalism in the Information Age: Japan and the Politics of Telecommunications Reform," *Japan Policy Research Institute Working Paper No. 98* (2004).

⁵⁸ Kushida, "Japan's Telecommunications Regime Shift: Understanding Japan's Potential Resurgence".

DSL technology sends a high frequency signal through existing copper lines on top of conventional telephone signals. This requires equipment to be installed on both the user's end and within the carrier's facilities. The new interconnection rules described above did not include provisions for competitors to place equipment within NTT's switching facilities, known as *collocation*. In the absence of rules for collocation, NTT had been able to stonewall requests for information delaying access to its facilities. In 1999, Tokyo Metallic, a startup firm, became the first company to commence DSL services in Japan. However, NTT had little interest in the technology, preferring to rely on its existing ISDN services and to wait until it could deploy fiber optic networks,⁵⁹ and facing NTT's stonewalling, Tokyo Metallic and other startups struggled to expand their DSL services. They charged that NTT took five to nine months to assess whether collocation space was available within a particular facility.⁶⁰

In October 2000, MIC revised several Ministerial Ordinances, requiring NTT to clarify the terms under which it offered collocation, and to publicize how it calculated fees. The Ministry also required NTT to "unbundle" its unused fiber optic and copper capacity, allowing any carrier to lease the infrastructure at prices determined by NTT's cost of operations.⁶¹ That same month, the Japan Fair Trade Commission issued a warning to NTT, the first time it had ever done so, over its practices against the DSL startups. (The lack of specific rules precluded it from taking punitive actions.) In 2001, the newly established Dispute Resolution Commission ruled against NTT in disputes brought to it by Tokyo Metallic and eAccess, another DSL start-up.

⁵⁹ NTT's ISDN services also mostly charged by the minute, rather than having flat-fees.

⁶⁰ Kotorii, NTT wo chousa, Kousoku tsushin senryaku misu utsusu -- shinki sannnyuu gyousha to toraburu. 2000. *Nihon Keizai Shimbun*, October 24, 3.

⁶¹ Hidenori Fuke, "The Spectacular Growth of Dsl in Japan and Its Implications," *Communications & Strategies*, no. 52 (2003).

The Breakdown of Patterned Interaction and NTT's Leadership in Business Models

The “strategic liberalization” of Japan’s telecommunications policy regime accelerated the breakdown of patterned interactions among firms in the sector and the demise of NTT’s leadership in determining business models industrywide. New entrants to ICT services markets played a major role in shifting the dynamics of competition, leading to Japan’s rapid adoption of DSL and FTTH. They created price wars, and NTT was rendered a catch-up player. The entry and exit of foreign firms redistributed the ownership of infrastructure. The regulatory regime shift also opened new avenues for challenges to the government, with several new entrants experimenting with a variety of methods to pressure policymakers, including, for the first time, lawsuits.

New Market Dynamics Surrounding DSL: Softbank’s Price Shock

Softbank, a startup firm, took advantage of the new regulatory environment favoring DSL provision to its extreme. It leased unused fiber optic infrastructure from NTT to create its own backbone, and took advantage of the new collocation rules to aggressively place its equipment in NTT switching stations.⁶² Softbank then initiated a major price war in 2001, cutting subscription prices to half the prevailing market amount. It also took a new approach to offering broadband services by bundling IP telephony (sending voice signals over the Internet) subscriptions with its DSL services, delivering another set of price shocks by offering flat-rate long distance calls between its IP telephony subscribers, and setting international call rates at below-cost.⁶³ Softbank insisted that its business model was to make money on services that used broadband as a platform, despite massive short term losses in its broadband business. Many MIC officials privately expressed concern (if not alarm) at what they perceived to be Softbank’s reckless business model that threatened the profitability of

⁶² It moved so aggressively, in fact, that other DSL providers brought a case to the Dispute Resolution Commission, charging that Softbank was hogging collocation capacity.

⁶³ Japan’s domestic telephony market did not offer flat-rate long distance services to consumers, and Softbank’s international service to the US was 8 yen a minute, compared to the prevailing rates of 200 or 300 yen for 3 minutes. Kushida, "Japan's Telecommunications Regime Shift: Understanding Japan's Potential Resurgence ".

other carriers to the point that potential to reinvest in future infrastructure was in jeopardy. Softbank's plans were unlikely to have been approved by MIC beforehand if the licensing requirements had still been in place, and its price war was a surprise to all concerned.⁶⁴

NTT was initially hesitant to enter the DSL market, since it had invested heavily in the slower ISDN networks, which charged by the minute and was therefore more profitable, and because it wanted to transition directly to its proprietary fiber optic service.⁶⁵ However, it had little choice but to begin heavily promoting its own DSL services.

FTTH: Rapid Adoption Influenced by DSL Market Dynamics

Another new entrant, followed by newly restructured NCCs, shaped the terms of competition in consumer Fiber-To-The-Home services, which delivered speeds of up to 100Mbps (versus 2 to 15Mbps for DSL at the time). In March 2001, Usen (pronounced "Yusen"), a landline music broadcaster with its own urban telephone pole and fiber infrastructure, was first to market with consumer FTTH services. It commercialized household FTTH services with speeds close to 100 mbps, for only slightly more than double the price of Softbank's DSL. NTT had yet to offer consumer FTTH services – it possessed far more fiber infrastructure, but it had originally planned for a proprietary service combining video, telephony, and data with a far higher subscription rate. Regional electric utility companies, which had laid fiber networks as well, began offering FTTH at rates similar to Usen through subsidiaries.⁶⁶ KDDI, the largest competitor to NTT, also began aggressively expanding its FTTH services. KDDI was created out of a merger between several companies, after deregulation enabled firms to engage in multiple business activities. It was comprised of KDD, the former international carrier monopoly, DDI, one of NTT's first competitors in landline and wireless, and IDO, a wireless competitor. The intense competition in FTTH

⁶⁴ Kushida and Oh, "The Political Economies of Broadband in South Korea and Japan."

⁶⁵ For ISDN subscribers to use DSL, they needed to "downgrade" the ISDN line to copper wires.

⁶⁶ Competitors included K-Opticom, a subsidiary of Kansai Electric Power Company, TT Net, a subsidiary of Tokyo Electric Power Company, and KDDI.

markets, to which NTT was forced to enter much more quickly than it had anticipated, and at far lower prices, helping bring Japan's broadband price-performance to the highest levels worldwide.⁶⁷

Vodafone's Entry and Exit: Foreign Firms Redistributing Infrastructure

The entry of British multinational telecommunications firm, Vodafone, facilitated a shake-up of the set of stable players in the wireless market. In 2001, Vodafone bought out Japan Telecom, a landline competitor that owned one of the three nationwide cellular carriers, J-phone. This was the largest M&A deal involving a foreign firm in Japan's history until then. Vodafone proceeded to reorganize the company under a holding company, and sold off the landline businesses of Japan Telecom to US investment firm Ripplewood.⁶⁸ Ripplewood then sold Japan Telecom to Softbank, making a substantial profit of about 90 billion yen in the process.⁶⁹ Not only did this transaction demonstrate a new function for Japan's domestic market as a place where foreign firms could profit from buying and selling companies, but it redistributed infrastructure ownership to a startup firm. It is unlikely that Japan Telecom's majority shareholders, mainly railroad companies, would have agreed to sell their shares directly to Softbank, a firm which many in government and industry regarded as reckless for having waged its price wars in DSL. Softbank became the first startup firm to acquire infrastructure without constructing it. Japan's ICT market was witnessing new entrants, shaking up the longstanding set of stable set of actors.

Vodafone took full control of J-Phone, renaming it Vodafone, and transferring technology and know-how of J-Phone's cellular Internet (J-Sky) and camera-phone services to its European operations. Vodafone quickly introduced its own cellular Internet service, *VodafoneLive!*, in most of its European markets to quickly become the largest European

⁶⁷ For specifics, see Kushida and Oh, "The Political Economies of Broadband in South Korea and Japan."

⁶⁸ In 2000, Ripplewood had purchased a failed but prestigious bank, the Long Term Credit Bank.

⁶⁹ Ripplewood targets big bids for hefty investment returns. 2004. *Nikkei Weekly*, June 21.

cellular Internet service provider.⁷⁰ Vodafone also attempted to link Japan's domestic handset markets directly with international markets by offering handsets manufactured by firms such as Sanyo and Sharp in its European operations. However, the proprietary market dynamics of Japan's domestic cellular market frustrated Vodafone's strategy. As its competitors, DoCoMo and KDDI, moved quickly towards 3G services ahead of the rest of the world, Vodafone found it necessary to make investments specific to the Japanese market, for which payoffs in its global operations were small. Moreover, Japanese consumers began rejecting Vodafone's "global" model handset offerings, in which Vodafone attempted to attain scale by offering the same handset worldwide. From the perspective of Japanese consumers, Vodafone's handsets were regressing in terms of features and usability, as its competitors kept adding new features and designs according to the domestic logic of competition—offering new models frequently, with an array of services and features available only the domestic market. Eventually, in the context of Vodafone's overall global operations beginning to struggle financially, Vodafone decided to withdraw from the Japanese market.

In exiting the market, Vodafone further reshaped the composition of domestic market players. In May, 2006, Vodafone announced that it would sell its cellular operations to Softbank, through the largest leveraged buyout in Japan's history (at approximately 1.75 trillion yen, or 14.5 billion USD at 1 USD = 120 yen). In the end, Vodafone's five year venture into Japan's ICT markets led to a reorganization of domestic ICT carriers. Softbank emerged as a major ICT firm offering infrastructure-based services as well as content.

New Challenges to Policymaking Processes Enabled by the Regulatory Regime Shift

The regulatory regime shift toward ex post, legal accountability-based governance also opened opportunities for firms to challenge the existing stable patterns of government-

⁷⁰ Kontentsu kakumei no kishu tachi: Nihonhatsu no jouhou saabisu kaishi. 2003. *Nihon Keizai Shimbum*, October 6, 3. By the end of 2004, Vodafone had introduced Vodafone Live! in 21 countries, mostly Europe, with over 28 million subscribers (Vodafone website <<http://www.vodafone.com>>). At about that time, i-mode was offered in nine countries with only 3 million subscribers, through local carriers licensing the technology from DoCoMo (NTT DoCoMo website <<http://www.nttdocomo.com/presscenter/facts/index.html>>).

business interaction. In July 2003, five telecommunications carriers launched the first ever lawsuit brought by firms against the Minister of MIC. The issue was over MIC's approval of a rate hike for the interconnection fees charged by NTT. The lawsuit was led by KDDI, but included Japan Telecom, then under Vodafone management, majority British-owned firm Cable & Wireless IDC, and two Japanese startup firms, PoweredCom and Fusion Communications.⁷¹ Among their complaints were charges that MIC met repeatedly with NTT behind closed doors to discuss interconnection rates, and that a provision in the formula adopted to govern NTT's interconnection charges hindered competition, allowing rates to be raised unilaterally by NTT ex post if the levels of traffic on its networks dropped below a certain threshold. Although the Tokyo District Court ruled in 2005 in favor of the government, this lawsuit was widely regarded as primarily an attempt by carriers to remind the government that the previous industry norms of carriers obediently following the government's direction and informal decisions had come to an end.⁷²

In a second challenge, Softbank launched a multi-pronged attack on MIC attempting to obtain an allocation of wireless spectrum. Until it acquired Vodafone's cellular operations, Softbank mounted several attempts to enter the wireless services market. Softbank saw MIC's discretionary allocation of spectrum and licenses as unfair; in 2000, MIC had allocated spectrum for 3G services to carriers based on its own judgment, without public procedures or a clear set of criteria. Softbank, noting the high average revenues per user of Japanese carriers compared to most of the rest of the world, wanted to enter the cellular market and cause a price shock similar to the one it caused in DSL.

⁷¹ The lawsuit had five charges: 1) Procedural, on the basis that the ministry ignored the recommendation of its deliberation council, 2) Unfair pricing, since some portions of the cost calculations were not sensitive to whether communications actually occurred or not, and since NTT's efficiency gains were not taken into account, 3) violation of the Telecom Business Law, since LRIC as a pricing scheme was not stipulated, 4) anti-trust violations, for setting NTT East and NTT West's prices equal to each other, and 5) in violation of principles of contracts, since a priori agreed upon rates were revise ex post. "Setsuzokuryou No Gyousei Soshou, 5sha Ketsudan No Naimaku [the Administrative Lawsuit over Interconnection Fees, the inside Story of the 5 Firms' Decisions]," *Nikkei Communications*, August 8 2003.

⁷² Ibid.

Softbank's first attempt was through informal lobbying, which adhered to established practices. After discovering small slices of spectrum allocated as buffers, Softbank launched an informal lobbying strategy that lasted over six months. The slice of buffer spectrum was necessary only for KDDI's allocation, which conflicted with PHS services occupying the adjacent spectrum. However, for the sake of fairness, MIC had assigned the same width of spectrum as buffers in DoCoMo and J-Phone's (later, Vodafone's) spectrum. It was these slices of unused spectrum that Softbank lobbied to receive, and MIC went so far as to open public comments in late 2003. In May 2004, however, the Ministry, supported by the incumbent carriers, rejected Softbank's efforts.⁷³

Softbank's second attempt at obtaining spectrum was a more brazen attempt to challenge established modes of policymaking by mobilizing public pressure. MIC had announced in August 2004 that it would be reorganizing spectrum, allocating some 800 MHz band spectrum to the existing 3G carriers, DoCoMo and KDDI. Softbank's president, Son Masayoshi, a UC Berkeley graduate of Korean descent raised in Japan, contended that MIC should allocate the spectrum to new entrants, and that Japan's three nationwide cellular carriers were effectively a cartel keeping prices high. Son took the confrontational and unprecedented step of posting a full page ad in Japan's major daily newspapers twice, calling for users to voice their opinions to MIC and demand lower cellular service prices. He also held a press conference criticizing MIC's lack of transparency in spectrum allocation decisions. When MIC convened a public comment period on its website, it received over 30,000 comments – an unprecedented number by far – most of them calling for Softbank to be allowed entry. At the end of September, MIC announced a compromise; it would open a new frequency, 1.7 GHz. However, Son was not placated, insisting that 800MHz, the

⁷³ NikkeiCommunications, ed., *Fuunji Tachi Ga Makiokosu Keitai Denwa Houkai No Jokyoku: Shirarezaru Tsushin Sensou No Shinjitsu [the Opening Tune of the Destruction of the Cellular Phone Order, Brought About by Adventurers: The Truth of the Telecommunications Wars Revealed]* (Tokyo: Nikkei BP, 2005), 8-10.

bandwidth, ideal for cellular services and used by the incumbent carriers, was what he wanted.⁷⁴

Softbank then filed a lawsuit against MIC in October 2004, the second lawsuit against the ministry ever. He called for an injunction against the allocation of 800MHz spectrum, calling for new, public methods to assign spectrum. He charged that negotiations between MIC and the existing carriers occurred behind closed doors, and that incumbents took post-retirement bureaucrats.⁷⁵ From MIC's point of view, the reorganization of spectrum was a technical matter which had been debated for several years, and they did not welcome the new entrant's sudden demands at the end of the process. Furthermore, they found Son's criticism puzzling, since he had seemingly switched positions when demanding 800MHz, since his previous efforts had been to convince them to license TD-CDMA, a 3G standard approved by the ITU that had not been commercialized yet anywhere in the world. In December 2004, MIC convened a study group to take recommendations, and Son rescinded his lawsuit in hopes of convincing them. However, in late January, MIC rejected the wishes of new entrants to use the 800 MHz bandwidth.⁷⁶ In November of that year, three entrants, Softbank, eAccess, and IP Mobile, were granted licenses and use of the 1.7GHz band spectrum.⁷⁷ Softbank eventually returned this 1.7GHz spectrum allocation after it bought Vodafone's operations, and MIC did not reallocate the spectrum to any prospective entrant.

⁷⁴ Ibid.

⁷⁵ Son also approached then FCC chairman Michael Powell to ask him to put diplomatic pressure on Japan. Ibid., 27-30.

⁷⁶ Ibid., 31-45.

⁷⁷ The tactics of eAccess in obtaining spectrum were in stark contrast to that of Softbank, illustrating that MIC had not given up discretion and strategic interest in decisions of spectrum allocation. eAccess had been interested in entering the cellular market since early 2004, but the two main problems lay in receiving spectrum, and getting handsets from manufacturers, who were closely wedded to incumbent carriers. Interested in using equipment procured from the US, they reportedly used Navini Networks, a US startup firm with wireless data technology, to quietly pressure MIC through the US Treasury Department. eAccess ended up choosing to adopt W-CDMA because it was easier, but it had been regularly visiting MIC without making waves while Softbank's Son engaged in massively public attacks to obtain spectrum. eAccess' position was that if MIC licensed one carrier, they would have to license at least one more. The quiet lobbying succeeded, and eAccess was included in carriers receiving new spectrum.

The Changing Dynamics of Competition in Cellular Markets

Since the mid-2000s, several of the Japan-specific relationships in the wireless sector between carriers, manufacturers, and other actors began to shift. Drivers of these shifts included market factors as well as policy-driven factors. The saturation of cellular subscribers in the domestic market, higher R&D costs for 3G handsets, and new entrants and NTT's competitors introducing new business models for cellular Internet markets were the market drivers. Government policies, some explicitly at realigning Japan's domestic cellular dynamics of competition towards dynamics more favorable to connecting the domestic market with global markets, included the introduction of number portability and discussions about abolishing subsidies from carriers to retailers.

The Breakdown of Traditional Carrier-Manufacturer Groupings

From the mid-2000s, the traditional carrier-manufacturer groups began breaking down. They had been divided roughly between those close to DoCoMo, mainly the NTT family firms, and those closer to competing carriers KDDI and J-Phone/Vodafone (later, Softbank), mainly consumer electronics firms that were not part of the NTT family. See Table 2 for the groupings as of mid-2006. (Insert Table 2 here)

Table 2: Carriers and Handset Manufacturers as of 2006

	DoCoMo	KDDI	Vodafone (later, Softbank)
Panasonic	O	X	X
NEC	O	X	O
Fujitsu	O	X	X
Sanyo	O	O	X
Sharp	O	X	O
Sony Ericsson	O	O	X
Toshiba	X	O	O
Casio	X	O	X
Hitachi	X	O	X

Note: O indicates the manufacturer supplies that carrier, X indicates it does not (adapted from Nikkei 7.19.2006)

By the mid-2000s, an increasing number of manufacturers began offering handsets across the traditional relationships. For example, by mid-2007, Matsushita, which had only been providing handsets to DoCoMo, began supplying KDDI and Softbank as well.⁷⁸ Conversely, DoCoMo, which had leveraged its dominance of the PDC standard to consistently offer more sophisticated handsets until the late 1990s, actually adopted a popular handset in 1997 manufactured by Sharp, initially for Softbank.⁷⁹ KDDI, which had not offered Sharp handsets, also adopted this handset due to its popularity. This marked the first time all three carriers offered the same, branded handset.⁸⁰

A series of tie-ups between manufacturers began to shift the development process that had been previously atomized within each manufacturer. For example, KDDI began working with Toshiba, Sanyo, and Qualcomm to create a common operating system for handsets in its services. Until then, each manufacturer had been making its own software. The goal was to reduce R&D costs for software to less than one third, since a majority of the estimated 10 to 20 million yen for developing a new handset was in software.⁸¹ This made it easier for manufacturers who had not been supplying KDDI, such as Matsushita and NEC, to do so. Furthermore, from mid-2006, DoCoMo had moved to divide manufacturers into two groups and have them compete against each other to reduce costs. Fujitsu Renaissance and four other firms agreed to jointly develop system LSI chips. The other group, NEC and Matsushita, were moving towards a comprehensive alliance.⁸² In early 2007, DoCoMo announced that it would facilitate the joint development of cellular handset operating systems between NEC, Panasonic, Motorola, Samsung, and Vodafone, aiming to make it easier for them to develop

⁷⁸ This was partly as a result of its scaling down its international operations to focus on the domestic market “Matsushita, “au” ni keitai nonyu. [Matsushita to supply cellular handsets to ‘au’.]” Nihon Keizai Shimbun May 25, 2006.

⁷⁹ This was a popular model optimized for viewing digital broadcasts, sporting a large LCD display which tilted sideways, branded with Sharp’s commercially successful “Aquos” brand of flat screen televisions.

⁸⁰ “Yuragu tsushingaisha yuui: shouhish shuyaku, kadenkei ga hiyaku [The swaying advantage in communications firms: consumers as the main character, household electronics manufacturers leaping ahead.]” Nihon Keizai Shimbun. July 12, 2007. p.13.

⁸¹ “‘au’ keitai sofuto kyotsuka [‘au’ to facilitate common software.]” Nihon Keizai Shimbun. July 19, 2006.

⁸² Ibid.

handsets for overseas markets. In addition, NEC and Panasonic had begun collaborating with Texas Instruments from mid-2006 to jointly develop controlling circuits.⁸³

Market pressures also led to consolidation and exit from the domestic market. In early 2008, Kyocera reached a final agreement to buy out Sanyo's cellular division.⁸⁴ Also in early 2008, Sony, the only Japanese company with a significant global market presence through its joint venture with Ericsson, began scaling back its operations in the Japanese market to focus on international markets. Its procurements to DoCoMo were the first from which it withdrew.⁸⁵

Pressure on the Original Cellular Internet Services Business Models

In cellular Internet services, the dynamics of competition shifted more towards price-based competition as DoCoMo's competitors introduced new business models. Carriers had benefitted from the population of cellular Internet services by charged per packet of data transmission. However, led, by KDDI, the industry norm shifted to flat-rate Internet access for high speed, 3G services. In late 2003, KDDI began offering flat rate services, forcing DoCoMo, and then Vodafone, to follow suit. This was possible in part because KDDI used Qualcomm's CDMA2000 1x network, which, with an incremental upgrade to CDMA2000 1x EV-DO, enabled fast data transmissions.

The next move by KDDI was begin breaking apart the relationship between carriers and content providers. In an alliance with Google, in July 2006, KDDI began including a Google search bar on the portal page of its browser. DoCoMo and Softbank followed, with tie-ups to other search engines such as Yahoo, and by early 2007, it was estimated that

⁸³ "Keitai denwaki: DoCoMo eisha to OS kyotsuka, somusho shoreikin no haishi kentou, meekaa no kaigai shinshutsu sokushin [Cellular handsets: DoCoMo standardizing operating system with British firm, Somusho considering abolishing handset subsidies, to facilitate manufacturers' expansion abroad.]" *Nihon Keizai Shimbun*, February 16, 2007.

⁸⁴ Ryoza Ota, "Kyocera, Sanyo Denki No Keitaidenwa Jigyuu No Baisuhu De Saishuu Goui [Final Agreement Reached between Kyocera and Sanyo for Buyout of Sanyo's Cellular Business]" *Impress K-tai watch*, January 21 2008.

⁸⁵ "Keitai Denwa: Sony, Docomo Muke Tettai [Cellular Phones: Sony Withdrawing from Supplying Docomo]," *Nihon Keizai Shimbun*, March 10 2008.

approximately 70% of mobile internet sites were unofficial.⁸⁶ Unofficial sites tend to rely on advertising revenue rather than subscription fees from consumers.⁸⁷ Carriers were therefore shut out from taking a cut of those subscription fees.

Government Attempts to Shift the Dynamics of Competition: Number Portability and Abolishing Subsidies

MIC attempted to increase the level of competition in Japan's cellular market by implementing "number portability" in October 2006, enabling consumers to keep their telephone numbers after changing carriers. However, this policy actually accelerated Japan's cellular services markets evolution along its proprietary path. MIC's aim was to reduce the network effects, or subscriber lock-in that deterred users from changing carriers; network effects that disproportionately benefited DoCoMo, which had the largest installed base of users.⁸⁸ The response of carriers was to accelerate their development and deployment of proprietary features that would deter consumers from switching carriers. In preparation for the introduction of number portability, carriers engaged in a massive push towards electronic money, music players, thumbprint scans, ever high resolution cameras, and digital television broadcast receivers. As it turned out, the highly developed cellular Internet business ecosystem created powerful mechanisms for subscriber "lock-in" other than telephone numbers. Email addresses used for cellular internet services, with domain names specific to each carrier, were not "portable." Neither was data from various applications, as well as song downloads. Thus, after a year, the number of consumers who had taken advantage of number portability remained at 3%.⁸⁹

⁸⁶ Ibid.

⁸⁷ Ibid.

⁸⁸ The introduction of number portability in the US cellular market in 2003 had led to increased competition. In fact, a massive outflow of customers from AT&T Wireless, led to its demise and absorption by Cingular in 2004 (which, confusingly, renamed itself AT&T in 2007 after its parent, Bell South was purchased by AT&T.)

⁸⁹ "Keitai Norikae 3% Todomari [Cell Phone Carrier Shifting Remains at 3%]," *Nihon Keizai Shimbun*, October 22 2007.

In the fall of 2007, MIC made an explicit attempt to shift the dynamics of competition in domestic markets to better align them with international markets. MIC's deliberation council, the "Mobile Business Study Group," which had been considering the issue of subsidies paid by handset carriers to retail outlets, recommended that subsidies be abolished and SIM cards be "unlocked," allowing the same handset to work on different carriers. This was an explicit recommendation to align the dynamics of domestic competition closer to those of international markets, since the unusually large subsidies allowed Japanese handsets worth over 400 dollars to be virtually given away, with short lifecycles preventing manufacturers from attaining scale. Moreover, this arrangement tilted industry revenue towards carriers at the cost of manufacturers, especially after the shift towards more costly 3G handsets. In March 2007, the total profits of carriers was 1.3 trillion yen, while that of the 11 handset manufacturers combined was only approximately 0.3 trillion.⁹⁰ South Korea's experiences presented a case in support of banning subsidies. Korea's cellular market had closely resembled those of Japan in the late 1990s and very early 2000s, with large subsidies focusing domestic manufacturers on high end models for the domestic market. However, after these subsidies were prohibited, manufacturers focused on international markets and attaining scale, since the domestic market became less profitable.⁹¹

Carriers reacted preemptively upon learning of this report. In the late fall of 2007, they announced new fee structures. These new fee structures, offered in parallel to the conventional fee structures, allowed consumers to choose whether to pay higher communications fees and receive subsidized handsets, or pay slightly lower fees in exchange for lower subsidies and two year contracts. The result was an extremely complex menu of fee structures and option facing consumers, and the carriers were able to avoid being forced to

⁹⁰ "Yuragu tsushingaisha yuui: shouhish shuyaku, kadenkei ga hiyaku [The swaying advantage in communications firms: consumers as the main character, household electronics manufacturers leaping ahead]." Nihon Keizai Shimbun. July 12, 2007. p.13.

⁹¹ For details, see Kushida, "Wireless Bound and Unbound: The Politics Shaping Cellular Markets in Japan and South Korea."

shift entirely to new fee structures. This contributed to a slowdown in handset turnover, it is too early to assess effects on the international competitiveness of Japan's handset manufacturers.

Conclusion

This chapter posed the question of why Japan's ICT firms experienced a repeated pattern of *leading without followers* in global markets. Despite propelling the domestic market to ever-higher levels of sophistication, Japan's ICT firms were not prominent in global markets in the manner of its automobile, precision equipment, or high tech components firms.

I contended that distinctive features of Japan's domestic ICT market, driven by government policies and policymaking processes, created a set of domestic-oriented market dynamics. It was these market dynamics which de-coupled the domestic market from international markets, causing Japan's ICT firms to pursue particular technological trajectories vigorously, only to find that global markets had shifted direction, or were pursuing different trajectories. This chapter laid out the five distinctive features of the domestic market, explored their historical origins, and traced over time how they interacted with market dynamics to shape the technological choices and business strategies that ended up isolating the domestic market.

This chapter then outlined how external market pressures, in the form of a massive global shift towards the Internet, based on TCP/IP, and the internationalization of cellular markets, led to Japan's decline in international performance indicators of ICT. Political reactions from this relative decline led to a policy regime shift away from the government's previous stance of managing competition, towards one of promoting competition. However, the government retained a strategic orientation, focusing on fostering market dynamics that

would facilitate high speed broadband development, and adopting global 3G cellular standards. These strategic attempts to catch up, however, ironically paved the way for further leading without followers; Japan's domestic landline and wireless network and services environments developed rapidly, but without a business environment to create global "killer applications." Instead, services, applications, and business models from abroad, such as Yahoo, Google, iTunes and YouTube, were adopted rapidly.

Despite new technologies and business models introduced by new entrants and competitors, which led Japan towards price-based competition closer to international markets, the government, as well as NTT, have continued to pursue the buildout of high speed networks. MIC's technological evaluations and aggressive licensing of Next Generation wireless spectrum and business licenses, though with new multinational partners such as Intel, still risk isolating the domestic market. NTT's landline NGN services, by failing to be an open platform, face even more limited potential as a playground for experimentation and innovation. Although the government and manufacturers firms engaged in efforts to move towards global markets, and despite unprecedented participation by foreign firms in Japan's ICT sector, the inertia of domestic-oriented terms of competition were difficult to overcome in a short time.

This chapter makes the case that it is not simply a matter of more or less regulation that matters in enabling the domestic market to act as a springboard into global markets. Indeed, the government was aggressive in imposing new rules on NTT to enable various markets, ranging from DSL and FTTH to Mobile Virtual Network Operators (MVNOs). Many of the markets were quite competitive, especially in cellular services. Rather, it was the politicized decisions about how to privatize and split apart NTT, distribute R&D resources, and manage competition in the early years of wireless market markets that set the inward-

oriented dynamics of competition in motion, such as powerful carriers that pulled manufacturers into domestic market-specific terms of competition.

This study also reveals how that the relationship between services, networks, and hardware in ICT markets can trap not only equipment manufacturers, but innovative services in the domestic market. Unlike automobiles, precision equipment, semiconductors or consumer electronics, ICT hardware markets can be shaped by dynamics of competition in telecommunications services. If high-end hardware can only function when coupled with physical networks or particular services (such as 3G networks with flat fee structures) which exist only in the domestic market, then the domestic market cannot be used as a springboard into global markets. Moreover, as seen with Japan's cellular Internet services, even if open platforms give rise to vibrant business ecosystems with innovation and experimentation, if those platforms only exist in the domestic market, the entire business ecosystem innovation can become trapped.⁹²

Finally is Japan's current trajectory in ICT still pursuing a pattern of leading without followers? This analysis had shown that links into global markets have increased through the direct participation of foreign firms in the domestic market, and that the logic of competition is now more open to new actors utilizing technologies from abroad. However, the capabilities and willingness of NTT and the government to pursue particular technological trajectories, though weakened, remain. NTT's closed NGN is likely to become another domestic trap for any service innovations taking advantage of its features, and it is not obvious that wireless NGN services, despite participation by Intel, will have followers. While sitting back to fall behind seems an untenable option for NTT and MIC, this study urges caution and strategic planning before investing massive resources into a particular technological trajectory.

Therefore, although some improvements to the quality of life for Japan's domestic population

⁹² See also Kenji E. Kushida and John Zysman, "The Services Transformation and Network Policy: The New Logic of Value Creation," *Review of Policy Research* 25, no. 6 (2008 forthcoming).

through sophisticated services and proprietary market dynamics should not be dismissed out of hand, Japan does seem on a course for some time to continue leading without followers.

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