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Can the US transition to digital TV be fixed? Some lessons from two European Union cases

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Abstract

This paper compares the regulatory incentives created by government policies aimed at promoting the transition to digital TV in the US, France, and the UK. It argues that US policies have aggravated coordination problems and even created incentives for terrestrial broadcasters to retard the transition in order to receive compensations from wireless telecommunications providers for vacating frequencies before the statutory deadline. The institutional analysis framework is applied to explain the observed policy variations across countries as well as the factors retarding the transition in the American case. The conclusion suggests possible remedies to accelerate the transition to digital TV in the US based on the British experience.

Keywords: Digital TV; Institutional analysis; United States; European Union

The transition to digital TV has proven more difficult than most imagined. What started in the mid-1980s as an attempt to improve picture quality (i.e., high-definition TV, henceforth HDTV) has turned into a complex process of industrial restructuring. In the US, despite billions of dollars in investments by incumbent broadcasters, software vendors, and equipment manufacturers, the take-up of digital television has been agonizingly slow, particularly in the terrestrial sector (see Table 1). It is widely recognized that at the current pace the 2006 analog shut-off target set by the government is unlikely to be met (e.g., Bazelon, 1999). This delay has created numerous negative externalities for firms and regulators, among them the delay in the reallocation of spectrum (and of the associated auction revenues) for the launch of advanced wireless services, including third-generation (3G) wireless systems.

This paper examines the factors retarding the migration to digital TV in the US by comparing the regulatory incentives created by government policies in the US and two European cases:

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Table 1
Digital TV penetration (July 2001)

	US	France	Britain
Terrestrial	50,000	(not launched)	1,100,000
Cable	11,100,000	400,000	1,500,000
Satellite	15,700,000	2,900,000	5,300,000
Total households	26,850,000	3,300,000	7,900,000
Total penetration	26%	15%	32%

Sources: Digital TV group, NCTA, Sky report, New media markets, IDATE.

France and the UK. It argues that US policies have aggravated coordination problems and failed to create incentives for incumbent operators to aggressively roll-out digital TV equipment and services. Those of Britain and France, by contrast, have adequately created incentives for a rapid transition, though in the latter case at the expense of possible competition failures. The institutional analysis framework (Cowhey & McCubbins, 1995; Levy & Spiller, 1996; North, 1990) is applied to explain these national variations in government policies towards digital TV. The conclusion suggests possible policy remedies to accelerate the transition in the US based on the more successful British case.

1. The digital TV transition: challenges and opportunities

Digital TV offers a number of advantages over analog broadcasting: increased bandwidth use efficiency,[1] increased interoperability with telecommunications and computer industry hardware and applications, and increased flexibility for the provision of services other than traditional video broadcasting. For existing operators, it represents an opportunity to expand the range of services, lower transmission costs on a per channel basis, and tap into new revenue streams. For policymakers, however, it represents a disruptive technology that is forcing adaptation of the existing regulatory framework to the new dynamics of the sector. The erosion of bandwidth bottlenecks has renewed questions about the existing regulatory model whereby the State grants a handful of operators exclusive use of a public resource (a slice of spectrum each) in return for a series of obligations about programming (EC, 1997; Hazlett & Spitzer, 2000). The blurring of lines between broadcasting and telecommunications services has created problems of jurisdiction and regulatory asymmetry (OFTEL, 1998). The new network architecture of distributed intelligence in powerful digital set-top boxes has created competition problems novel to the sector (Cave, 1997; McCallum, 1999). In short, by changing the basic parameters of the industry (relative prices, entry and exit barriers, and industry boundaries) digital TV has left governments with antiquated regulatory instruments for the sector.

On the other hand, the migration to digital TV also offers governments a number of opportunities. First, it promises to alleviate the radio spectrum crunch created by the explosive

[1] The exact capacity gains depend on the transport platform. For a standard-definition TV channel, it varies from 4:1 in terrestrial to up to 10:1 in satellite TV. Ongoing developments in compression algorithms and interference-reduction techniques are likely to render higher capacity gains (Tadayoni & Skouby, 1999).

growth in wireless telecommunications services by freeing up "prime real estate" frequencies (i.e., frequencies below 1 GHz). Second, digital TV may offer a low-cost gateway into the Information Society, thus helping to bridge the so-called "digital divide".[2] Third, the transition has allowed governments to introduce pro-competitive reforms in the industry by lowering economic and regulatory barriers for market entry. These opportunities help explain why governments in the US and Western Europe, while preaching industry deregulation, have forced the broadcasting industry into a complex reorganization, often at a faster pace than the private sector was ready to accept.

Such reorganization has involved three basic policy problems. First, how to create agreement about technical standards to facilitate coordination among the different market actors involved in the transition. Second, how to address competition concerns associated with the digital TV user terminal (i.e., the digital set-top box). Third, how, to whom, and under what terms to allocate radio spectrum for digital terrestrial TV (henceforth DTT). While these problems have been common to policymakers on both sides of the Atlantic, this paper reveals that their responses have been remarkably different, thus creating different incentives for firms and users in each national market.

1.1. New technology, old politics: the development of standards for digital TV

Since the industry is no longer vertically integrated as was the case during the migration from black-and-white to color TV, the transition to digital TV necessitates coordination among a complex network of related sectors (i.e., content producers, broadcasters, equipment makers, software developers, etc.). Technical standards are the means through which such coordination is achieved. Generally speaking, the governance of industry standards can take three forms (Bar, Borrus, & Steinberg, 1995). Policymakers can let markets set standards, as has typically been the case in the computer industry. Alternatively, policymakers can choose to impose standards, as was common in the old telecommunications regime. Lastly, regulators can sponsor and ratify standards developed by private industry consortia (David & Shurmer, 1996). In the case of digital TV, both US and European regulators have by and large delegated the development of standards for digital TV to industry consortia. Yet, the results have been quite different.

In May 1993, the FCC decided to sponsor an alliance between the four remaining DTT system proposals, creating the so-called Grand Alliance. Hailed as an example of industry collaboration, the Grand Alliance ultimately failed to create credible commitments to a single standard. The first major dispute came over scanning formats, which pitched progressive scanning (used in PC monitors and supported by a coalition of players led by the computer industry) vs. interlaced scanning (used in analog TV and supported by broadcasters). Despite the lack of agreement, the FCC adopted the Grand Alliance standard in late 1996, allowing different implementations based on different scanning formats, aspect ratios, and resolution lines (Federal Communications Commission, 1996). The second major dispute came over the modulation scheme. Although the FCC had already ratified the Grand Alliance's choice of VSB-8 modulation, in mid-1999 a group

[2] The British government has already stated its goal that following the digital switchover every home with a TV-set and a telephone has access to the Internet (see *Joint ITC, OFTEL, and OFT Advice to Government on Digital Television*, November, 2000, available at www.itc.org.uk).

of broadcasters led by Sinclair challenged the decision, contending that the competing COFDM modulation technique (used in the European DTT system) performed better, particularly for indoor reception and mobile applications.[3] While the FCC rapidly dismissed Sinclair's petition to allow transmissions using COFDM modulation,[4] the controversy was only resolved in January 2001, when after a round of field tests broadcast industry leaders voted to support the original standard adopted in 1996 (Albiniak, 2001).

The development of standards to allow interconnection between digital TV equipment and cable systems has also suffered extensive delays. At stake are several related issues, such as the technical specifications for direct connection of TV sets to cable systems, the provision of tuning and program schedule information to support electronic programming guides (EPGs), the licensing terms for copyright protection technology, and the labeling of "cable-compatible" consumer equipment. These issues are critical for the success of the American transition plan given that over two-thirds of US households subscribe to cable. Initially, the FCC took a hands-off approach, delegating matters to industry consortia such as OpenCable.[5] Yet, after two years passed without substantial industry agreement, in April 2000 the Commission "reluctantly" began rulemaking proceedings to resolve the outstanding issues (Federal Communications Commission, 2000a). Despite this more active FCC role, which included rulings on the labeling for cable-ready TV sets and the licensing terms for copy protection technology, (Federal Communications Commission, 2000b) the cable compatibility issues seem far from resolved.

Overall, delegating standards-setting to the industry has been a more successful policy strategy in the EU case. After the debacle of the so-called MAC project (which aimed at forcing broadcasters to adopt an EU-backed HDTV standard), the European Commission (EC) opted for handing over the development of digital TV standards to the digital video broadcasting (DVB) group, a consortium established in 1993 by European equipment manufacturers, broadcasters, programmers, application developers, and representatives of national regulatory bodies. The DVB rapidly developed specifications for digital satellite, cable, and terrestrial TV backed by most market actors in the region, thus laying the foundations for a rapid roll-out of digital TV services and equipment. However, this consortium has not been immune to the problems that have characterized American private standards-setting organizations, as revealed by its failure to reach agreement on a common conditional access system (CAS) and the delays in the completion of an open-architecture set-top box platform.

1.2. New technology, new bottlenecks: the set-top box control issue

Analog broadcasting networks were engineered in such way that little intelligence was placed in the user terminal. With the cost reductions in information processing components, and the increase in bandwidth capacity and functionality provided by digital broadcasting, the user terminal has evolved from a simple demodulator/de-scrambler of video signals into a complex terminal that allows storage, browsing, and processing of a number of TV-based services. In

[3] Petition for Expedited Rulemaking, dated October 8, 1999, filed by Sinclair Broadcast Group, Inc.

[4] Letter of denial to Mr. Martin R. Leader on behalf of Sinclair Broadcast Group, Inc., by direction of the Commission, FCC 00-35, February 8, 2000. See also DTV Report on COFDM and VSB-8 performance, FCC/OET 99-2 (dated September 30, 1999).

[5] OpenCable is an initiative launched in 1997 by CableLabs, a R&D consortium formed by US cable operators.

essence, a digital set-top box is similar to a stripped-down PC. There are three components of the digital set-top box that, absent regulatory safeguards or open industry standards, present opportunities for discriminatory behavior by incumbent operators (Cave & Cowie, 1998). The first is the application program interface (API), which is the software layer between the operating system and the different applications running on the terminal. Unlike the more mature PC industry, there is no de facto industry standard for set-top box APIs. If such a standard were to develop in the future, and if its technical specifications were available to programmers and application developers on nondiscriminatory terms, the regulatory concerns associated with the API would be mitigated. There are a number of attempts to create open set-top box platforms, among them OpenCable's OpenCable applications platform (OCAP), the DVB's multimedia home platform (MHP), and the TV Linux Alliance. Yet, most existing digital TV services have deployed terminals embedded with proprietary APIs.

The second component is the CAS, which control end-users' access to the services offered by the platform operator. The CAS presents a classic example of gateway facility as programmers and other service providers wishing to access a certain customer base are dependent on interacting with the set-top box security functions, as well as the subscription management system for tracking usage and providing access keys to customers (Cave, 1997).[6] The third component is the electronic programming guide (EPG), a navigation software comparable to a Web browser that allows users to customize, navigate, and select channels and services. With the manifold increase in the number of channels and applications made possible by the transition to digital TV, the EPG is expected to become to the broadcasting industry what Web portals have become to the Internet: powerful positions from which to direct traffic and obtain advertising revenues (Mansell, 1999). Form a policy standpoint, the main concern is that dominant platform operators do not use the EPG to leverage their power onto the market for video programming and interactive TV services.[7]

Regulators have approached the concerns raised by the roll-out of advanced set-top boxes in a number of ways. The FCC has required a certain degree of interoperability for cable digital TV terminals (specifically, that the terminal supports different CAS modules), in order to facilitate the creation of a retail market for cable boxes as mandated by Congress in Section 304 of the Telecommunications Act of 1996 (Federal Communications Commission, 1998). The implementation of the statute was based on the "right to attach" principle established by the Hush-a-Phone and Carterfone cases.[8] However, the lack of technical standards for cable-compatible equipment (discussed above) has delayed the availability of digital TV terminals in the retail market. Interestingly, the European approach has been less intrusive than that of the FCC. After much controversy (see Levy, 1997), the EC declined to impose a Community-wide interoperability mandate for digital set-top boxes, effectively allowing the deployment of incompatible terminals

[6] In theory, programmers and service providers could also deploy its own set-top boxes. However, as an EC competition official explains, "the scale of investment required means that the new entrants' most realistic option is to provide a pay-TV service using the set-top boxes which already exist" (McCallum, 1999, p. 11).

[7] As the EC explains, "Issues of ensuring listing of third-party services or programming, and the quality of such listings, will be of critical importance. Exclusive arrangements tying particular EPGs to particular service bundles may become a problem requiring regulatory intervention to ensure third-party access on fair, transparent and non-discriminatory terms" (EC, 1997, p. 24).

[8] Hush-a-Phone Corporation v. US, 238 F.2d 266 (1956), and FCC 2d 420 (1968), In the Matter of Use of the Carterfone Device in Message Toll Telephone Service.

across the continent. Despite the market fragmentation and competition concerns raised by proprietary terminals, this decision was based on the assumption that mandating standardization would lead to higher terminal prices and lengthy delays in the roll-out of services (which in fact is what has happened in the US). Instead, the EC ordered (in rather vague terms) that incumbent CAS operators offer access to the set-top box security functions to non-affiliated programmers and service providers on fair, reasonable and non-discriminatory terms (European Council, 1995).

The EC's reluctance to mandate standardization reflects the anti-*dirigiste* climate among European regulators after the failure of the MAC initiative. In fact, the goal was to create strong market incentives for incumbent operators to migrate to digital.[9] However, such "light" regulatory touch has also given member-states significant autonomy in interpreting the vague wording of the open access obligations set forth by EC Directive 95/47. In the UK case, the Directive was transposed by OFTEL and the DTI into class licenses detailing obligations for incumbent CAS operators about the terms and pricing of access services provided to non-affiliated entities, as well as for the recovery of set-top box subsidies.[10] Not surprisingly, these contracts closely resemble the British telecom regime: asymmetry between dominant operators and new entrants, monitoring of interconnection agreements between CAS operators and programmers, and even possible application of price controls by OFTEL.[11] By contrast, France initially failed to transpose Directive 95/47 into national law, prompting the Commission to initiate an infringement case before the European Court of Justice (EC, 1999).[12] The Directive was eventually transposed in the Audiovisual Law of 2000, a full five years being sanctioned by the European Council.[13] Unlike in Britain, however, the vague open access requirements of the Directive were left undefined.

On the other hand, US regulators have been far more cautious about regulating EPG services. The FCC has repeatedly asserted jurisdiction over EPGs, but has so far declined to take regulatory action (see for example Federal Communications Commission, 2001a). Nonetheless, after the merger of the two main EPG providers (Gemstar and TV Guide) in 1999, the issue came under scrutiny from the Antitrust Division of the Department of Justice (DOJ). While the DOJ approved the merger without conditions, it is now investigating Gemstar-TV Guide for abuse of its control over critical patents for EPG services.[14] Similarly, in its review of the Havas-Compagnie Générale des Eaux merger (which created Vivendi), French competition authorities identified the EPG as an area of concern, but nonetheless declined to impose merger-specific

[9] As EC officials put it, "to have mandated the standard interface would have impeded the pay-TV operators' business model (generally based on subsiding decoders from service revenues)" (de Cockborne, Clements, & Watson-Brown, 1999, p. 3).

[10] Advanced Television Services Regulations 1996 (SI No. 1996/3151) and Advanced Television Services (Amendment) Regulations 1996 (SI No. 1996/3197). See also OFTEL (1997).

[11] EC officials have in fact criticized OFTEL for extending Directive 95/47 beyond its original scope, arguing that "telecom regulators used to transposing the heavy telecom regulation intended to control dominant telecoms operators have not brought a light touch to what is an entirely different situation, a new market starting up" (de Cockborne et al., 1999, p. 8).

[12] Case C-319/99.

[13] Loi no. 2000-719 du 1er août 2000 modifiant la loi no. 86-1067 du 30 septembre 1986 relative à la liberté de communication, Article 22.

[14] "A guide to navigate the TV maze gives pause", *New York Times*, June 25, 2001, p. C1.

conditions.[15] By contrast, both European and British regulators have taken steps to prevent discrimination of non-affiliated parties on EPGs. European competition authorities forced BSkyB to open its EPG to non-affiliated interactive TV providers as a condition for approving the BiB joint venture (an interactive TV service controlled by BSkyB).[16] OFTEL has interpreted EPGs as covered by the non-discriminatory rules for CAS (discussed above). In addition, the Independent Television Commission (ITC) has adopted a "code of conduct" for EPG providers that, among other things, prevents discrimination of non-affiliated broadcasters and mandates that the EPG interface gives public service channels (i.e., BBC1 and 2, ITV, Channels 4 and 5, and S4C) "due prominence" (Independent Television Commission, 1997).

1.3. The licensing of DTT

The transition to digital broadcasting will eventually allow reallocation of part of the analog broadcast spectrum for other uses. In the US, for example, the current plan calls for the reallocation of 108 MHz (channels 52–69) out of a total of 402 MHz used for analog TV. In the short term, however, the transition raises several spectrum management problems. How to minimize loss of service during the migration period? Should DTT licenses be awarded on the basis of a specific amount of spectrum (e.g., a 6 MHz channel) or on the basis of the services offered? How should licenses be assigned (e.g., auction, "beauty contest," lottery) and what obligations should licensees be subject to?

Prioritizing incumbent broadcasters to favor continuity of "free" TV has been at the core of the American DTT plan. After much controversy about possible auctions (see Goodman, 1997), in early 1996 the US Congress granted existing broadcasters a second 6 MHz channel at no cost for digital transmissions during the transition period, after which one of the channels would be returned.[17] The Balanced Budget Act of 1997 (BBA) later established a conditional analog shut-off deadline of December 31, 2006, which nonetheless may be extended if (a) $<85\%$ of households in the broadcaster's market are capable of receiving digital broadcasts, or (b) one or more of the four largest networks has an affiliate in the market that is not broadcasting a digital signal, or (c) set-top box converters are not available in the market. The BBA also directed the FCC to hold auctions for the reallocated spectrum in time for the receipts to be deposited by September 30, 2002.[18]

It is now clear that, at the current pace, the 85% threshold will not be met by 2006. As a result, potential bidders for the reallocated spectrum are uncertain over the date in which incumbents will effectively clear their channels. The first round of auctions (36 MHz in the channels 60–69 band) has already been postponed twice. The Commission has recently adopted rules to facilitate band-clearing arrangements between incumbent broadcasters and potential new licensees (Federal Communications Commission, 2001b), modeled after the scheme used in the early 1990s by PCS entrants to relocate microwave incumbents (Cramton & Kwerel, 1998). In addition, it has ruled that digital-only stations (whether new licensees or incumbents that have returned their analog

[15] Conseil de la Concurrence, Avis 98-A-14, dated October 31, 1998.

[16] See EC Notice 98/C 322/05, OJ C 322/6.

[17] Technically, the Telecommunications Act of 1996 orders the FCC to limit the "initial" eligibility for DTT licenses to existing licensees. See 47 USC. Section 336 (a).

[18] The auctions exclude 24 MHz of spectrum allocated by the BBA for public safety uses.

channels) are entitled to mandatory cable carriage, although it declined to impose "dual carriage" (i.e., mandatory carriage of both the analog and digital channels) as demanded by incumbent broadcasters (Federal Communications Commission, 2001c).

By contrast, the British approach to DTT has emphasized the development of a competitive digital TV market over the protection of incumbent market actors. According to the plan set forth in the Broadcasting Act of 1996, only the BBC received full control of a digital multiplex (the equivalent of an analog channel). As for the other analog incumbents, Channel 3 (ITV) and Channel 4 were granted joint control of a second multiplex, while Channel 5 and S4C were simply guaranteed carriage on a third multiplex. The remaining capacity (essentially three multiplexes) was opened to a new entrant selected by the ITC through a traditional "beauty contest".[19] In mid-1997 the ITC awarded the multiplexes to BDB, a joint venture between two of the largest ITV programmers (Carlton Communications and Granada) and BSkyB. However, after concerns raised by EC competition authorities, the ITC required BSkyB to withdraw from the consortium and remain solely as a programmer for the new operator.

As for the switch-off of analog services, the British government has recently stated three pre-conditions: (a) that the digital signal of public service broadcasters replicates the coverage of its analog one (99.4%); (b) that 95% of consumers have a digital receiver; and (c) that such receivers are affordable.[20] The government did not commit to a firm date, but expects these conditions to be met between 2006 and 2010. While the take-up of digital TV has been quite remarkable so far, it has been driven largely by set-top box subsidies from pay-TV operators. It is estimated that, as the penetration of pay-TV levels off, government subsidy of terminals may be needed to reach the 95% threshold.[21]

The long-awaited French plan for the launch of DTT services was finally approved as part of the Audiovisual Law of 2000. The Law directs the Conseil Supérieur de l'Audiovisuel (CSA) to prioritize existing public service broadcasters (France 2, France 3, La Cinquième, and Arte) in the allocation of DTT licenses, and grants existing private broadcasters (TF1, Canal+, and M6) the right to request two new licenses, one for simlucasting its analog feed, and the other to develop new digital services. The CSA is also charged with allocating the remaining frequencies to new entrants according to a set of criteria that includes fostering pluralism, sustaining "free" TV services, enhancing competition (the Law limits to five the number of DTT licenses that any company can hold), and promoting French and European audiovisual production. Interestingly, unlike the UK case, the Law orders the CSA to issue DTT licenses on a per channel basis (rather than to a multiplex operator). After a period of industry consultation (see Hadas-Lebel, 2000), in July 2000 the CSA presented its final spectrum assignment plan. Of a total of six available multiplexes, the first two were assigned to the public service and regional broadcasters. The remaining four multiplexes will support 22 programmers, to be selected by the CSA by March 2002 following the criteria set by the Law. It is expected that DTT will become operational in France before 2003.

[19] No cash bid was required due to concerns over the financial ability of the new operator to subsidize user terminals (see Collins, 1997).

[20] House of Commons Hansard, 12th April 2000, Column 157 W.

[21] The government has already started a pilot project to provide free terminals to low-income households. See "Move to hasten viewers' switch to digital TV," *The Financial Times*, August 2, 2001, p. 3.

2. Explaining digital TV policies: an institutionalist approach

The above review of the policies adopted in the US, France, and the UK to promote the digitization of the broadcasting industry reveals that national policymakers have responded in remarkably different ways to the challenges and opportunities presented by digital TV. British policymakers have seized the window of opportunity opened by the transition to enact aggressive pro-competitive reforms in the sector, such as licensing a new DTT operator, imposing open access-type rules on dominant CAS and EPG operators, and reshuffling regulatory authority in favor of OFTEL. By contrast, French policymakers have orchestrated a defensive transition strategy with two basic goals in mind: first, to slow down the pace of change in order to allow incumbent market actors to better adjust to the new industry dynamics; second, to safeguard the State's traditional cultural guardian role.

The US transition strategy shares with the French a deliberate effort to protect a selected group of market actors, in this case incumbent local broadcasters. With the British, it shares a concern for preventing anti-competitive behavior by dominant pay-TV operators, in this case local cable franchisees. With that of the EU, it shares an approach to standards-setting based on industry collaboration and market-driven innovation, though too often such an approach has only been offered lip service. Yet, the defining attribute of the American transition strategy has arguably been its ambivalence. The use of multiple policy instruments by different government bodies in somewhat uncoordinated fashion—partly because successive failures have led to constant reassessments of the government's plan—has only aggravated the coordination problems inherent to the transition, and, most ironically, even created incentives for certain market actors to retard it.

The second part of this paper attempts to explain the determinants and outcomes of these different transition policies. The analysis is based on the assumption that regulatory choices can be explicated by tracing back the nature of policy formation and the set of institutional endowments within which they emerge (Cowhey & McCubbins, 1995; Noll & Rosenbluth, 1995; Zysman, 1994). For simplicity, I explore three sets of factors. First, different normative models guiding regulatory policy, and in particular broadcasting policy, in each nation. Second, cross-national differences in the organization of the State. Third, path-dependency effects stemming from differences in the pre-existing analog TV regime.

The rapid implementation of a transition program characterized by pro-competitive industry restructuring reflects Britain's political-economic arrangements and its legacies in the organization of the broadcasting sector. A deep-seated normative orientation favoring ad hoc industrial policies and arm's length government led the Major administration away from attempting to micro-manage the transition or to favor particular market players (with the notable exception of the BBC).[22] On the contrary, the administration perceived the transition as an opportunity to create competition to BSkyB, whose dominance in the pay-TV sector has often been the subject of regulatory scrutiny by British competition authorities (Office of Fair Trading, 1996). The single-party bias in the UK's electoral rules and the autonomy of the British Cabinet to formulate and

[22] It is worth recalling that the British never fully supported the MAC initiative, despite the fact that British electronics manufacturer Thorn-EMI had significant stakes in the project. In fact, the Major government dealt the last blow to the initiative in 1993 by vetoing a salvage plan (Hart & Thomas, 1995).

implement policies created the conditions for the rapid execution of the government's agenda, even when it imposed losses on incumbent market actors such as BSkyB.[23] This lack of checks and balances on the British Cabinet is the reason why, in order to provide credible regulatory commitments for market actors, industry reforms have been embedded in contract law (namely, in long-term class licenses enforceable in the courts)[24]. Lastly, the pro-competitive reforms adopted in the British telecommunications sector since 1982 provided both the normative model and a readily available set of administrative tools with which to approach some of the questions raised by the transition to digital TV.

The British tradition of arm's length government contrasts with that of central economic planning and strong government involvement in the restructuring of industrial sectors in France (Hall, 1986; Zysman, 1994). The organization of the French State which took shape with the Fifth Republic reflects this tradition: centralized rulemaking authority in the Cabinet and a handful of powerful ministries (in particular the Ministry of Economy, Finance and Industry), a cohesive elite bureaucracy with tight working and personal relations with industry leaders, a rather weak parliament with limited control of its own agenda, and only subsidiary delegation of powers to industry regulators. In the broadcasting sector, government involvement has been further justified by the State's traditional role in nurturing, managing and funding French cultural industries.

Given this normative orientation favoring *dirigisme* and the extensive State apparatus available for managing industrial adjustments, French policymakers have approached the transition as a problem of market reengineering. Initially, France strongly supported the MAC initiative, which in many ways resembled the modernization of the domestic telecommunications infrastructure undertaken by the French State during the 1970s (the so-called Plan Rattrapage Téléphonique). Despite the MAC debacle, the French government continued to micro-manage the transition, particularly in the strategic terrestrial sector (recall that cable/satellite penetration in France is below 25%). The delays in the introduction of a DTT licensing plan and in the transposition of Directive 95/47 have protected national champions like Canal+ and TPS (in which the government holds a 25% stake through France Télécom and France Télévision) as well as the public service broadcasters from new market entrants. It is also noteworthy that throughout the transition relatively little authority has been delegated to the broadcasting regulator (the CSA).[25] "Controlled deregulation," a term coined by Socialist party officials to describe the slow, State-managed reforms that have characterized French communication markets for the last two decades, is what best describes France's approach to digital TV.

As Weaver and Rockman (1993) write, "the constitutional order bequeathed by the Framers of the American Constitution was not designed for efficient government. It was designed to counter ambition with ambition and to inhibit tyranny" (1993, p. 2). The question is whether a government mandate to reorganize the terrestrial broadcasting industry based on digital technology is consistent with a system of separation of powers that consistently militates against policy change and fails to give anybody clear decision-making authority. The case of digital TV

[23] The Major administration announced its digital TV program in August 1995 (DNH, 1995). Less than two years later, before the return of Labour to power in May 1997, the program had been implemented through the Broadcasting Act of 1996 and other statutes.

[24] Spiller & Vogelsang, (1996) make a similar argument about the British telecommunications reform.

[25] The CSA case is a good illustration of the general weakness of independent regulatory bodies in France (see OECD, 1999).

exemplifies some of the more adverse effects of the organization of the American State. Fragmentation of authority between Congress, the FCC, different executive agencies, and the courts (to name the most relevant players) has led to a transition fraught with poor coordination, ambiguous rules, and frequent policy paralysis. In addition, a strong anti-trust tradition and sector-specific rules limiting the integration of broadcasting operators (ranging from audience caps to limits on vertical integration between content makers and distributors) have created a more fragmented industry than in the case of Europe, thus exacerbating coordination problems. Because no single policy actor has been in control, the transition has progressed in fits and starts related more to political than market needs.

The reluctance of US regulators to step in to resolve the issues retarding the transition (e.g., lack of standards, uncertainty over "must-carry" rules, etc.) reflects these institutional arrangements. In a system where any policy proposal faces a gauntlet of veto points and is likely to be challenged at a later stage, FCC officials have opted to facilitate market-based solutions. This is also consistent with the traditional American orientation against industrial policies and State-led industrial adjustment (Johnson, 1984; Hart, 1992). The problem is that digital TV has been, almost from the start, a government program. Market mechanisms, when applied, have thus worked poorly to facilitate an orderly transition. This is, I suggest, the crux of the American digital TV dilemma: for more than a decade, policymakers have attempted to direct a complex overhaul of the broadcasting industry without the policy instruments (and in many cases, the incentives) for doing so.

3. Conclusion

Despite seemingly ubiquitous deregulation, governments continue to play a key role in allocating resources and shaping market dynamics in the broadcasting industry, particularly in the terrestrial sector. As discussed, government policies have been a key determinant of the transition to digital TV. In the US, the problems inherent to such complex migration have been aggravated by at least three regulatory choices: the reluctance to arbitrate in standards disputes despite the failure of industry-led initiatives to provide the necessary coordination; the attempt to mitigate competition concerns by mandating the unbundling of CAS functions within digital set-top boxes (which has lowered incentives for incumbents to subsidize those boxes); and a licensing plan for DTT that has created few incentives for incumbent broadcasters to accelerate the transition (particularly given the possibility of receiving monetary compensations for vacating the analog channels before the 85% equipment penetration threshold is reached).

In perspective, the inertia of US policies is quite remarkable. As noted, this is largely a function of policymaking institutions that prevent discretionary government behavior and (in the short term) favor existing industry arrangements. In addition, the American electoral system based on single-member districts makes reelection heavily dependent on campaign contributions, either monetary or, in the case of local TV stations, in-kind. The result has been a long-lived regulatory bias in favor of incumbent local broadcasters (Horwitz, 1989; Hazlett, 1998), which throughout the transition to digital TV have been, once again, sheltered from competition by fiat.

Despite these constraints, there are several lessons for US policymakers from the roll-out of digital TV in the EU, particularly from the UK case. First, regulatory jaw-boning may be of

limited use when interested parties have few incentives to reach agreement on technical standards. A more active government role will be required to resolve critical issues such as cable compatibility and copyright protection. Second, there is a need to revise a DTT licensing plan that ultimately rewards "spectrum squatting". Along these lines, there have been several proposals to eliminate the 85% threshold and impose an escalating "spectrum squatters fee" on broadcasters that do not meet their conversion deadline, with proceeds helping fund the digital conversion of public stations.[26] Third, the basic lesson from the UK case is that users' switching costs are critical. Rather than expecting millions of households to replace their video equipment with expensive digital TV sets (or still pricey converter boxes), the transition may be accelerated by eliminating barriers for incumbent operators to develop and subsidize inexpensive set-top boxes. If this means leaving terminal interoperability and HDTV for later, the price may well be worthy.

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[26] See for example the remarks by then FCC Chairman Kennard titled "What does $70 billion buy you anyway," delivered October 10, 2000 (available at www.fcc.gov).

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