DEVELOPING A NATIONAL WIRELESS REGULATORY FRAMEWORK: A LAW AND ECONOMICS APPROACH

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I. INTRODUCTION

One of the longest-running debates in telecommunications policy in the United States concerns the division of regulatory responsibilities between the federal, state, and local governments. While this debate usually begins with an analysis of which political subdivision is likely to produce the optimal regulatory policy, the debate often becomes a discussion as to which regulators are more responsive to consumer interests and more effective at their jobs.[1] Rather than merely fueling the debate, this article takes a slightly different approach by providing a focused economic analysis of the social welfare effect of state and local policymaking in the telecommunications industry.

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[1]   *See* J.R. Haring & K.B. Levitz, *The Law and Economics of Federalism in Telecommunications*, 41 FED. COMM. L.J. 261 (1989) (providing a general review and discussion of these viewpoints).

This article will demonstrate that when regulation in one jurisdiction has substantial effects on other jurisdictions[2]—known as "extra-jurisdictional effects"—consumers and society will be worse off from a welfare perspective if local regulation is permitted to occur. This outcome will be true even if state and local governments act as efficient regulators within their own jurisdiction. This article does not make any claims as to whether state regulators are "better" or "worse" than federal regulators. On the contrary, the approach contained herein demonstrates that even if states enact regulatory policies that are tailored to maximize welfare within their jurisdiction, the overall social welfare will still decrease if extra-jurisdictional effects result from that action. In essence, state regulators participate in a type of "prisoner's dilemma,"[3] in which the decision that maximizes the welfare of their own citizens can render a lower level of social welfare across multiple jurisdictions. This finding nullifies the theory that the proper regulatory framework for the industry must be driven by an assessment of which set of regulators—federal or state—is more competent.

This approach reveals that the impact of a particular regulation is not dependent upon whether policymakers are competent (indeed, the model used assumes they are). Nor is regulation dependent upon whether telecommunications firms fail to invest or exit the jurisdiction due to promulgation of a regulatory policy that reduces welfare. Rather, the true impact of a regulation is dependent upon the size and scope of its extra-jurisdictional effects. Unlike situations in which state commissions have been asked to implement policies pursuant to consistent federal guidelines, permitting unfettered state regulation of an industry characterized by extra-jurisdictional effects and spillovers may harm social welfare—even if states enact policies that maximize the welfare of their own constituents.[4]

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2   Substantial effects on other jurisdictions include, for example, an increase in the cost of providing a service or a change in the quality of a service.

3   In the prisoner's dilemma, two players may cooperate with or betray one another. Each player maximizes his own expected payoff without any concern for the other player. In the standard form of this game, defection always dominates cooperation, so the only equilibrium is for all players to defect. In other words, whatever the choices of the other player, defection is always the best choice. However, cooperation, if it could be achieved, renders a better outcome for both players.

4   See Federalism in Telecommunications Regulation: Effectiveness and Accuracy of State Implementation of TELRIC in Local Telecom Markets, PHOENIX CENTER POLICY BULLETIN NO. 9, Mar. 2004, available at http://www.phoenix-center.org/PCPB9Final.pdf; see also In re The Public Utility Commission of Texas; The Competition Policy Institute, IntelCom Group (USA), Inc. and ICG Telecom Group, Inc., AT&T Corp., MCI Telecommunications Group, Inc.; City of Abilene, Texas; Petitions for Declaratory Ruling and/or Preemption of Certain Provisions of the Texas Public Utility Regulatory Act of 1995, Memorandum Opinion and Order, 13 F.C.C.R. 3460, ¶¶ 1–7 (Sept. 26, 1997).

The choice of regulatory authority is, as always, based on a comparison of costs and benefits. State and local actions may not always reduce aggregate social welfare when extra-jurisdictional effects are present. As a result, the scope of preemption in telecommunications regulation should not turn solely upon questions of relative competence or motivations of the local regulator. Instead, issues of preemption must necessarily take into account the size and scope of the extra-jurisdictional effects and the benefits of decentralized and differentiated forms of regulation itself. In other words, preemption should be motivated by positive analysis rather than normative or ideological concerns.

These findings are particularly relevant with regard to the division of author-ity between state and federal government on the regulation of commercial mo-bile wireless services. Beginning with the passage of section 332 of the Com-munications Act,[5] it has been recognized that commercial mobile wireless ser-vice exemplifies interstate commerce and requires a federal regulatory overlay of sorts. This is because wireless service gives users the ability to make and receive calls virtually nationwide and not simply at the location where they purchased the service or to where the monthly bill is sent. In addition, wireless services are generally sold with national uniform prices, terms, and conditions. As a result, local and state regulation of those services may impact the offer-ings made in other parts of the United States.[6]

While section 332 recognizes federal jurisdiction over commercial mobile wireless services, it divides this authority between the federal and state gov-ernments. For instance, although states are prohibited from engaging in rate regulation of commercial mobile services, they are permitted to regulate "other terms and conditions."[7] This division of authority has resulted in tension be-tween state and federal regulators over the proper role of state regulation of consumer protection rules and service quality mandates. This article demon-strates that these debates should focus upon the extra-jurisdictional effects of state regulation—even regulation that is perfectly suited to and serves the in-

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[5] *See* 47 U.S.C. § 332(c)(1) (2000) (providing what mobile services the Commission may regulate).

[6] *See* Leonard J. Kennedy & Heather A. Purcell, *Wandering Along the Road to Compe-tition and Convergence—The Changing CMRS Roadmap*, 56 FED. COMM. L.J. 489, 556 (2004) (discussing the state and local regulation issues relating to wireless services).

[7] 47 U.S.C. § 332(c)(3)(A) (2000) (enunciating states' power to regulate commercial mobile services); *see also* Cellular Telecomm. Indus. Ass'n v. FCC, 168 F.3d 1332 (D.C. Cir. 1999) (holding that states have the ability to request ratemaking authority if the state proves to the FCC that "market conditions with respect to such services fail to protect sub-scribers" from unjust, unreasonable, or discriminatory rates, or that "such service is a re-placement for land line telephone exchange service for a substantial portion of the telephone land line exchange service within such State."). The FCC has granted no such request by a state since this provision was enacted.

terests of that state's consumers. Since these extra-jurisdictional effects are likely to be significant in the wireless industry, there are likely to be substantial national social welfare effects from local and state regulation. As a result, to maximize social welfare, the regulation of wireless communications services should have a national bias.

There may be reasons other than economic efficiency and social welfare that a federal policymaker may prefer to decentralize and delegate regulatory authority to a political subdivision such as a state or local government.[8] In particular, liberty and democracy interests are often cited as reasons for preventing the accumulation of power in the federal government.[9] Without discounting the importance of those interests and concerns, this article will provide a context for assessing these claims by showing the economic implications of decisions to delegate authority to state and local policymakers.

In this article, Section II will begin by discussing the debate between state and federal actors, as well as the effects of federalism. Section III will then analyze the effects of federalism including a step-by-step explanation of the analysis, payoffs, cost-benefit determinations, and lastly, a comparison to the Nash Equilibrium. Section IV will conclude the article by summarizing its findings.

II. EXTRA-JURISDICTIONAL EFFECTS AND FEDERALISM

The division of authority among the local, state, and federal government is at the heart the United States system of government, and debates over the proper scope of this division of authority date back to before the Communications Act of 1934.[10] In general, proponents of federal preemption fear that states will make poor regulatory decisions, resulting in a "race to the bottom."[11] Proponents of state power believe that state policymaking results in better-quality decisions, referred to as the "race to the top."[12] Proponents of state authority also assert that states have superior knowledge and expertise over local conditions; that states are more accountable to the people; that there is value in having states experiment with policies; and that the federal govern-

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8   *See* Barry Friedman, *Valuing Federalism*, 82 MINN. L. REV. 317, 388 (1997).
9   *See id.* at 388 & n.301.
10   *See id.*
11   *See* Phillip J. Weiser, *Federal Common Law, Cooperative Federalism, and the Enforcement of the Telecoms Act*, 76 N.Y.U. L. REV. 1692, 1709–11 (2001); *see also* Robert W. Hahn, Anne Layne-Farrar & Peter Passell, *Federalism and Regulation*, REGULATION, Winter 2003–2004, at 46, 47.
12   *See* Hahn et al., *supra* note 11.

ment is more likely to fail at regulatory oversight.[13] For example, one commentator stated that "[i]ntuition suggests that with fifty different parallel state governments, and countless substate governments as well, innovations in governing or problem solving will occur that will inure to the benefit of the entire populace in the long run."[14] The same theory was applied to the break-up of the Bell System in 1984, leading to state regulatory responses that "offered a textbook example of how decentralized authority, in this case over intrastate telecommunications policy, [which] led to the testing of a wide range of public policy alternatives."[15]

These viewpoints are contested by proponents of a standardized single, national framework. Opponents of decentralized regulatory authority argue that government actors will "race to the bottom" and enact regulations that are not in the best interests of their citizenry. Some say that without federal oversight, the political subdivision is "forced to cater" its policies to an "identified class of itinerant at-the-margin consumers, rather than by a dispassionate and responsible calculation of the public welfare."[16] Additional arguments against decentralized regulation are regulatory externalities or extra-jurisdictional effects that may adversely influence another jurisdiction. For example, a local zoning requirement that makes it difficult to construct wireless broadcast antennae in a municipality not only affects the quality of service to residents of that municipality, but it also affects the quality of wireless service to all individuals that may visit, drive through, or work in the municipality. As a result, the value and reliability of wireless services as a whole are diminished by virtue of this local government decision.

Extra-jurisdictional effects of state and local regulations are an important component of the debate over federalism as applied to telecommunications policy. Former Federal Communications Commission ("FCC") Chief Economist Michael L. Katz explained:

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[13] *See id.* at 47–49.

[14] *See* Friedman, *supra* note 8, at 397. As Justice Brandeis famously stated, "[i]t is one of the happy incidents of the federal system that a single courageous State may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country." New State Ice Co. v. Liebmann, 285 U.S. 262, 311 (1932); *see also* United States v. Lopez, 514 U.S. 549, 581 (1995) (Kennedy, J., concurring) (stating that "the theory and utility of our federalism" is that "States may perform their role as laboratories for experimentation to devise various solutions where the best solution is far from clear").

[15] Haring & Levitz, *supra* note 1, at 272–73.

[16] *See, e.g.,* William W. Bratton & Joseph A. McCahery, *The New Economics of Jurisdictional Competition: Devolutionary Federalism in a Second-Best World,* 86 GEO. L.J. 201, 217 (1997) ("Supporters [of federalism] argue that the ensuing race-to-the-top will ensure a high standard of government service. Opponents answer that competitive government actors will forsake their public mission and thereby 'race-to-the-bottom.'").

Public policy toward the provision of telecommunications services in one area may affect the provision of services in other areas. For example, charges for the completion of long-distance telephone calls clearly will affect the welfare of parties in areas where the calls originate. The effects of regulation on competition also may create jurisdictional externalities. For example, policies that make entry difficult in one geographic area may raise the overall cost of entering the industry and thus reduce the speed at which entry occurs in other areas.[17]

Particularly in the wireless communications industry, competition and consumer marketing demands frequently cause firms to create a national uniform pricing structure and comprehensive billing systems.[18] The competitive and technological conditions of such communications services do not normally permit a wireless provider to establish fifty different business models, one for each state. Thus, a regulatory environment that differs from state-to-state can erode a provider's ability to offer cost-efficient service through uniform national service and pricing plans.[19] Similarly, if one state tries to force an industry to redesign its national facilities or services solely to meet that single state's individual mandate, then it is unlikely that the industry will be able to confine those costs to that particular state. As a result, the increased costs will have an effect across the entire industry and not simply in the state that established the regulation.[20] One such example is the seemingly continuous effort in California to enact a telecommunications Bill of Rights that would regulate such matters as billing languages and timelines.[21] In sum, unless new costs imposed by one local or state authority can be contained to that local jurisdiction, those costs will typically raise prices for consumers everywhere, and possibly alter industry structure.[22] Importantly, while the incremental impact of any one local

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[17]   Michael L. Katz, *Regulation: The Next 1000 Years, in* SIX DEGREES OF COMPETITION: CORRELATING REGULATION WITH THE TELECOMMUNICATIONS MARKETPLACE 27, 44 (2000).

[18]   *See, e.g., In re* Truth-in-Billing and Billing Format, National Association of State Utility Consumer Advocates' Petition for Declaratory Ruling Regarding Truth-in-Billing, *Second Report and Order, Declaratory Ruling, and Second Further Notice of Proposed Rulemaking,* 20 F.C.C.R. 6448, ¶¶ 49–54 (Mar. 10, 2005).

[19]   *See* Thomas W. Hazlett, *Is Federal Preemption Efficient in Cellular Phone Regulation?,* 56 FED. COMM. L.J. 155, 176 (2003) ("When economic realities dictate that production of goods is efficiently done across jurisdictions (i.e., economies of scale stretch beyond state borders), decentralized regulations lack effective feedback.").

[20]   *Id.* at 180–82.

[21]   *See* Aurelio Rojas, *Phone 'Bill of Rights' Battle Resumes: Backers of Stronger Protections Face Foe in Governor's Office,* SACRAMENTO BEE, May 6, 2007, at A3 (detailing California's attempt to create a telephone Bill of Rights for consumer protection).

[22]   Prices are always a positive function of costs. *See* JEAN TIROLE, THE THEORY OF INDUSTRIAL ORGANIZATION 66–67 (1998). If regulation alters the fixed or sunk costs of firms, then the industry structure may be impacted. *See, e.g.,* T. Randolph Beard, George S. Ford, Thomas M. Koutsky & Lawrence J. Spiwak, *Network Neutrality and Industry Structure,* 20 HASTINGS COMM. & ENT. L.J. (2007) (describing that certain network neutrality mandates might alter the industry structure and ultimately harm consumers).

regulation may be seemingly insignificant, the presence of dozens of such changes can have a large cumulative impact and add significant costs for society.

Several studies contend that state and local regulation of wireless services can have extra-jurisdictional effects. Former FCC Chief Economist Thomas W. Hazlett noted that the industry "has gravitated to national networks because of economic efficiency, not due to regulatory constraints or path dependency."[23] Such regulatory constraints or path dependency do not affect consumers because the consumer can use mobile services throughout jurisdictions, regardless of political boundaries. Though the consumer is not affected, the mobile service providers are. For example, a quality of service mandate by the State of Maryland that affects wireless consumers with Maryland billing addresses will require service providers in surrounding areas such as Virginia and the District of Columbia to upgrade their networks as well.[24] Mercatus Center Senior Research Fellows Jerry Ellig and James Nicholas Taylor showed that state and local taxation of wireless services creates an annual loss of $9.6 billion, much of which could be alleviated if state and local regulatory mandates were subjected to a cost-benefit analysis.[25]

Incorporating state and local authority into federal regulatory regimes could alleviate some of these losses. This would establish a federal "floor" and permit state and local authorities to adopt additional, heightened regulations tailored to local conditions. This model of "cooperative federalism" has already been utilized in some areas of environmental and communications law and has been proposed for wireless services.[26]

III. A COST-BENEFIT ANALYSIS OF FEDERALISM WITH EXTRA-JURISDICTIONAL EFFECTS

The debate over federalism in communications policy, particularly with regard to extra-jurisdictional effects of state and local regulations, is often ex-

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[23]   Hazlett, *supra* note 19, at 193 (noting that if local or regional wireless networks were more efficient, the industry had ample opportunity to emerge in that manner because the FCC has not issued national cellular licenses but instead has auctioned hundreds of regional and local licenses).

[24]   *See* Leonard J. Kennedy & Heather A. Purcell, *Section 332 of the Communications Act of 1934: A Federal Regulatory Framework That is "Hog Tight, Horse High, and Bull Strong,"* 50 FED. COMM. L.J. 547, 550 (1997).

[25]   Jerry Ellig & James N. Taylor, *The Irony of Transparency: Unintended Consequences of Wireless Truth-in-Billing,* 19 LOY. CONSUMER L. REV. 43, 63 (2006).

[26]   Phillip J. Weiser, *Cooperative Federalism and its Challenges,* 2003 MICH. ST. L. REV. 727; *see also* Weiser, *Federal Common Law, Cooperative Federalism, and the Enforcement of the Telecom Act, supra* note 11.

pressed in very general terms. In rare instances, the argument against state intervention relies on accusations of incompetence or pro-regulatory ideology by state regulators.[27] Assuming that state regulators make correct and appropriate decisions for their constituents, the model illustrates that in so doing, those state activities can still harm social welfare overall if extra-jurisdictional effects are present and significant. In other words, it is possible for state regulators to do what is "right" in their own jurisdiction, yet, in the aggregate, harm social welfare across multiple jurisdictions. As a result, it is perhaps wise to have a formal federal backstop for state interventions in industries in which extra-jurisdictional effects are likely to be significant.

To illustrate this point, suppose that there are two independent jurisdictions faced with the decision of instituting a regulatory mandate for an industry (for example, consumer protection or service quality rules).[28] In the first jurisdiction, there are a substantial number of business users of wireless services and a young, well-educated population. In the second jurisdiction, there are substantially more retirees and less employer/employee interests. Given the needs of their respective constituencies, policymakers in the first jurisdiction may favor strong mobile broadband service quality standards, but perhaps may not be interested in rules governing bill format and disclosures because businesses and wealthy young users may not be as concerned with those issues. In contrast, policymakers in the second jurisdiction may focus upon bill clarity and format and have very little interest in ensuring mobile broadband service quality.

Note that in this example, if both jurisdictions respond perfectly to the demands of their constituents, then they will make different policy choices that maximize welfare within the jurisdiction for those constituents. However, maximizing social welfare within the jurisdiction does not necessarily maximize social welfare between the jurisdictions. Even if there is no difference in the specific welfare benefits of selecting one regulatory standard over another, there might be a loss of social welfare if the jurisdictions fail to coordinate their efforts by selecting different service qualities or billing format standards.

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[27] *See, e.g.*, R. Noll, *Managing the Transition to Competition in Telecommunications* (Stanford Univ., Working Paper, 1986) (arguing that state regulators mainly seek to keep telephone rates low for political reasons); P. TESKE, STATE TELECOMMUNICATIONS REGULATION: ASSESSING ISSUES AND OPTIONS IN THE MIDST OF CHANGING CIRCUMSTANCES 6 (1987) ("It has certainly been true at the federal level for 20 years that state regulators have been viewed as poor relations . . . . Federal agencies have viewed them with suspicion and guarded distrust."); Hahn et al., *supra* note 11, at 49 ("One might also wonder whether individual states have adequate expertise to regulate wireless communications.").

[28] Here, we are less interested in the merits of such interventions and instead assume that such mandates have positive welfare consequences within the jurisdiction.

The costs of implementation may increase when different standards are promulgated.[29]

The model in this article assumes that each jurisdiction will choose its preferred type of regulation and that they will make these decisions without cooperating with each other. The decisions regarding the types of regulation are made to maximize the sum of producer and consumer surplus in the jurisdiction.[30] Once the level of regulation is selected, up to two firms may enter each jurisdiction. The selection of two firms is for modeling purposes only and is not meant to imply that the wireless industry is a duopoly—in fact, according to the FCC, approximately ninety-eight percent of Americans have access to at least three wireless service providers.[31] After entry, firms compete as Cournot competitors, and payoffs ensue.[32] The relative costs and benefits of uniform or jurisdictional-specific regulatory standards are assessed by comparing these payoffs. Though the game has an entry stage, all payoffs are computed assuming duopoly competition in both jurisdictions.

A. Basic Setup

For the purposes of this analysis, assume there are two jurisdictions (J_1 and J_2), two firms providing service ($F1$ and $F2$), and two types of regulation (A and B).[33] The regulation might be a mix of service quality and consumer protection regulation, as per the example discussed above. Assume J_1 prefers Regulation A and J_2 prefers Regulation B in the sense that the sum of producer

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[29] For example, suppose that two jurisdictions are considering bill format regulation and are both faced with the choice as to whether to require that bills be printed in Times New Roman font or Book Antigua. The welfare effect of either typeset inside both jurisdictions is likely to be equal. However, if the jurisdictions do not coordinate and select the same type style, then service providers and overall social welfare will be harmed because implementing both standards will cost more than implementing one standard. In this situation, coordination problems have resulted in a poor regulatory outcome.

[30] Treat the regulation as increasing demand, which would increase both consumer and producer surplus.

[31] *In re* Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services, *Eleventh Report*, 21 F.C.C.R. 10,947, app. A, tbl. 6 (Sept. 26, 2006).

[32] In the Cournot model, rival firms choose the quantity they wish to offer for sale. Each firm maximizes profit on the assumption that the quantity produced by its rivals is not affected by its own output decisions. In other words, the conjectural valuation of the Cournot firm is equal to one. The Cournot equilibrium asserts that prices and quantities approach competitive levels as the number of firms supplying the market increase. TIROLE, *supra* note 22, at 209, 218–21, 226–27.

[33] The results would remain the same even if more than two jurisdictions and service providers were considered.

and consumer surplus within each jurisdiction (jurisdictional welfare) is higher under the preferred regulation. The final test of the desirability of the regulation is based on aggregate social welfare, which is the sum of the jurisdictional welfare less the firms' fixed and sunk costs of complying with the regulations across the jurisdictions.[34] Assume that it is more costly to comply with two regulatory standards than it is a uniform standard.

The analysis is based on a four-stage game. In Stage 1, the jurisdictions J_1 and J_2 choose their preferred regulatory approaches from either A or B. In Stage 2, the two firms, F_1 and F_2, decide which markets to enter given the regulatory choices in Stage 1. In Stage 3, once the firms decide to enter (or not), they engage in Cournot competition in quantities.[35] Finally, in Stage 4, payoffs accrue. The game is solved using backward induction,[36] solving for equilibrium quantities of Cournot competition first (with duopoly in both jurisdictions).

B. Solving for the Payoffs

The first step of the modeling effort requires the computation of the equilibrium values from the Cournot competition occurring at Stage 3. Recall that due to consumer demand, J_1 prefers regulatory regime A and J_2 prefers regulatory regime B. This preference can be captured by the specification for the demand curves for the service. To do so, let the demand curve for the relevant service in J_1 be

$q = 1 - p$ if Regulation A adopted (1a)
$q = \gamma - p$ if Regulation B adopted (1b)

where $0 \leq \gamma \leq 1$ and γ measures the jurisdictional preference in demand for the preferred regulation. Because γ is less than or equal to 1, Regulation A is always as good as, or preferred to, Regulation B in J_1. Assuming the two jurisdictions are symmetric,[37] the demand curve for the relevant service in J_2 would be

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[34] Assume that the fixed and sunk entry costs of entering a second market is zero. However, adding a small entry cost for the second market does not change the character of the solution, as long as this cost is not too large.

[35] TIROLE, *supra* note 22, at 216–17, 224 (noting that in Cournot competition, firms engage in quantity competition before competing over price).

[36] Backward induction is the standard procedure for solving such games. *See, e.g.,* RANGARAJAN K. SUNDARAM, A FIRST COURSE IN OPTIMIZATION THEORY 273 (1996).

[37] Because the jurisdictions are symmetric (equal-sized), the results do not depend on one market being larger or smaller than the other.

$q = 1 - p$ if Regulation B is adopted   (1c)

$q = \gamma - p$ if Regulation A is adopted   (1d)

Assuming zero marginal cost to providing service and Cournot competition among duopolists, one can compute the equilibrium values of quantities, price, profits, and consumer surplus. Table 1 summarizes these equilibrium values under cases of a "good match" of regulation (J_1 chooses A; J_2 chooses B) and a "bad match" of regulation (J_1 chooses B; J_2 chooses A).[38] In the table, consumer surplus is summed across both markets (CS^*) and the sum of profits consists of four parts (2 firms, 2 jurisdictions). Importantly, profit in these payoffs does not include the fixed and sunk costs of complying with the regulations because such costs are not jurisdiction specific.

Table 1: Equilibrium Values (Duopoly)

	Good Match (J_1, A) (J_2, B)	Bad Match (J_1, B) (J_2, A)
$q^*_i =$	1/3	$\gamma/3$
$\sum q^*_i =$	2/3	$2\gamma/3$
$p^* =$	1/3	$\gamma/3$
$\pi^*_i =$	1/9	$\gamma^2/9$
$CS^* = \sum \pi^*_i =$	2/9	$2\gamma^2/9$

Note that if there is no preference for technology ($\gamma = 1$), then there would be no good or bad match and the equilibrium values between the two would be identical. Otherwise, all equilibrium values are lower under a bad match (because $\gamma < 1$). Therefore, the constituents (firms and consumers) in each jurisdiction prefer a good match. Consequently, so does the regulator.

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[38]   Assume that there are two policy options and that a constituency prefers one over the other. A "good match" occurs when the regulatory policy chosen coincides with the preferences of the constituency.

C. Payoffs

Payoffs are evaluated to determine whether the independent decisions made by jurisdictions conflict with social welfare.[39] Importantly, all payoffs are calculated assuming a duopoly in both markets. While it is possible that other market structures could result from the choice of regulation (either monopoly or no entry in either or both jurisdictions due to higher costs), this analysis focuses on situations in which there is no change in the competitive market structure. A reduction in competition will reduce jurisdictional welfare, biasing the analysis in favor of a uniform standard.[40] Thus, this approach is conservative because the welfare consequences of the regulation do not include the sizeable effects resulting from a reduction in the amount of competition due to the exit of firms.

First, consider the payoffs in the good match scenario, in which J_1 picks Regulation A and J_2 picks Regulation B. Using the data from Table 1 and assuming that both firms enter both markets, the aggregate consumer (Expression 2) and producer (Expression 3) surpluses are as follows:

$$\sum CS^* = 2/9 + 2/9 = 4/9 \tag{2}$$

$$\sum \pi^*_i = 2/9 + 2/9 = 4/9 \tag{3}$$

The values representing consumer and producer surplus are two of the three components of aggregate social welfare (ASW), and together equal the jurisdictional welfare. The third component is the fixed and sunk costs of compliance with the regulatory standards. Call these costs $C(A,B)$ for each firm if both Regulations A and B are implemented. If only Regulation A was required in all jurisdictions, then the costs would be $C(A)$, and likewise for B. Aggregate social welfare is as follows:

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[39]   A payoff is the net benefit rendered after a particular course of action. In a heads-or-tails wager of $10, the payoff is $10.

[40]   *See, e.g.* George S. Ford, Thomas M. Koutsky & Lawrence J. Spiwak, *Competition After Unbundling: Entry, Industry Structure and Convergence*, 59 FED. COMM. L.J. 331, 332–35 (2007) (arguing that within the goal of "intermodal competition," policymakers "should favor entry" because the "value of more entrants in a concentrated market is sizeable"); George S. Ford, Thomas M. Koutsky & Lawrence J. Spiwak, *Wireless Net Neutrality: From Carterfone to Cable Boxes*, PHOENIX CENTER POLICY BULLETIN NO. 17, Apr. 2007,   at   1,   13–14,   *available*   *at*   http://www.phoenix-center.org/PolicyBulletin/PCPB17Final.pdf (arguing that commoditization of broadband networks, especially wireless networks "result[s] in increased industry consolidation" and "produce[s] higher prices, and potentially less innovation").

$$ASW = 4/9 + 4/9 - 2 \cdot C(A, B) \tag{4}$$

Second, consider a uniform standard across the jurisdictions. In this scenario, one of the two jurisdictions does not get its preferred regulatory regime. Assuming that a "national" regulator imposes Regulation A as the uniform level of regulation in both J_1 and J_2,[41] aggregate social welfare is:

$$ASW = 4/9 + 4\gamma^2/9 - 2 \cdot C(A) \tag{5}$$

If $\gamma < 1$, then the jurisdictional welfare (the sum of the first two terms) is lower in the case of a uniform standard. However, aggregate social welfare is not necessarily lower because the fixed and sunk costs of compliance are lower.[42] Further, the difference between the two expressions depends on the size of γ. There are other possible outcomes (such as a Bad Match), but these two cases are of primary interest.

D. Cost Benefit Analysis

Although the jurisdictional welfare is lower under a uniform standard, whether aggregate social welfare is lower or higher depends on the compliance costs. From Expressions (4) and (5) above, it is apparent that a uniform regulatory standard is superior to different standards in an aggregate social welfare sense if and only if:

$$[C(A, B) - C(A)] > 2/9 \, (1 - \gamma^2) \tag{6}$$

Expression (6) states that a uniform standard is superior if the additional costs of complying with two, rather than one, regulatory standard exceed the additional jurisdictional surplus provided by the better matched technology.[43] Expression (6) reflects a simple cost-benefit test—it analyzes the benefits of better matched regulatory standards to assess whether they exceed the fixed and sunk costs of complying with those standards. Note that if there is no preference across jurisdictions for a regulatory standard ($\gamma = 1$), then the condition in Expression (6) is satisfied because the right-hand side is zero $[1 - 1^2 = 0]$.

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[41]   It is also possible for the uniform method of regulation to be selected as B. If B had been selected, the results would be symmetric to this scenario. Therefore, this alternative is ignored.

[42]   By assumption $C(A) < C(A,B)$.

[43]   It is assumed that the incremental cost to a firm of adding another standard is positive, but not too large. If the incremental cost is too large, then market structure is affected by regulatory choices.

Thus, the smaller the gain in surplus (either consumer or producer) from the technology, the less likely the condition is satisfied, assuming costs remain constant. In some cases, there may be multiple regulatory standards available, none of which is preferred to another. Yet, if jurisdictions cannot coordinate their decisions, then multiple standards may be chosen, thereby leading to an inefficient outcome in which there are costs but no benefits. The payoffs are computed based on a duopoly market structure. Therefore, one must determine whether it is possible for Expression (6) to hold true while the jurisdictions remain competitive. A second entrant will enter the mismatched market (J_2) if and only if:

$$[C(A, B) - C(A)] < 1/9 \qquad\qquad (7)$$

The left-hand side of Expression (7) is the same as that of Expression (6). The right hand side of Expression (6) lies between 0 and 2/9 (given the ranges of γ). Thus, it is possible for Expression (6) and (7) to be simultaneously satisfied. Therefore, a duopoly can be viable with two regulatory regimes in a situation in which a uniform standard is preferred. Of course, this result does not imply that defection from a uniform standard will result in a more concentrated market structure. If regulations keep some firms out by creating monopolies or ending markets altogether, then jurisdictional welfare will be lower and the uniform standard is more likely to be optimal.

E. Nash Equilibrium in Choice of Regulatory Approach

Under some conditions, a uniform standard is preferred in the presence of extra-jurisdictional effects. However, local regulators should not be trusted to select the aggregate social welfare maximizing level of regulation. Table 2 illustrates the payoff matrix for the regulators: the upper left is payoff to J_1; the lower right is payoff to J_2. As before, payoffs assume a duopoly in both markets. For J_1, choosing Regulation A is a dominant strategy—meaning the payoff for choosing A (2/9) is always at least as big as the payoff for choosing B ($2\gamma^2/9$). Likewise, for J_2, choosing Regulation B is a dominant strategy. Thus, the regulators choose their own preferred regulatory regime. This presents a sort of prisoner's dilemma[44] because the dominant strategies of both jurisdictions do not necessarily render the social welfare maximizing result, even though they maximize jurisdictional welfare.

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[44]   *See supra* note 3.

Table 2: Payoff Matrix

$$J_2$$

		A	B
J_1	A	$4/9$ $4\gamma^2/9$	$4/9$ $4/9$
	B	$4\gamma^2/9$ $4\gamma^2/9$	$4\gamma^2/9$ $4/9$

In effect, a jurisdictional surplus-maximizing regulator always picks the preferred standard (a good match) because $0 \leq \gamma \leq 1$. Thus, in situations in which a uniform standard is socially optimal, the jurisdictions will not make the welfare maximizing choice of regulation from an aggregate welfare perspective. This fact is not a criticism of the regulator—the regulator here chooses to maximize the welfare of its jurisdiction. The regulator in J_1, however, cannot control the decision in J_2, and as a consequence cannot control compliance costs. This lack of control (and coordination) is the source of the problem.

This analysis demonstrates that the cooperative federalism approach[45] presents a significant risk of decreasing social welfare in an industry characterized by large extra-jurisdictional effects and spillovers, even if state and local governments regulate in the interests of their own constituencies. As a result, there should be some formal accounting, even if crude, of the likely benefits and costs of deviating from a uniform, national standard to jurisdiction-specific regulation. The administrative costs of complying with seemingly trivial interventions can be sizeable, and such costs may not be considered in a decentralized regulatory regime.

IV. CONCLUSION

The purpose of the theoretical analysis in this article is very specific and makes no attempt to create a general theory of federalism. In the end, questions about the division of authority between federal, state, and local governments are complex cost-benefit analyses that involve a multitude of factors. This article demonstrates that even in the presence of extra-jurisdictional effects, it is possible for state regulatory actions to reduce aggregate social welfare even when independent jurisdictions make decisions that maximize the social welfare of their own constituents. In essence, it is possible for regulators to "do what is right" for their own constituents, yet at the same time reduce social welfare. Such analysis does not imply that all independent state actions are

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[45]   *See supra* note 26 and accompanying text.

welfare-reducing when extra-jurisdictional effects or spillovers are present, but it does observe that when those effects or spillovers are particularly large, a national solution or standard is generally preferable. Accordingly, because extra-jurisdictional effects in wireless communications are likely to be present, and in many situations significant, the regulation of wireless communications services, to the extent there is any, should have a national bias.

Mobile wireless services are not offered in a vacuum, and they are complementary to a number of advanced communications technologies and services both within and across regulatory boundaries. Regulation of a single aspect of service in one geographic area can have effects well beyond the borders of the regulating state or municipality. Such costs should be quantified and compared to alleged benefits. However, as shown in this article, because state and local regulation in the wireless industry has the tendency to spill across borders, society is likely better off with a single, national regulatory framework for wireless services.