Chapter 10.
Conclusion

10.1 Introduction

Academic and policy debates about net neutrality and traffic management have been largely normative and theoretical, characterized by a wide diversity of predictions and opinions about the relationships between discrimination, competition, regulation, and innovation. This thesis makes a substantive, positive, empirical contribution to both scholarship and policy concerned with these issues. The inquiry was framed by two research questions:

> Question 1. Why do network operators take up discriminatory traffic management (or not)? In particular, how does competition in the market for broadband service influence network operators' traffic management decisions?
>
> Question 2: How does the institutional setting – the formal and informal constraints that comprise the regulatory environment – influence traffic management outcomes?

In answering these questions, this thesis explains the reasons that network operators do or do not take up discriminatory traffic management, why and how regulators choose to intervene or not in response, and the influence of competition on traffic management outcomes. These explanations are derived from a qualitative, comparative study consisting of elite interviews, participant observation, and documentary analysis. This chapter reviews these findings, explains how they contribute to scholarship concerning net neutrality and regulatory theory, and discusses their broader applicability. It concludes with a discussion of future directions for research and policy.

10.2 Research Findings and Contributions

10.2.1 Network Operator Decision-Making

Scholars and practitioners seeking to assess the motivations for network operators to take up discriminatory traffic management have to date primarily focused on operational drivers of a technical or business nature. The net neutrality literature points to three core types of rationales to explain the use of discriminatory traffic management – to control performance

and/or cost, to segment the broadband market, and to disadvantage competing applications – and these motivations have been much debated by policy stakeholders.

This thesis demonstrates that controlling performance and/or cost is by far the most common operational concern that causes ISPs to adopt discriminatory traffic management solutions. The impact of peer-to-peer traffic on the performance of other applications was the central operational factor that drove adoption among US cable companies, supporting the suggestion in the literature that changing network usage patterns motivate the use of discriminatory solutions (Clarke 2009; Hahn, Litan, and Singer 2007; Marsden 2010; Shelanski 2007; van Schewick 2010). The engineering specifications of DSL and fiber networks lacked the same characteristics that created the performance problems for cable, allowing the US telcos to refrain from discriminatory traffic management without undue concern for performance degradation. In the UK, the wholesale market structure created a broadband landscape in which cost and performance were intimately intertwined and in which peer-to-peer management was viewed by many ISPs as a critical tool for controlling both. As price competition intensified after the expansion of LLU, the perception of that need only intensified. Together these findings support claims in the literature that bandwidth costs can drive adoption of discriminatory traffic management (Marsden 2010; van Schewick 2010), as can achieving a particular level of network performance within ISPs' budget constraints (Crocioni 2011; Hazlett and Wright 2011). However, the costs associated with the equipment used to conduct application-specific management can be just as important and can drive some operators away from application-specific solutions.

The UK provided examples of instances in which ISPs used discriminatory traffic management to segment their customer bases or as leverage in business negotiations, as envisioned by some net neutrality scholars (Litan and Singer 2007; Marcus 2008; Renda 2008; Valcke et al. 2009; Weisman 2010; Yoo 2004; Yoo 2005), but those were exceptions to the general trend. Assessing the extent of anti-competitive motivations would require more intimate knowledge of ISPs' decision processes than could be uncovered in this research.

Operational considerations are just one component of ISPs' overall decision-making, however. Operators' broader institutional settings – consisting of pressures and constraints from regulators, consumers, and other stakeholders – are fundamental factors that are determinative of whether they choose to pursue discriminatory traffic management. In the US, the regulatory histories of individual companies and their corresponding internal regulatory oversight structures circumscribed the set of traffic management choices that they conceptualized and selected. The telcos had battled for decades to have their regulatory requirements lifted, along the way creating corporate oversight structures whose ultimate effect was to prevent them from taking the kinds of regulatory risks that discriminatory traffic management entailed. By contrast, the cable companies' relative regulatory success and lack of internal policy oversight gave some cable marketing teams an opening to steer their businesses towards DPI-based traffic management solutions that they believed would provide them with customer insights while also solving performance problems. In the end, even in the absence of industry-wide regulation, the FCC's intervention in the *Comcast* proceeding at the urging of public interest advocates and Internet companies put both cable and telco ISPs on notice that the threat of regulation was real, and those that had adopted discriminatory traffic management reversed course.

The threat of regulation – or even significant consumer backlash – was nearly non-existent in the UK. At the time when ISPs were making early decisions about traffic management, Ofcom was focused on spurring local loop unbundling and promoting competition. Its initial position was that discriminatory traffic management was a technical necessity – an argument that even the ISPs themselves did not make as vociferously and that proved to be untrue in practice. The agency was not inclined to undermine its enduring dedication to competition by admitting that competition might not provide an adequate safeguard against discriminatory conduct. At the same time, UK users and consumer groups were loathe to complain visibly about discriminatory traffic management. Consumer groups adopted Ofcom's rhetoric while user complaints remained muted, in part out of users' fear of being associated with claims of

illegal copyright infringement, as peer-to-peer users had been previously. UK ISPs seized the freedom that their institutional environment provided them to adopt discriminatory traffic management, often using blunt approaches that remained largely static over time.

Thus regulatory threat explains differences not just between the US and UK but also within the US. The threat of regulation was clear to US telecommunications providers with a long history of regulatory strife, less clear to US cable operators who made forays into discriminatory traffic management, and not present for UK providers. The evidence from these countries supports the hypothesis offered at the outset concerning the reasons for ISPs to adopt discriminatory traffic management:

> Hypothesis 1: The threat of regulation limiting how operators can manage traffic acts as an informal constraint on operator behavior. This threat is at least as important, if not more so, than the competitiveness of the market.

Where regulatory threat is present and internalized by ISPs, it fundamentally shapes traffic management, while its absence has an equally strong effect. This finding supports the arguments that scholars have made about the deterrent effect of regulatory threat (Felten 2006; Marsden 2007; Wu 2003; Wu 2004). Principles-based case-by-case enforcement, as was used in the *Comcast* proceeding, can clearly also have deterrent effects, as some scholars had envisioned (Atkinson and Weiser 2006; Bauer, Clark, and Lehr 2009; Greenstein 2007; Lessig 2006; Sluijs 2009; Weiser 2003; Weiser 2008). Regulators need not enact detailed, prescriptive rules in order to influence network operator behavior.

Overall, these findings provide an in-depth qualitative view of how technical, economic, and regulatory pressures feed into internal ISP decision-making about traffic management. They complement the quantitative work of Mueller and Asghari (2011) and Asghari, Van Eeten, and Mueller (2012) that draws links between discrimination, regulatory activity, and market characteristics using network traffic measurements and economic metrics. The qualitative insights herein also enhance the body of work that has sought to characterize ISP discrimination by analyzing network traffic and operator policies (Beverly, Bauer, and Berger

2007; Dischinger et al. 2008; Dischinger et al. 2010; Kreibich et al. 2010; Li and Losey 2009; Sidak 2006; Tariq et al. 2009; Weinsberg, Soule, and Massoulie 2011; Wu 2003; Wu 2007; Zhang, Mao, and Zhang 2009).

10.2.2 Influence of Competition on Discriminatory Traffic Management

With respect to competition, the UK case provides strong evidence that competition does not deter discrimination, and that instead it reinforces the drive to conduct discriminatory traffic management within an institutional setting that lacks countervailing pressures from regulators or consumers. Competition drove UK broadband prices down, making any cost-saving option attractive to ISPs, including peer-to-peer management. Most consumers did not understand traffic management or use it as a basis for switching even in a competitive marketplace with a handful of nondiscriminatory choices. Those consumers who were concerned about traffic management comprised a small enough group that ISPs felt safe in pursuing discriminatory strategies even if it meant losing a fraction of (high-volume) users.

The evidence from the UK contradicts the often-stated view in the net neutrality literature that competition reduces incentives to discriminate (Becker, Carlton, and Sider 2010; Cave and Crocioni 2007; Chirico, Haar, and Larouche 2007; Faulhaber and Farber 2010; Hahn, Litan, and Singer 2007; Nuechterlein 2009; Shelanski 2007). Even under competitive circumstances, ISPs can still be motivated to adopt discriminatory approaches for performance improvement, as envisioned by van Schewick (2010) and Wu (2003). The UK case demonstrates that the combination of information asymmetry (Lennett 2009; Marsden 2007; van Schewick 2007) and switching costs (Bar et al. 2000; Economides 2008; Krafft and Salies 2008; Wu 2007) can effectively dilute the market discipline that having multiple competing operators is intended to provide. Scholars have claimed that opening access networks to competition by regulatory mandate, as Ofcom did, would safeguard nondiscriminatory access to content and applications (Bar et al. 2000; Cooper 2003; Lemley and Lessig 2001). Open access can clearly have the opposite effect, driving prices down and

bandwidth demand up, thus making discriminatory behavior a profitable strategy, as modeled by Hogendorn (2007). When a fraction of consumers are directly affected by discriminatory traffic management and when consumers generally do not internalize the costs to innovation of discriminatory practices – as proponents of regulation have argued (Lemley and Lessig 2001; Lessig 2001; van Schewick 2010; van Schewick 2012) – a competitive market with pervasive discriminatory traffic management can arise as it did in the UK. These findings support the formally modeled results of Reggiani and Valletti (2012) and Guo, Cheng, and Bandyopadhyay (2012) that show how discrimination can harm niche or fringe content or applications providers and their users while benefitting large, established providers.

The UK case also shed light on a question that was not at the center of this thesis, but that motivates many academic and policy discussions concerning net neutrality: does discrimination create barriers to application innovation? The findings contained herein demonstrate that discrimination can create costs for application developers whether their products are the targets of application-specific traffic management or not. That application-specific management requires network operators to observe and classify traffic means that some application developers must expend resources to avoid having their applications misclassified or risk performance degradation. Thus discrimination can lead to negotiations between application developers and network operators, as proponents of net neutrality regulation have feared. It can also lead to "arms races" between network operators seeking to identify applications and application developers aiming to avoid having their products' traffic managed (Lehr et al. 2006; Marsden 2010; Sandvig 2007). Operators in the UK were aware of these drawbacks but remained committed to application-specific management in many cases. There was no competitive, regulatory, or consumer force that compelled them to do otherwise.

10.2.3 Regulatory Decision-Making

The findings of this thesis reveal that telecommunications regulators operate within an "institutional matrix" (North 1990) that consists of a diversity of constraints that guide their regulatory decision-making concerning traffic management. The evidence presented here supports the claim that institutionalist scholars have made that "institutions matter" in determining regulatory behavior (Baldwin, Cave, and Lodge 2012; Black 1997). Traffic management regulation cannot be understood as a market good governed by the laws of supply and demand (Stigler 1971), but as the product of a multi-faceted institutional landscape (Galperin 2004).

Some of the constraints that telecommunications regulators face are formal, derived from law, regulation, or administrative practice, while others are informal, constructed based on conventions, norms, and perceptions (North 1990). These formal and informal factors, many of which are interrelated, fall across three of the four categories of regulatory theories identified in Chapter 3: institutional design, external forces, and internal characteristics, as shown in Table 2. The fourth category, nation-specific factors, is discussed further below.

	Formal constraints	**Informal constraints**
Institutional design	Governance structure	Perception of remit Endowment of policy-setting function
External forces	Standards for appeal	Perception of litigation risk Interest group participation
Internal characteristics		Reputation

Table 2. Constraints in the regulatory environment that influence traffic management.

Matrix of Institutional Influences

Analysis of the FCC and Ofcom demonstrates that certain formal constraints create the foundational structure in which informal constraints drive regulators' decisions about whether and how to engage with respect to traffic management. The institutional design consideration of agency governance structure circumscribes the kinds of reputational pressures that

regulators face, which in turn shape their traffic management decisions. The FCC's commission structure vests substantial authority with the chairman, allowing him to dictate the agency's agenda and priorities. This gives the chairman significant freedom to pursue policy objectives according to his preferences, albeit within the confines of political considerations relating to Congress and the need to garner supporting votes from his fellow commissioners. As a result, the steps that the FCC takes are a strong reflection of each chairman's ideals and personal reputational aspirations. During the last decade, the agency had successive chairmen who, for different reasons, felt that regulatory intervention to deter discriminatory traffic management was necessary. Had there been different chairmen, these outcomes surely would not have been the same, although they still would have reflected the personal image that the chairmen intended to convey.

Ofcom's more corporate structure yielded a focus on regulatory activities that could build and sustain the agency's reputation in the long term. It was endowed from its creation with a strong vision of what it should be as an organization (regardless of who was leading it): a rigorous, evidence-based, industry-savvy regulator with a competition-centric viewpoint. As a policy issue, net neutrality presented challenges that carried reputational risk because determining a course to pursue required assessing ambiguity, conducting qualitative assessment, and possibly conceptualizing the issue outside the bounds of traditional competition analysis. As many corporations would have done (particularly in light of budgetary constraints, which the agency was facing), Ofcom proceeded with caution, declining to intervene to alter existing discriminatory practices. The combination of governance structure and reputation was in sharp contrast to that of the FCC, and produced a sharply divergent outcome.

An agency's perception of its own remit and the extent to which it is viewed as a policymaking body are also paramount in defining the space of traffic management approaches that it is willing to consider. The policy issues associated with ISP discriminatory conduct, including those related to innovation, go beyond the core competency that would be

expected of a traditional competition regulator. Likewise, addressing those issues through regulatory intervention potentially requires the regulator to set a national Internet policy direction and decide technical and economic questions about the relative balance of power between different industries. To be able to fully consider policy questions concerning discriminatory traffic management, a telecommunications regulator must both perceive its remit broadly, as encompassing industrial and social policy, and be endowed with the ability to set such policy. The FCC is such a regulator and took advantage of the breadth of its remit and policymaking authority to act. By contrast, Ofcom viewed itself primarily as a competition regulator, was imbued with a technocratic culture, and had good political reasons for resisting the public appearance that it was engaging in setting an Internet policy direction for the UK. These were central factors contributing to its reticence to act.

It is important to recognize how powerful these factors are despite being legitimately informal. Ofcom for many years focused its telecommunications work on competition regulation, but this was based on its own choices and culture, not specific restrictions in its authorizing statute. The Communications Act 2003 tasks the agency with duties in relation to both citizens and consumers and its remit is not limited to competition matters (c. 21, s. 3(1)). Similarly, the extent to which Ofcom felt that it could engage in policymaking was clearly fluid and changed based on political circumstances, not amendments that were made to existing law or regulation. Recognizing this informality is crucial because it demonstrates the extent to which the factors that contribute to regulatory outcomes related to traffic management are self-determined by regulatory agencies, not bestowed by laws or legislatures. When the legal bounds of a regulator's authority are broad, as was the case for both the FCC and Ofcom, the regulator's conception of itself comes to hold tremendous sway over the path that the agency pursues. Narrow self-conceptions leave the innovation and social questions at the crux of traffic management policy out of scope.

In addition to institutional design factors, external forces related to judicial review present another instance in which formal constraints provide a foundation on which informal ones

serve to influence traffic management outcomes. The legal structure that defines how and by whom a regulatory agency can be challenged in court sets the foundation for whether litigation risk factors into regulatory decisions about traffic management. In both the US and the UK, these legal standards were certainly taken into account; they took on much more prominence in the UK given that the Competition Appeal Tribunal has the power to decide Ofcom's rulings anew. But just as critical as the legal framework governing appeals is the regulatory agency's perception of its litigation risk and the effects that litigation may have on the agency. The FCC was so accustomed to being sued over its decisions that while it sought as best it could to avoid a lawsuit over the *Open Internet Order*, in the end the near-certainty of litigation was not enough to deter Chairman Genachowski and his fellow commissioners from enacting rules. The onset of constant litigation was much more recent and perceived much more potently at Ofcom, where it factored into the agency's decision to refrain from net neutrality intervention. Both countries' telecom industries were litigious, but the regulators' differing levels of attentiveness to this dynamic – resulting from their being at different stages in the regulatory agency life cycle – yielded differences in their willingness to risk litigation. These perceptions also tie back into reputation. Ofcom's caution was inspired by a desire to safeguard its organizational brand, while FCC chairmen could justify taking bold steps that would reflect well on them whether or not their decisions were later upheld in court.

The final informal constraint that clearly impacts traffic management regulatory decisions is the willingness of interest groups to engage in policy debate, particularly Internet companies and public interest advocates. Regulatory intervention does not arise without some constituency to request it and argue for it. That constituency was minimal in the UK, whereas in the US a powerful coalition of advocates and companies engaged in a high-profile public campaign that ultimately inspired regulatory intervention.

That traffic management regulation results from a matrix of institutional constraints provides support for regulatory theories that vest explanations for regulatory activity in a multi-faceted collection of factors, rather than seeking a single cause for regulatory outcomes (Galperin

2004). The "external signals" theory, which suggests that regulatory agencies maximize the positive feedback they receive from each branch of government, the press, and interest groups (Joskow 1974; Noll 1971; Noll 1985), is one example that takes account of the complexity of external influences on regulatory agencies. Noll's (1985) rejection of simple cause-effect models of regulation is supported by the case of traffic management regulation.

Even accounting for multiple external signals does not sufficiently explain regulatory outcomes in this case, however. Carpenter (2001; 2004; 2010) has emphasized the importance of reputation in explaining the behavior of regulators, and this thesis shows how reputation intersects with other factors to shape their decision-making. Supporting the findings of Gilad (2012), it is clear that understanding the unique reputational motivations that attach to particular regulatory roles helps to explain why regulators devote more attention to some external signals than others. The reputational differences between the FCC and Ofcom are vital to understanding their differing approaches to litigation and their willingness (or lack thereof) to engage in policy-setting activities.

In addition to external forces and reputational factors, an agency's own perception of itself, governance structure, and professional culture all contribute to defining its regulatory path. A complex regulatory arena begets a complexity of factors to explain it.

National Regulatory Styles

The analysis presented thus far does not speak to nation-specific factors, one of which was at the center of the second hypothesis set out at the beginning of the thesis:

> Hypothesis 2: National regulatory styles are a key determinant of traffic management outcomes. Consensual regulatory regimes are more likely to produce regulatory outcomes that do little to constrain network operator behavior; adversarial regulatory regimes are more likely to restrain network operators from discriminating for traffic management purposes.

This hypothesis was inspired by prior comparative studies of regulation in other industries that had emphasized the differences between American adversarialism and the more consensual styles of European regulators (Kagan 2003; Kagan and Axelrad 2000; Kelman

1981; Vogel 1986; Wilson 1989). While adversarial and consensual aspects of the US and UK telecommunications regulatory regimes influenced whether traffic management was placed on each regulator's agenda, the findings of this thesis do not provide strong evidence in support of theories concerning nation-specific regulatory styles as articulated in this literature. US telecommunications regulation certainly has adversarial characteristics: interest group participation creates cacophonous public debates and litigation is frequent. But it was not because of adversarialism that the FCC intervened to restrict discriminatory traffic management. The conflicts between interest groups over net neutrality inspired the interest of FCC chairmen, but they intervened as a means to accomplish their own policy goals and establish their own legacies rather than as a show of strength in the struggle with the industry they were tasked with overseeing. Chairman Genachowski in particular operated as a consensus-builder and expended tremendous resources in an attempt to find a regulatory compromise that the broadband industry would not challenge. All the while, litigation was viewed not as a weapon in the regulatory arsenal, but as a fact of life.

Without vocal demands from consumer groups and Internet companies, the regulatory environment in the UK did lack antagonism, but that was neither the sole cause nor a consistent explanation for Ofcom's actions. Some of the agency's initial positioning with respect to traffic management gelled with the arguments that network operators made about its utility and necessity, but Ofcom's overarching logic related more to the agency's own grounding in competition principles than to negotiation with or influence from the broadband industry. Ofcom's reticence to intervene with respect to traffic management resulted in part from the advent of adversarialism in the form of increased litigation, not from cooperation with broadband providers – a finding that runs counter to what would be expected from the national regulatory styles literature. Indeed, characterizing Ofcom's general approach to broadband regulation as consensual would be inconsistent with the agency's most significant and enduring broadband accomplishment: the functional separation of BT. This was nothing if not a direct challenge to the core of the business of the regulated industry. Thus the

depiction of the UK regulatory environment as consensual is too sweeping and largely does not explain the permissive atmosphere for discriminatory traffic management that Ofcom helped to create.

There is clearly value in questioning how a particular instance of regulatory activity on a specific topic fits into larger national narratives concerning the relationship between industries and their regulatory overseers. In the case of traffic management, the adversarialism engendered by the participation of particular interest groups (or lack thereof) forms an important backdrop for regulatory activity, even if national regulatory styles more broadly lack explanatory power when compared to the institutional design factors, external forces, and internal characteristics discussed above.

In addition to national regulatory styles, scholarly attention has focused on how the relationship between potent ideas and nation-specific institutional structures produces specific policy outcomes in some nations (Derthick and Quirk 1985; Hall 1989; Hall 1993) and on how these ideas spread from one nation to another, particularly under harmonized European legal frameworks (Gilardi 2002; Gilardi 2005; Thatcher 2002a). This thesis demonstrates the power of ideas concerning competition in telecommunications, particularly that competitive discipline protects consumers from abuses more likely to arise in concentrated markets. This idea is common to most liberalized regulatory regimes and much regulatory rhetoric, but it has had exceptional influence over telecommunications regulation in the UK (as well as in other UK industries (Thatcher 2007)). Promoting competition was one of the key bases of Ofcom's creation; the formative imprint of the competitive ideal continues to shape how the agency conceptualizes regulatory problems and solutions. Ofcom's success in spurring a competitive broadband marketplace has been much revered by its counterparts in current and previous incarnations of the Body of European Regulators for Electronic Communications (BEREC), and that reverence reinforced some of the reputational drivers that deterred the agency from engaging in net neutrality policymaking. Thus the UK case provides evidence that ideas can be influential in state-specific ways and that the cross-pollination of regulatory

activities in neighboring states can augment the power of ideas that are valued and promoted in multiple countries.

10.2.4 Broader Applicability of Findings

The findings discussed above reveal much about telecommunications market and regulatory behavior that applies beyond the context of traffic management.

When facing decisions about how to offer their products, Internet service providers are clearly concerned first and foremost with the combination of cost and performance. Broadband markets that are more competitive increase pressure on operators to cut costs while increasing capacity, which may influence a variety of the technical choices they face, such as how and where to interconnect with other networks or whether to install technology upgrades (IPv6 support or Domain Name System security extensions, for example). Operators in more concentrated markets may have more money to spend on these kinds of investments that users may not notice in the short term, but that can bolster the network's performance, accessibility, and security in the long term. That significant competition squeezes operators' margins has consequences not only for traffic management, but for any other choice an operator makes that involves a trade-off between cost and user experience, broadly defined.

Whether ISPs face significant competition or not, their behavior is deeply influenced by the regulatory environment, even in the absence of specific regulatory requirements or prohibitions. The threat of regulatory intervention can be enough to alter their behavior, as can a long history of regulatory confrontations that get reflected in internal corporate oversight structures. These informal regulatory influences can be sufficient to achieve policy goals without the need for regulators to articulate detailed rules. Those companies that have incorporated regulatory oversight into their internal decision-making processes can leverage those oversight structures as new regulatory issues arise.

These dynamics may apply to corporate choices related to data protection, content filtering, universal service, or other policy issues just as they do to traffic management. Examples of the role of regulatory threat abound in Internet policy. As a result of pressure – but not legislation or litigation – from the UK government, nearly every UK ISP has for years been conducting content filtering using the same third-party blacklist of sites said to be hosting illegal content (Clayton 2006). Meanwhile the industry of companies that find novel ways to exploit data about consumer web usage has flourished in the US over the last decade while the likelihood of consumer privacy regulation or legislation being adopted has been slight.

That competition can incentivize discrimination rather than discourage it may have important implications for other non-price-based values that policymakers expect competition to support. Competition in telecommunications policy is often viewed as a way to deliver better performance, improved customer service, or novel product features to consumers. In light of the evidence concerning nondiscrimination, it is worth questioning whether competition has delivered those benefits in practice and examining the relationship between the price declines that competition inspires and its other effects on how telecommunications products are offered.

This thesis also points to key barriers that prevent competition from functioning optimally: switching costs, lack of consumer understanding, and the inability of consumers and carriers to internalize spillovers associated with broadband Internet services. These limitations are not specific to traffic management and may influence the extent to which competition can have disciplining effects on network operators with respect to their product offerings, prices, or terms of service more broadly. Technological advances such as those discussed above related to IPv6 and DNS security provide examples of benefits that are unlikely to be fully internalized through the price system; relying on competition between providers to spur their adoption is unlikely to be sufficient.

Finally, the findings concerning the regulatory agencies are likewise generalizable to telecommunications more broadly, as it is the same agencies that make decisions about traffic management, spectrum allocation, media ownership, and many other issues. The FCC's chairman-centered structure, cavalier approach to litigation risk, and broad policy framework shape its actions on these issues just as Ofcom's more corporate, conservative, and competition-focused approach does. Furthermore, as Lunt and Livingstone (2012) have demonstrated, when communications regulation is conceived narrowly, framed primarily in economic terms, and limited to conclusions that can be drawn from quantitative analysis, its social and democratic implications can go unaddressed regardless of whether it pertains to the Internet, television, radio, or other communications mediums. The converse is just as true.

10.3 Future Directions

Net neutrality has been a contentious, high-profile telecommunications policy issue over the last decade and debates about discrimination on broadband networks show no signs of subsiding. In the US, the pending legal challenge to the FCC's *Open Internet Order* will leave both industry and policymakers to chart their courses through continuing legal uncertainty in the coming years. The UK government is developing plans for legislative reform related to communications, starting from a position that emphasizes the need for network operators to be transparent about traffic management but that is otherwise accepting of application-specific management (DCMS 2013). The European Commission is also crafting new telecommunications legislation that will address net neutrality and traffic management (COM(2013) 627 final 2013/0309 (COD)). National laws and co- or self-regulatory programs that limit discrimination continue to be debated and adopted in other countries, and neutrality issues continue to arise in global Internet governance discussions.

All of this ongoing policy activity means that net neutrality will continue to be ripe for scholarly attention. The key contribution that future academic scholarship can make in this area is to provide empirical evidence and analysis of the effects of different net neutrality

policy approaches on network investment, application innovation, economic growth, and digital rights. The academic literature is replete with normative and theoretical arguments about these topics, but little concrete evidence about the effects of the particular choices that policymakers and network operators have made. This thesis elucidates the relationships between regulatory policy, discriminatory traffic management, and competition, but only minimally explores the broader effects of any particular policy or technical choice on innovation, consumers, or whole economies. Nor does it explore other forms of conduct that are just as central to net neutrality debates as fixed-line traffic management: paid prioritization, discrimination on mobile networks, or preferential interconnection agreements, for example. Because net neutrality policy choices can have a significant impact on the Internet's economic, social, and democratic benefits, the decisions that shape it should reflect rigorous analysis of available evidence about the consequences of existing policy choices.

Understanding the implications of institutional differences between different countries' regulatory settings will also require further scholarly attention. The FCC provides an example of a regulatory agency with a broad mandate that stretches beyond promoting competition and incorporates social and industrial policy objectives. The European telecommunications regulatory framework, in contrast, relies heavily on competition between network operators as the means for developing the optimal communications infrastructure to serve the public and the European economy. Ofcom has taken its competition responsibilities related to telecommunications to heart despite being tasked with broader duties. Does a national or regional telecommunications regulatory regime that relies primarily on competition between operators foster communications networks that meet policy goals related to network availability, performance, choice, and technological advancement? Or must regulation be conceptualized within a broader framework to ensure that those goals are met? This thesis provides answers to these questions with respect to the goal of nondiscrimination, but the other objectives of telecommunications regulation are equally important and deserve further study. As communications networks are becoming ever more intertwined with everyday life

in advanced economies, it is critical to understand what sort of regulatory regime promotes networks that reflect the interests of their users.

The engineering choices that Internet service providers make are central in determining how the Internet is experienced by its users, which applications succeed or fail, and the overall potential for the Internet to support economic activity and human rights. These choices are driven by individual business needs, available technology, and ISPs' perceptions of the regulatory environment. Understanding why these decisions get made in particular ways and the influence of the regulatory context on the paths chosen is therefore vital to understanding how the future of the Internet might be affected by technological change, business developments, and regulatory activity. Policy stakeholders that move beyond normative debates and leverage the kinds of empirical insights contained in this thesis can more effectively shape that future to the benefit of the Internet and its users.