

Queues in Law

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INTRODUCTION

The Pacific Telegraph Act of 1860, which was intended to facilitate communication between the Atlantic and Pacific states, provided that received messages “shall be impartially transmitted in the order of their reception, excepting that the dispatches of the government shall have priority.”¹ In doing so, the Act introduced a “first come, first served” (“FCFS”) rule, also known in queuing theory as the “first in, first out” principle (“FIFO”), with a limited exception. FIFO is an allocation method in which resources are apportioned/distributed to interested parties in their order of entry.² The compensation fund, established by BP in partial fulfillment of its obligations under the Oil Pollution Act following the Deepwater Horizon oil spill,³ provides a contemporary manifestation of the same FCFS/FIFO principle, with a different exception. Kenneth Feinberg, the fund’s administrator, stated, “claims are processed in a single queue that operates on the principle of ‘first in, first out’ and that claimants confronting financial need are the only ones who can skip to the front of the line.”⁴ Likewise, the Uniform Commercial Code (“UCC”) provides that conflicting security interests in the same collateral rank according to priority in time of filing or perfection, namely on a FIFO basis, but recognizes a consent-based exception.⁵ Finally, in *Pierson v. Post*,⁶ one of the foundational readings in every property law class,⁷ the court applied a variation of the

1. Pacific Telegraph Act of 1860, ch. 137, § 3, 12 Stat. 41, 42.

2. See, e.g., Neil MacCormick, *Norms, Institutions, and Institutional Facts*, 17 LAW & PHIL. 301, 305 (1998) (explaining the meaning of FIFO).

3. See Ronen Perry, *The Deepwater Horizon Oil Spill and the Limits of Civil Liability*, 86 WASH. L. REV. 1, 3-4, 54 (2011) (discussing the *Deepwater Horizon* incident and its legal implications).

4. Sasha Chavkin, *Gulf Spill Victims’ ‘Escalated’ Claims Still Languishing*, PROPUBLICA (Oct. 25, 2010, 9:38 AM), <http://www.propublica.org/blog/item/gulf-spill-victims-escalated-claims-still-languishing>.

5. U.C.C. §§ 9-322(a)(1), 9-339 (2011); see also 4 JAMES J. WHITE & ROBERT S. SUMMERS, UNIFORM COMMERCIAL CODE § 33-3 (6th ed. 2010) (“First in time, first in right—that general rule runs like a golden thread through virtually all priority schemes . . .”).

6. *Pierson v. Post*, 3 Cai. 175 (N.Y. 1805).

7. See Alfred L. Brophy, *Introduction: A Famous Fox, a Surfacing Whale, and the Forgotten Slave*, 27 LAW & HIST. REV. 145, 146 (2009) (“[E]ach year tens of thousands of first year law students read *Pierson v. Post* . . .”).

FIFO principle—the rule that property in wild animals is acquired by first occupancy—to decide between competing claims to property.

As noted, FIFO allocates resources to interested parties in their order of entry.⁸ Although the introductory illustrations imply that FIFO is an omnipresent and overarching principle in the law, the legal literature has never recognized or analyzed it as such.⁹ This Article aims to fill this surprising theoretical gap. The Article makes three contributions to the literature. First, it constructs an innovative and comprehensive theoretical framework to assess FIFO's role in resource allocation, integrating several dimensions of fairness and efficiency. Second, this Article highlights the prevalence of FIFO in law by analyzing and critically evaluating its role in a wide array of legal contexts. Third, this Article substantiates a jurisprudentially provocative thesis: While FIFO can be similarly applied in numerous contexts, it has no consistent set of justifications for all applications. Its rationalization in law must be highly varied and context-specific. We shall now elaborate on each contribution.

The first and main purpose of this Article is to provide a theoretical framework for evaluating FIFO-based rules and practices, their exceptions, and their real-life operations. FIFO plays a significant role in allocating resources in everyday life.¹⁰ Thus, it has been studied in many disciplines, including economics, psychology, sociology, political science, engineering, computer science, telecommunications, and operations research.¹¹ It has occupied the minds of some of the most prominent scholars of our era, such as mathematician J.F.C. Kingman,¹² operations researcher Richard Larson,¹³ social psychologist Stanley Milgram,¹⁴ political philosopher Michael Sandel,¹⁵ and economist Donald Wittman,¹⁶ to name but a few. However, non-legal studies have usually addressed very specific applications of FIFO from distinct methodological perspectives, without attempting to provide a

8. See, e.g., MacCormick, *supra* note 2, at 305 (explaining the meaning of FIFO).

9. There is seemingly one exception. Dean Lueck briefly enumerates FIFO's manifestations in various legal contexts. Dean Lueck, *The Rule of First Possession and the Design of the Law*, 38 J.L. & ECON. 393, 394 (1995). However, his model focuses on first-possession—a very limited application of FIFO—and analyzes it only from an economic perspective.

10. See DONALD GROSS ET AL., *FUNDAMENTALS OF QUEUEING THEORY* 4 (4th ed. 2008) (observing FIFO's prevalence in everyday life); Donald Wittman, *Efficient Rules in Highway Safety and Sports Activity*, 72 AM. ECON. REV. 78, 78 (1982) (same).

11. See GROSS ET AL., *supra* note 10, at 2–3 (reviewing applications of queuing theory).

12. J.F.C. Kingman, *The Effect of Queue Discipline on Waiting Time Variance*, 58 MATHEMATICAL PROC. CAMBRIDGE PHIL. SOC'Y 163 (1962).

13. Richard C. Larson, *Perspectives on Queues: Social Justice and the Psychology of Queueing*, 35 OPERATIONS RES. 895 (1987).

14. Stanley Milgram et al., *Response to Intrusion into Waiting Lines*, 51 J. PERSONALITY & SOC. PSYCHOL. 683 (1986).

15. MICHAEL J. SANDEL, *WHAT MONEY CAN'T BUY: THE MORAL LIMITS OF MARKETS* 17–41 (2012) (discussing the ability to jump queues).

16. Wittman, *supra* note 10.

comprehensive and integrative theory of its justifications and limitations. And while non-legal literature on FIFO is overly concrete, the legal literature on the subject is scant, partly because legal theorists have failed to recognize FIFO's high prevalence in substantive law and legal practice beyond the limited area of first possession as the root of title.¹⁷ Even this limited application has not been thoroughly examined, taking into account plausible arguments from different theoretical angles. In providing a theoretical framework, this Article aspires to fill this intriguing void in both legal and non-legal scholarship.

In order to construct and apply the theoretical framework, this Article uses the fundamental distinction in legal theory between fairness and efficiency as a cornerstone.¹⁸ For purposes of the Article, we define "efficiency" as maximizing aggregate welfare and "fairness" as a morally defensible treatment of or distribution among those who take part in the process. The fairness–efficiency distinction provides a roadmap for this Article. Part I endeavors to unveil the fairness of FIFO as a matter of both common perceptions and normative commitments, with an emphasis on egalitarianism and desert. Part II addresses the advantages and possible drawbacks of adherence to FIFO in terms of efficiency. It first compares the outcomes of allocations made through FIFO with those achieved by competing methods. In addition, it considers administrative costs, participants' and allocators' incentives, and the allocation method's impact on third parties and the public at large. These two Parts demonstrate where fairness and efficiency might be at odds and how different concerns within a single category—either fairness or efficiency—might be inconsistent with each other. Admittedly, tension or incongruence between various concerns may call for value judgments.¹⁹ Part III adds another layer of complexity to the analysis. It assumes that FIFO is justifiably applied in a particular context. The question then arises as to whether individuals or groups should

17. Existing literature focuses mainly on an area-specific and extreme case of FIFO: the rules of first in time, first in right in property law. See, e.g., Lawrence Berger, *An Analysis of the Doctrine That "First in Time Is First in Right,"* 64 NEB. L. REV. 349 (1985) (focusing mainly on property law, discussing bilateral relationships rather than allocations, dedicating more space to the exceptions than to the principle itself); Richard A. Epstein, *Possession as the Root of Title*, 13 GA. L. REV. 1221 (1979) (discussing possible justifications for the first-possession rule in property law); Lueck, *supra* note 9 (recognizing other manifestations of FIFO but focusing on first-possession from an economic perspective); Symposium, *Time, Property Rights, and the Common Law*, 64 WASH. U. L.Q. 661–865 (1986). This literature covers a very limited area on the descriptive level and inevitably lacks a general theory of FIFO in law.

18. See, e.g., George P. Fletcher, *Fairness and Utility in Tort Theory*, 85 HARV. L. REV. 537 *passim* (1972); Louis Kaplow & Steven Shavell, *Fairness Versus Welfare*, 114 HARV. L. REV. 961 *passim* (2001). This distinction is mirrored in non-legal literature on queues. See, e.g., Benjamin Avi-Itzhak & Hanoach Levy, *On Measuring Fairness in Queues*, 36 ADVANCED APPLIED PROBABILITY 919, 919–21 (2004).

19. See, e.g., MacCormick, *supra* note 2, at 319 (discussing cases in which "considerations of fairness take second place to considerations of efficiency").

be allowed to evade FIFO in light of these underlying justifications and other normative constraints. We discuss wealth-blind exceptions, namely permissible violations of FIFO that do not favor the wealthy, and circumvention tactics, specifically the use of wealth to obtain an allocated resource without entering or waiting on the queue.

Embedded within its exploration of FIFO along the fairness–efficiency distinction’s contours, this Article pursues two other goals. Its second purpose is to demonstrate and evaluate FIFO’s role in law. Although case law and legal literature sporadically mention or apply concrete legal manifestations of FIFO, they do not recognize its general prevalence and significance in law, nor seriously assess its proper role.²⁰ FIFO is commonly considered an extra-legal norm.²¹ As such, the law normally does not enforce it; rather, FIFO’s implementation is based on trust and cooperation among participants, and on their responses in cases of violation.²² Put differently, people often observe FIFO without supervision, direction, or enforcement, apart from participants’ internal restraint (voluntary compliance)²³ and the external responses of other participants.²⁴ If these mechanisms fail, then “sheer competition [may take] over . . . causing the line to degenerate into a mere crowd fighting for advantage.”²⁵

In some cases, the allocator takes some measures to enforce queue norms.²⁶ For example, an administrator may be appointed to interpret and apply the norms or even to create new procedural rules. In such cases,

20. See *supra* note 17 and accompanying text.

21. See MacCormick, *supra* note 2, at 305. Apparently, FIFO is also followed in the animal kingdom. See ROBERT SUGDEN, *THE ECONOMICS OF RIGHTS, CO-OPERATION AND WELFARE* 102 (1986) (discussing male lions contesting for females).

22. F. Neil Brady, *Lining Up for Star-Wars Tickets: Some Ruminations on Ethics and Economics Based on an Internet Study of Behavior in Queues*, 38 J. BUS. ETHICS 157, 162 (2002) (“Probably the single most important feature of lines is their reliance on trust and cooperation.”); MacCormick, *supra* note 2, at 304–05 (explaining that the practice of FIFO relies on “some minimum threshold of compliance” and that queues are “unregulated by any authority”); Leon Mann, *Queue Culture: The Waiting Line as a Social System*, 75 AM. J. SOC. 340, 347–49 (1969) (discussing measures taken by queuers to protect their queue “rights”); Milgram et al., *supra* note 14, at 683–85 (explaining that people do not violate the norms either because they internalize them or because others in the line enforce them through physical and verbal means and non-verbal gestures).

23. Studies report that inhibitory anxiety ordinarily prevents people from violating social norms. One study showed that even those asked to intrude on queues for an experiment felt nervous. Milgram et al., *supra* note 14, at 685–86.

24. See, e.g., MacCormick, *supra* note 2, at 309–10, 322–23 (discussing informal queues).

25. Brady, *supra* note 22, at 164; see Mann, *supra* note 22, at 349 (explaining that non-compliance that is not followed by effective enforcement measures signals “that the queue organization is about to disintegrate,” which may “encourage an epidemic of queue jumping”); Milgram et al., *supra* note 14, at 683 (“The queue . . . constitutes a classic illustration of how individuals create social order . . . in a situation that could otherwise degenerate into chaos.”).

26. See, e.g., MacCormick, *supra* note 2, at 307 n.12, 311–14 (describing systems in which officials maintain order); Milgram et al., *supra* note 14, at 683 (same).

jumping a queue is more difficult, because the administrator can deny service to violators.²⁷ Still, there is no legal intervention, apart from the ordinary protection of allocators' property rights and the enforcement of contracts between allocators and recipients.

However, FIFO plays a significant role in all areas of law. To demonstrate the wide range of possible applications, we use two original taxonomies—one concerning FIFO's endorsement mode and the other concerning FIFO's operation mode. To begin with, FIFO may be endorsed in various ways in the legal world. Sometimes, as illustrated by the Pacific Telegraph Act, the UCC, and *Pierson v. Post*, FIFO is manifested in concrete legal rules. In other cases, such as the satisfaction of claims by the BP compensation fund, FIFO underlies a legal practice. At times, legal rules defend the integrity of FIFO-based allocation systems, such as anti-scalping laws and inalienability rules. Finally, the protection of public peace and order during a FIFO allocation is a weak form of endorsement, as illustrated by police presence at gas stations in the aftermath of Hurricane Sandy.²⁸ Although the law does not explicitly favor FIFO, it legitimizes and approves it.

With respect to operation modes, we note that using FIFO may affect allocation to participants in three ways (see Figure 1). First, FIFO determines the sequence of the allocation, which may be important per se. The Pacific Telegraph Act provides an excellent example: each participant technically received equal service, and his or her place in the queue determined only the time of service. We refer to this outcome as “a simple ordering effect.” Second, FIFO may determine the quality or quantity of the resource allocated to each participant. For example, imagine a parking lot adjacent to an office building, in which the number of employees and expected visitors does not exceed the number of parking spaces. The earlier one arrives, the nearer to the building entrance one can park.²⁹ We label this “a quality-determining effect.” Third, when used to allocate limited resources, FIFO may regulate entitlements, determining who is entitled to

27. See MacCormick, *supra* note 2, at 324 (explaining that where administrators enforce queue norms, they can refuse service to queue jumpers).

28. Elizabeth A. Harris, *A Slow Return to Normal Skips the Gas Station*, N.Y. TIMES (Nov. 3, 2012), www.nytimes.com/2012/11/04/nyregion/gas-rationing-is-new-burden-after-hurricane-sandy.html (“[P]olice officers had to be sent to service stations to keep order.”); Greg Wilson, *Man Pulls Gun in Gas Line, State Troopers Deployed at Stations as Tensions Boil in Sandy's Wake*, FOXNEWS.COM (Nov. 2, 2012), <http://www.foxnews.com/us/2012/11/02/tensions-boil-over-at-gas-stations-as-pumps-rundry-in-wake-sandy/> (“Troopers . . . monitor the operational gas stations . . .” (internal quotation marks omitted)).

29. An analogous example is a traditional queue for event tickets, where each person can select a seat from those remaining at the theater upon his or her arrival at the counter.

the resource.³⁰ We refer to this outcome as “an entitlement-determining effect.” First in time, first in right (“FTFR”) rules in property law constitute a special and unique case of this third form of FIFO-based allocation, whereby the winner takes all.³¹ In a kidney transplant queue, FIFO has a combined quality-and-entitlement-determining effect: a person who is late to enter the queue may either receive a kidney later, perhaps after his or her condition deteriorates, or never if he or she dies waiting. In essence, the three effects represent points on a continuum. In all three cases, the benefit a participant acquires correlates with the time of his or her entry into the system. In the first case (simple ordering effect), latecomers obtain an ostensibly equal share, but at a later time; in the second (quality-determining effect), they may obtain a lesser share; and in the third (entitlement-determining effect), they may lose their share in the allocated resource.

Figure 1. Operation Modes

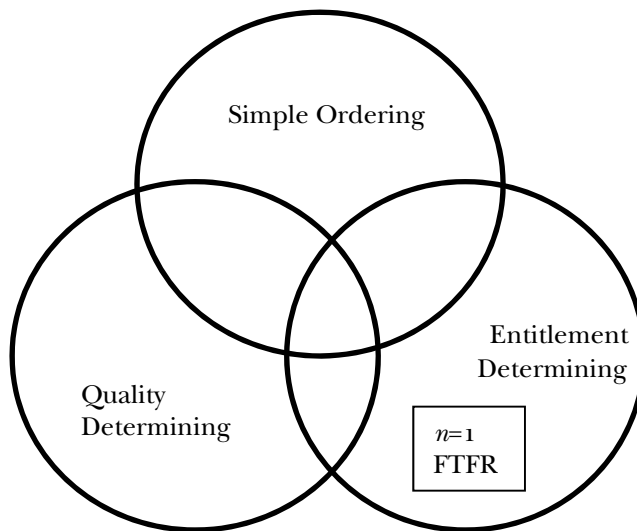


Figure 1 illustrates the relation between FIFO’s three possible operation modes. First in time, first in right (“FTFR”) rules are a special case of an entitlement-determining effect with only a single asset ($n=1$).

30. See, e.g., Avi-Itzhak & Levy, *supra* note 18, at 921 (discussing cases where service is not guaranteed, and those pushed back in the queue may not be served at all by the relevant allocator).

31. Some contend that while the first-possession rule plays an important role in the books, in practice title was often acquired through conquest, and the notion of first possession was introduced only later. Symposium, *supra* note 17, at 806 (expressing Margaret Radin’s view).

The omnipresence of FIFO becomes evident through the numerous legal illustrations in this Article. Of course, to the extent that adherence to FIFO is integrated into law in one way or another, it requires more than mere intuitive appeal. In many cases, a compelling reason exists, but must be fleshed out. In others, FIFO is applied by analogy or inertia without a valid justification. Distinguishing between the two categories is a thorny task that this Article makes possible.

The Article's third purpose derives from these other two pioneering contributions. FIFO, like other overarching concepts and principles,³² is manifested in many branches of law—private and public, substantive and procedural—and in legal practice. However, while one might expect it to have the same underlying goals in various contexts, its rationales are actually very context-specific. Consequently, FIFO cannot be applied in a particular context simply because it was justifiably applied in another, even if the two contexts seem analogous. FIFO's potential strengths and weaknesses must be identified and rigorously analyzed in every setting. Moreover, this Article will show that the validity of at least some of FIFO's justifications must be constantly re-examined, given the dynamic social and technological environment.

I. FAIRNESS

A. OVERVIEW

In an influential article, Richard Larson, an MIT engineering systems expert, stated that “[q]ueueing theorists and social scientists have long believed that first come, first served . . . is the socially just *queue* discipline and first in, first out . . . the socially just *system* discipline.”³³ Others have similarly opined that the FIFO/FCFS principle is “ethical,”³⁴ reflects “distributive justice,”³⁵ or constitutes “the ‘fairest’ queue discipline.”³⁶ We shall commonly refer to these accounts as “attributing fairness to FIFO.”³⁷ This attribution may have two dependent bases: either people perceive FIFO

32. Cf. Alan D. Miller & Ronen Perry, *The Reasonable Person*, 87 N.Y.U. L. REV. 323, 327 (2012) (observing the prevalence of the concept of reasonableness in most areas of law).

33. Larson, *supra* note 13, at 896; see also Avi-Itzhak & Levy, *supra* note 18, at 922 (endorsing Larson's view); Brady, *supra* note 22, at 161 (same); Michael H. Rothkopf & Paul Rech, *Perspectives on Queues: Combining Queues Is Not Always Beneficial*, 35 OPERATIONS RES. 906, 908 (1987) (same); Rongrong Zhou & Dilip Soman, *Consumers Waiting in Queues: The Role of First-Order and Second-Order Justice*, 25 PSYCHOL. & MARKETING 262, 264, 276 (2008) (same). “Queue discipline refers to the manner in which customers are selected for service when a queue has formed.” GROSS ET AL., *supra* note 10, at 4.

34. Brady, *supra* note 22, at 161.

35. Mann, *supra* note 22, at 346.

36. Kingman, *supra* note 12, at 163.

37. See also Avi-Itzhak & Levy, *supra* note 18, at 919 (explaining that Larson's idea of social justice “is another name for fairness”).

as a fair principle (the positive aspect) or it is normatively fair (the normative aspect). We will discuss the positive aspect in Subpart B, following a brief explanation of the importance of perceptions of fairness, and the related normative aspect in Subpart C.

B. POSITIVE FAIRNESS

At the outset, we need to address a preliminary question: Why should perceptions of fairness matter in the assessment of legal principles? One possible answer is that fairness is defined in terms of actual perceptions. That is, a principle is fair if people actually consider it so. A second possible answer involves legitimacy. The renowned philosopher James Griffin observed that “[t]here is no point in announcing moral restrictions unless they fit the human psyche.”³⁸ If moral considerations aim to shape action, “they must be able to find a place inside human motivation and, what is more, a position of authority.”³⁹ Although Griffin discussed moral restrictions, the rationale is applicable *mutatis mutandis* to legal allocations. Any legal regime must be compatible with the most fundamental human perceptions. Otherwise, the people may not endorse it, and therefore it would lack legitimacy.⁴⁰ As one political scientist observed, “[t]he large body of research conducted under the rubric of ‘political culture’ is grounded in the hypothesis that democratic institutions require certain value commitments on the part of citizens to be effective.”⁴¹ A third possible answer concerns efficiency. Perceptions of fairness matter because complying with or violating one’s perception of fairness impinges on one’s welfare, and hence on social welfare. Complying with or violating commonly held perceptions may have a significant impact on social welfare.⁴² We shall elaborate on this below.⁴³ A fourth answer, which links this Subpart to the next, is that positive perceptions of fairness often reflect defensible

38. JAMES GRIFFIN, *WELL-BEING: ITS MEANING, MEASUREMENT, AND MORAL IMPORTANCE* 163 (1986).

39. *Id.*

40. See James L. Gibson, *Group Identities and Theories of Justice: An Experimental Investigation into the Justice and Injustice of Land Squatting in South Africa*, 70 J. POL. 700, 701 (2008) (“[I]nstitutions that rely upon principles of justice not widely shared by the citizenry are likely to have a rocky existence.”); Peter H. Schuck, *The Worst Should Go First: Deferral Registries in Asbestos Litigation*, 15 HARV. J.L. & PUB. POL’Y 541, 560 (1992) (“To the extent that the general public perceives [the unfair] pattern, the demoralization is bound to be more widespread, discrediting our system of justice.”); M.E. Yaari & M. Bar-Hillel, *On Dividing Justly*, 1 SOC. CHOICE & WELFARE 1, 3 (1984) (“[A] distribution mechanism will be deemed untenable if its prescriptions are significantly at variance with observed ethical judgments.”).

41. Gibson, *supra* note 40, at 701 n.2. Political philosophers may also use a “social contract” terminology.

42. Cf. Steven Globberman, *A Policy Analysis of Hospital Waiting Lists*, 10 J. POL’Y ANALYSIS & MGMT. 247, 251 (1991) (“[A] widespread perception of fair social treatment ultimately contributes to a more cohesive society.”)

43. See *infra* notes 238–41, 338–41 and accompanying text.

normative accounts of fairness. The fact that people consider a certain principle fair might indicate that it is possible to actually defend this principle in terms of normative fairness. Of course, this is only *prima facie* evidence, because common perceptions of fairness might be misguided. However, common mistakes are more likely to result in over- or under-utilization of a generally justifiable norm, not in universal acceptance of and adherence to a normatively indefensible norm. In conclusion, actual perceptions of fairness are significant not only in understanding, but also in defending and justifying legal regimes. Thus, an important component of any justification for an allocation method is compliance with positive perceptions of fairness.

The literature confirms the idea that people attribute fairness to FIFO. In recent decades, a large body of research on perceptions of fairness has developed in various disciplines.⁴⁴ Many studies pertain directly to the issue at bar. To begin with, scientists and theorists often assume the existence of a common perception of FIFO's fairness. For example, Larson conjectured without further explanation that "the actual [or] perceived utility of participa[n]ts in [a queuing] system" depends on "social justice," as measured by adherence to FIFO.⁴⁵ MacCormick opined, "the queue belongs to a form of normative order that exists because there is an overlapping, largely shared, common understanding of the right way to behave."⁴⁶ Others have observed that "people sense a kind of fairness about queues,"⁴⁷ and that "violating the seniority of a customer, by serving less senior customers ahead of her, is a source of resentment."⁴⁸ Sasser, Olsen, and Wyckoff notably contended that one of restaurant patrons' most frequent aggravations was a FIFO violation: "The feeling that somebody has successfully 'cut in front' of you causes even the most patient customer to become furious. Great care to be equitable is vital."⁴⁹

These intuitions have empirical support. A laboratory experiment conducted by Zhou and Soman showed that in a business licensing system, applicants had a significantly better experience and were more satisfied when FIFO was followed.⁵⁰ The study also found that differences in waiting times between applicants had a significant effect on their experience only when FIFO was adhered to, but not when FIFO was violated.⁵¹ This finding

44. See, e.g., David Miller, *Review Article: Recent Theories of Social Justice*, 21 BRIT. J. POL. SCI. 371, 371 (1991) (discussing "empirical research on perceptions of justice," a related concept).

45. Larson, *supra* note 13, at 895, 901.

46. MacCormick, *supra* note 2, at 308-09.

47. Brady, *supra* note 22, at 164.

48. Avi-Itzhak & Levy, *supra* note 18, at 922.

49. W. EARL SASSER ET AL., *MANAGEMENT OF SERVICE OPERATIONS: TEXT, CASES, AND READINGS* 89 (1978).

50. Zhou & Soman, *supra* note 33, at 271-72.

51. *Id.* at 271-72, 276.

led to the conclusion that a violation of FIFO is a more salient indicator of social injustice than a difference in waiting time.⁵² Lab and field experiments confirm that an illegitimate violation of the commonly endorsed FIFO principle “triggers negative responses from other queuers who are motivated to take actions to defend the queue as a social system.”⁵³ People’s attitudes toward violation are reflected in the observed objections to such violations.⁵⁴ Presumably, the more vital the resource, the greater the sense of irritation created by violation.⁵⁵ Interestingly, Stanley Milgram reported that even those asked to intrude queues for an experiment felt nervous.⁵⁶ Compliance with FIFO has become such a salient and undisputed determinant of people’s sense of fairness, that it is assumed in many customer satisfaction studies.⁵⁷

Participants in queues also sense injustice when the service provider, rather than other participants, is responsible for violating FIFO, as in the case of opening new counters that serve latecomers.⁵⁸ One lab experiment examining the impact of differences in waiting times between restaurant patrons on their satisfaction found that patrons were more dissatisfied where such differences existed.⁵⁹ However, this additional dissatisfaction existed only “when the [difference] was attributed to the service provider,” that is, a decision to open a new seating area after more patrons joined the line; there was no additional dissatisfaction when the difference ensued from random fluctuations in arrival and departure rates.⁶⁰ We have reason to believe that violation of FIFO by allocation participants may be perceived as slightly more troubling than violation by the allocating party. The intuitive explanation is that violation would be less resented if authorized or invited by the party “in charge.” For instance, *A1* and *A2* will be more resentful if *A3* cuts in front of them at the supermarket, than if a cashier asks *A3*, who was

52. *Id.* at 276.

53. *Id.* at 264 (surveying previous studies).

54. *See, e.g.,* Milgram et al., *supra* note 14, at 684–85 (showing that people object to violations in various ways). *But see* Lior Jacob Strahilevitz, *How Changes in Property Regimes Influence Social Norms: Commodifying California’s Carpool Lanes*, 75 *IND. L.J.* 1231, 1267 (2000). Observing very little objection to express toll lanes among drivers, Strahilevitz attributes this to the fact that the resource was not utilized by the entire population but only by carpoolers and to the fact that the allocation was not perceived as involving “risk [to] life and limb.” *Id.* at 1268, 1295–96. He notes, however, that a similar project was cancelled elsewhere because of the fear that “Lexus Lane[s]” would generate public outrage. *Id.* at 1269 (internal quotation marks omitted).

55. Milgram et al., *supra* note 14, at 688.

56. *Id.* at 686 (describing this nervousness as “inhibitory anxiety”).

57. *See, e.g.,* Zhou & Soman, *supra* note 33, at 267 (testing second-order perceptions of fairness, assuming compliance with FIFO).

58. *Id.* at 264.

59. *Id.* at 274–77.

60. *Id.* at 276.

last to arrive, to move to a newly opened lane so that A_3 is served before A_1 and A_2 .

Allocation participants may prefer adherence to FIFO to other resource-allocation methods even when the alternative generates personal benefits, including a reduction of time in the system. For example, in one reported case, customer satisfaction in single-queue restaurants of chain A was higher than in multi-queue restaurants of chains B and C , although the average waiting time at the A restaurants was twice the waiting time at the B and C restaurants. The reporter hypothesized that customers prefer longer queues that do not violate the FIFO principle to shorter but potentially unjust ones.⁶¹ Similarly, passengers disembarking from morning flights complained about lengthy baggage handling delays, although the total delay did not exceed eight minutes, consisting of a one-minute walk from the aircraft to the baggage carousel and a seven-minute wait at the carousel. However, it transpired that as passengers with hand luggage proceeded directly to the taxi stand, the others were waiting at the carousel, watching those who disembarked after them start the day earlier—a violation of FIFO.⁶² After deliberately inserting delays into the system by prolonging the walk from the airplane to the carousel, thereby limiting waiting times at the carousel, passengers' complaints were reduced to nearly zero.⁶³ Of course, adhering to FIFO and saving time is preferable to any alternative. Thus, a single line feeding several tellers or cashiers is preferable to a multi-queue system.⁶⁴

Recognizing the universal and deep commitment to FIFO, psychological research has turned to examine why people so intensely object to its violation. One theory was that a violation by one participant imposes an additional personal cost on others (loss of time, loss of entitlement, lower quality).⁶⁵ An alternative theory was that people show moral outrage at the violation of social norms or values, such as egalitarianism or orderliness, regardless of the personal cost incurred⁶⁶: "Because the queue constitutes a social system, individuals waiting in a queue are motivated by concerns that transcend individual cost considerations."⁶⁷ Research has shown that the two

61. See Larson, *supra* note 13, at 896 (reporting these findings).

62. See *id.* at 897 (reporting these findings).

63. *Id.* Apparently, even those with hand luggage found no reason to complain.

64. *Id.* at 899. *But cf.* Markus Groth & Stephen W. Gilliland, *The Role of Procedural Justice in the Delivery of Services: A Study of Customers' Reactions to Waiting*, 6 J. QUALITY MGMT. 77, 82, 86, 88–92 (2001) (hypothesizing that a single line with multiple servers would be deemed better than multiple lines, but finding no significant difference).

65. Bernd H. Schmitt et al., *Intrusions into Waiting Lines: Does the Queue Constitute a Social System?*, 63 J. PERSONALITY & SOC. PSYCHOL. 806, 806 (1992).

66. *Id.*

67. *Id.* at 814. The distinction between the two theories dates back to CHARLES HORTON COOLEY, HUMAN NATURE AND THE SOCIAL ORDER 282 (1964) ("The delay . . . [may be] only a matter of a few seconds; but here is a question of justice, a case for indignation. . . .").

theories are to some extent complementary. A recurring finding is that most objections to FIFO violations come from those behind the point of intrusion (who incur a personal cost), whereas only a few emanate from those in front of the intrusion.⁶⁸ Note that those in front of the intrusion do not incur a personal cost, but still suffer moral indignation from FIFO's violation. This indicates, on the one hand, that personal cost incurred by a violation has a more significant impact on a person's response than moral indignation, and, on the other hand, that moral indignation does play a limited role. Moreover, empirical studies show that people are far more likely to respond to loss of time caused by queue intrusion than to an equal loss of time caused by the service provider's lapse, despite the similar personal cost incurred in both cases—supporting the existence of moral outrage, irrespective of cost.⁶⁹

Intriguingly, it was also found that “[t]he volume of objection[s] dropped” the farther back from the intrusion point queuers were, despite the fact that all participants behind this point incurred the same cost and seemingly witnessed the same moral wrong.⁷⁰ Possible explanations for this phenomenon may be: (1) those farther behind are less likely to notice the intrusion; (2) the lack of action by closer participants signals a legitimate entry (e.g., place-keeping) not worth intervening; (3) those more remote from an illicit intrusion attribute a greater responsibility for handling the intrusion to those who are closer;⁷¹ (4) those closer to the intrusion “may have already invested more time” than those farther behind.⁷²

In summary, scientists and theorists often contend that FIFO may be supported in terms of perceived fairness. Empirical evidence confirms that people are more satisfied when the principle of FIFO is followed than when it is violated; that they express their objection to violations; and that they feel nervous when asked to violate FIFO, even for the sake of scientific research. Participants in queues sense injustice when other participants or the allocator violate FIFO. Psychologists have argued and shown that people resent a FIFO violation because it imposes specific personal costs and because they generally feel moral outrage at the violation of social norms or values.⁷³

68. Milgram et al., *supra* note 14, at 686–87; Schmitt et al., *supra* note 65, at 806–07.

69. Schmitt et al., *supra* note 65, at 808–11, 814.

70. Milgram et al., *supra* note 14, at 687, 689.

71. *Id.* at 687–88.

72. Schmitt et al., *supra* note 65, at 807.

73. This Article focuses on Western norms and values. Social norms are culturally contingent. Thus, the level of adherence to FIFO and reactions to its violation may be different across countries. See BILLY EHN & ORVAR LÖFGREN, *THE SECRET WORLD OF DOING NOTHING* 46–52 (2010) (discussing the impact of culture on queuing practices).

C. *NORMATIVE FAIRNESS*

1. Equality: The Negative Aspect

The first fairness-based justification for adherence to FIFO derives from the notion of egalitarianism.⁷⁴ In hierarchical societies people are treated in accordance with their relative rank.⁷⁵ Higher ranked individuals get preferential treatment, and vice versa. As legal philosopher Neil McCormick opined, in modern egalitarian societies, “the provision of a service or opportunity should be based on some ground that is universalistic rather than personally discriminatory.”⁷⁶ In providing a public service or allocating public resources, people should not be discriminated against on the basis of gender, sexual orientation, race, ethnicity, appearance, religion, age, political orientation, socioeconomic status, or any other traits deemed irrelevant for purposes of the allocation.⁷⁷ FIFO is arguably blind to irrelevant interpersonal differences and as such treats all people equally: “The very arbitrariness of making priority depend on temporal order of arrival at the point of service or of opportunity is usually satisfactory from [the egalitarian] point of view.”⁷⁸ Even when several groups may be distinguished based on a normatively relevant feature, FIFO may be applied to each class, being blind to all irrelevant differences.⁷⁹

Blindness to irrelevant differences is reminiscent of the Rawlsian “veil of ignorance,” an idea originally introduced by Nobel Prize laureate John Harsanyi.⁸⁰ According to John Rawls, justice is manifested in the allocations that rational individuals would endorse behind a veil of ignorance, namely deprived of all knowledge of their tastes, talents, social position and so forth.⁸¹ While Rawls has used this notion to discuss the fairness of allocations (outcomes), it may also apply to procedures. Presumably, people behind a

74. See EDWARD T. HALL, *THE SILENT LANGUAGE* 201 (1959) (explaining that FIFO is based on the idea that everyone should be treated equally); see also Groth & Gilliland, *supra* note 64, at 81; McCormick, *supra* note 2, at 307; Milgram et al., *supra* note 14, at 683; Schmitt et al., *supra* note 65, at 806.

75. See HALL, *supra* note 74, at 157 (“In cultures where a class system or its remnants exist, such ordinality may not exist . . . where society assigns rank for certain purposes . . . the handling of space will reflect this.”).

76. McCormick, *supra* note 2, at 307.

77. Cf. HALL, *supra* note 74, at 157 (“[I]t is regarded as a democratic virtue for people to be served without reference to the rank they hold in their occupational group. The rich and poor alike are accorded equal opportunity to buy . . . in the order of arrival.”).

78. McCormick, *supra* note 2, at 307; see also EHN & LÖFGREN, *supra* note 73, at 42 (“[B]eing beautiful, wealthy, or well-connected should mean nothing once you are standing in line.”).

79. McCormick, *supra* note 2, at 307.

80. See John C. Harsanyi, *Cardinal Utility in Welfare Economics and in the Theory of Risk-Taking*, 61 J. POL. ECON. 434 (1953).

81. JOHN RAWLS, *A THEORY OF JUSTICE* 136–42 (1971).

veil of ignorance would select an allocation procedure that ignores irrelevant personal traits, such as FIFO.

The egalitarian argument has limited justificatory power for two reasons. First, while FIFO is blind to irrelevant interpersonal differences, it may also be insensitive to morally and legally relevant criteria, such as special personal need or merit.⁸² From an equality perspective, people should be treated equally unless there is a special reason relevant to the allocation to treat one or more of them unequally.⁸³ FIFO assumes that all allocation participants are roughly equal in all relevant respects. If this assumption is proven false, FIFO should be either abolished or relaxed. More accurately, if people vary in a relevant sense, FIFO cannot be justified in terms of equality; if most participants are indistinguishable, and only relatively few differ, a FIFO-based system with exceptions may be defensible.

Second, in being blind to irrelevant criteria, and hence crossing the egalitarian threshold, FIFO is no better than other allocation methods, such as last-in-first-out (“LIFO”) or random selection for service (“RSS”).⁸⁴ In fact, random selection, which is used in such noteworthy allocations as ticket sales for the Super Bowl or the NCAA Final Four,⁸⁵ is totally indifferent to personal characteristics of any sort, whereas FIFO, as explained below, is sensitive to the subjective desire and ability to acquire and maintain a temporal advantage. Thus, while the basic egalitarian argument can support using FIFO, it cannot serve as an independent justification, insofar as it does not explain why FIFO is preferable to some other methods. An additional justification—whether fairness-based or efficiency-based—is required for such a preference. For example, FIFO may be preferable to LIFO or RSS in terms of respect for time or desert.⁸⁶ FIFO may also be more practical than RSS if the pool of applicants is unascertainable in advance, because a fair lottery cannot be held before all applications are made.

A possibly more troubling weakness of the egalitarian argument is that while FIFO is formally blind to irrelevant criteria, its real-life application may reflect power structures in society—a problem that may be less acute in other allocation methods, such as RSS. For starters, more affluent participants may have the resources necessary to secure early arrival or to strategically adapt to any non-random method. Moreover, affluent participants may essentially circumvent the class-blind system.⁸⁷ For example,

82. We will argue, however, that in some cases temporal advantage may serve as a proxy for such factors. See *infra* Part II.C.1.

83. See D. Daiches Raphael, *Equality and Equity*, 21 *PHILOSOPHY* 118, 120–23 (1946) (explaining that exceptions to equality must derive from relevant reasons).

84. GROSS ET AL., *supra* note 10, at 4–5 (introducing the concepts of LIFO/LCFS and RSS).

85. Stephen K. Happel & Marianne M. Jennings, *Creating a Futures Market for Major Event Tickets: Problems and Prospects*, 21 *CATO J.* 443, 448 (2002).

86. See *infra* Parts I.C.2–3.

87. See *infra* Part III.C.

they can pay other queuers to cut in,⁸⁸ employ others to enter the queue and obtain the resource on their behalf,⁸⁹ or hire people to serve as placeholders for a period of time.⁹⁰ Alternatively, the advantaged can purchase the resource at a higher price from speculators or from others who acquired the resource by waiting.⁹¹ The last option, however, may be available regardless of the allocation method.

To the extent that equality is important, measures should be taken to prevent such circumvention. A private entity or a government agency allocating a benefit can verify that only those actually waiting in line obtain and utilize the benefit. This can be done by requiring identification when acquiring and using the benefit and by supervising the queue. The law governing the allocation can also impose restrictions on agency and alienability, as in the case of anti-scalping laws.⁹² Admittedly, some distortion will still exist, because the privileged may utilize their resources to enter the queue earlier or to alleviate the burden of waiting. This problem may be difficult to resolve within a FIFO-based framework, as the following example demonstrates.

In some cases the law overrules FIFO and endorses an alternative allocation method, building on the aforementioned practical weakness of FIFO in terms of fairness. For instance, in medieval times, creditors obtained resources from the debtor's estate based on the "first come, first served" principle.⁹³ This method generated an aggressive race, giving an advantage to affluent and powerful parties who were more capable of acting swiftly.⁹⁴ Today, an insolvent debtor's assets are distributed *pari passu* among all creditors, subject to differences in the level of security. Commentators explain that using the *pari passu* principle prevents "a free-for-all where weak creditors would inevitably be beaten into last place by better-resourced competitors, and where the advantages associated with an orderly liquidation would be lost."⁹⁵

88. See Felix Oberholzer-Gee, *A Market for Time: Fairness and Efficiency in Waiting Lines*, 59 KYKLOS 427 *passim* (2006) (discussing the possibility of trading places for a fee).

89. See Barry Schwartz, *Waiting, Exchange, and Power: The Distribution of Time in Social Systems*, 79 AM. J. SOC. 841, 849 (1974) (discussing agency).

90. See Brian Montopoli, *The Queue Crew: Waiting in Line for a Living*, LEGAL AFF., Jan.–Feb. 2004, at 6 *passim* (discussing placeholders).

91. See Mann, *supra* note 22, at 353 (discussing privileged classes' ability to circumvent lines); see also *infra* Part III.C.2 (discussing fairness in "secondary markets").

92. See Happel & Jennings, *supra* note 85, at 445–47 (discussing anti-scalping laws).

93. See Rizwaan Jameel Mokal, *Priority as Pathology: The Pari Passu Myth*, 60 CAMBRIDGE L.J. 581, 590, 592 (2001) ("The earlier they can get a judgment and execute it, the more likely it is they would get paid in full, or at all.").

94. *Id.* at 590.

95. *Id.* at 591.

2. Equality: The Positive Aspect

In the previous Subpart, we argued that FIFO is an egalitarian principle in the sense that it is indifferent to irrelevant personal traits in allocating resources. We explained, however, that such indifference is not distinctive of FIFO alone. In this Subpart, we put forward a related argument that singles out FIFO. We contend that FIFO treats people equally not only by being completely blind to irrelevant differences, but also by being responsive to a relevant difference that competing methods ignore. Given that FIFO is formally responsive only to a participant's time of entry into the queue, we must show that such responsiveness validates equality. In our view, adherence to FIFO positively vindicates equality by valuing and respecting people's time equally.

Waiting takes away a precious resource: time. The importance of time as a value in Western society is undisputed.⁹⁶ Time has an economic value—equivalent to its opportunity cost.⁹⁷ However, since the opportunity cost varies among different people, the economic value of time cannot underlie an egalitarian argument. More importantly for the purposes of this Subpart, spending time irreversibly consumes a fraction of a person's life.⁹⁸ Because our lives should be treated equally, our time should be treated equally, regardless of gender, race, socioeconomic status, etc. In particular, an allocation method should afford equal respect for each person's time; enforcement of such a method must disprove any claim of superiority of one person's time over that of others.

FIFO reflects the equality of personal time in several ways. First, and most simply, if a person who arrives after others is served before them, this person's time is assigned a greater value than the others' time.⁹⁹ Assume, for example, that *A* enters the line thirty minutes before *B*, but *B* jumps the queue and gets service before *A*. By ignoring *A*'s prior arrival, *B* makes an implicit claim that his time is more valuable than *A*'s. Enforcing FIFO nullifies this assertion. Alternatively, if a service provider serves a latecomer before an early comer, the provider implicitly assigns a greater value to the latecomer's time. Again, adherence to FIFO prevents such assignment.

96. See, e.g., France Leclerc et al., *Waiting Time and Decision Making: Is Time Like Money?*, 22 J. CONSUMER RES. 110, 110 (1995) (“[T]ime is not just a scarce resource; it is *the* scarce resource.”); Mann, *supra* note 22, at 350 (emphasizing the importance of time). Adherence to FIFO is thus culturally contingent. See *supra* note 73.

97. Leclerc et al., *supra* note 96, at 110; see also Schwartz, *supra* note 89, at 867–68.

98. See Lance Morrow, *Waiting as a Way of Life*, TIME, July 23, 1984, at 65 (“[T]he subtler misery of waiting is the knowledge that one's most precious resource, time, a fraction of one's life, is being stolen away, irrecoverably lost.”).

99. Cf. Schwartz, *supra* note 89, at 856 (“To be kept waiting . . . is to be the subject of an assertion that one's own time . . . is less valuable than the time and worth of the one who imposes the wait.”).

Second, the importance of equal respect for individual time is manifested in the common understanding that a person who leaves the queue and wishes to reenter at a later stage must go to the back of the line. Otherwise, that person gets some time off, while the other queuers are waiting, implying that this person's time is more valuable than that of others. Similarly, in cases of a long wait—a marathon queue where temporary absence from the queue may be inevitable—for example to obtain food or use the restroom, timeouts are restricted, because unreasonable absence implies that the absentee's time is more valuable than that of other queuers.¹⁰⁰

Third, the variance of waiting time, namely the statistical measure of dispersion, may serve as a measure of fairness.¹⁰¹ The lower the variance, the lesser the difference in waiting times among customers; and if waiting time is similar for all customers, we may conclude that each customer's time is equally consumed, hence equally respected. As J.F.C. Kingman showed fifty years ago, assuming equal service time for all customers, adherence to FIFO minimizes the variance of waiting time, making FIFO the "fairest" queue discipline.¹⁰² Put differently, FIFO renders waiting time relatively equal for all participants. Thus, for example, despite the high variance in urgency, priority in kidney transplant queues is determined, at least in part, by waiting time.¹⁰³

Several comments must be made at this point. To begin with, FIFO does not necessarily entail that latecomers wait longer than early comers. Waiting time under FIFO is dependent not only on time of entry, but also on arrival rate—namely the rate at which customers arrive—and on variance in time of service. All other things being equal, the higher the arrival rate, the longer the wait. Consider a pharmacy or a traffic light queue. Early in the morning congestion results in relatively long waits for all queuers. Towards noon, the arrival rate declines, so latecomers wait less. In other words, FIFO does not guarantee equal waiting times. But it preserves equal respect for participants' time. FIFO assures that time spent on the queue is not disregarded and prevents implicit assertions of superiority of one queuer's time over that of others. Furthermore, people know when congestion occurs

100. See Mann, *supra* note 22, at 350 (explaining that the importance of time is reflected "in the emphasis placed on serving time, and restrictions on time-outs").

101. See Avi-Itzhak & Levy, *supra* note 18, at 928 ("[Waiting time variance may] serve as a measure of unfairness; the larger the variance is, the greater is the unfairness . . .").

102. Kingman, *supra* note 12, at 163 (internal quotation marks omitted).

103. Dimitris Bertsimas et al., *Fairness, Efficiency and Flexibility in Organ Allocation for Kidney Transplantation* 9–10 (Harvard Bus. Sch., Working Paper No. 12-025, 2011), available at <http://www.hbs.edu/research/pdf/12-025.pdf>. Although a FIFO-based allocation of organs has been criticized for being inefficient, reform plans do not fully discard it. Kevin Sack, *Kidney Transplant Committee Proposes Changes Aimed at Better Use of Donated Organs*, N.Y. TIMES (Sept. 21, 2012), www.nytimes.com/2012/09/22/us/proposals-aim-to-improve-kidney-transplant-system.html.

and can make partially informed decisions about the best time to enter the queue. In this sense, FIFO respects the value they assign to their own time.

Moreover, FIFO necessarily minimizes waiting time variance only if service time—the duration of being served by the allocator—is similar for all customers. If this condition is not met, it may be fairer in terms of waiting time variance to prioritize shorter jobs over longer ones.¹⁰⁴ A special cashier who serves customers with few items at the supermarket is an implementation of this caveat.¹⁰⁵ As we explain below, deviation from FIFO in cases of different service times may also be efficient in terms of average waiting time.¹⁰⁶

A more fundamental qualification concerns the importance of time in different types of allocations. Where FIFO has a simple ordering effect, all queuers ultimately receive a similar resource, and the only differences between them are those of entry and exit times. Thus, respecting the equal value of people's time may be the main fairness-related concern. FIFO does not presuppose that all participants are equal, but it implies that "the only difference among [them] that should be relevant to priority" is the time of entry.¹⁰⁷ The law often legitimizes and protects such allocations, as in the case of gas rationing following Hurricane Sandy. On the other hand, in cases of entitlement- and quality-determining effects, which are very common in legal applications of FIFO, time is probably a lesser concern. In such cases, a queue jumper will not only be served earlier, but will also obtain a greater benefit. Those skipped may get a share of lesser quality or quantity, or they be denied an expected entitlement. As the differences between participants' shares become more significant, disrespect for people's time turns into a secondary concern and a different justification for adherence to FIFO must be sought.

Finally, as explained above, privileged classes may circumvent an allocation method that respects equality of time by employing agents, or by purchasing the resource from speculators or others who acquired it by waiting.¹⁰⁸ If we allow this, it could be argued that we are no longer treating people's time equally, but rather importing social inequality into the system.¹⁰⁹ To the extent that the time-based egalitarian argument is

104. For example, assume ten people are approaching a counter, at a rate of one per minute (for example, at 10:00, 10:01 . . . 10:09). The second person to arrive will spend ten minutes at the counter, whereas each of the other nine will spend two minutes. Waiting times under FIFO are {0, 1, 10, 11, 12, 13, 14, 15, 16, 17}. The average waiting time is 10.9 minutes, and the standard deviation is 5.9. If the second customer is served last, waiting times are {0, 0, 1, 2, 3, 4, 5, 6, 7, 17}. The average is 4.5, and the standard deviation is 5.0.

105. A multi-choice business answering machine may be another example.

106. See *infra* Part II.B.

107. Schuck, *supra* note 40, at 563.

108. See *supra* notes 88–91 and accompanying text.

109. Because we are here discussing normative fairness, the fact that other queuers may be unaware of the circumvention is irrelevant.

controlling a particular allocation, these phenomena need to be regulated. We will address these issues in detail in Subpart III.C.

3. Desert

Another fairness-based justification for adherence to FIFO, which has a more limited scope of application, derives from the notion of desert. Desert claims share the following structure: *A* deserves *B* (from *D*) for *C*.¹¹⁰ Put differently, they have three (or four) components: a subject *A*, an object *B*, a desert basis *C*, and possibly a source *D*, although the latter is not always present (and can be deemed part of *B* when existent). The basis for desert (*C*) is usually perceived as a fact about the subject, such as an act or a characteristic,¹¹¹ for which he or she is responsible.¹¹² In simpler words, desert requires correlation between the value of a person's conduct, attribute, or achievement (the "input"), and the extent of that person's reward or punishment (the "output").¹¹³

A preliminary question is whether a fitting reward is simply deserved for doing or achieving something, or necessary to achieve an ulterior goal, such as incentivizing others to do the same or compensating the doer for harm incurred during the process.¹¹⁴ The answer may have some bearing on the validity of our argument that correlation between input and output can serve as an independent justification for FIFO. If FIFO maintains such correlation, and maintaining correlation is merely intended to incentivize some conduct,¹¹⁵ we move into the realm of utilitarianism or efficiency, to be discussed below in Part II. However, the conventional view is that the principle of desert is an independent normative principle: A person should get his or her due, regardless of the effect of the specific reward or punishment on others.¹¹⁶

110. See JOHN KLEINIG, PUNISHMENT AND DESERT 51-52 (1973) (discussing the structure of desert claims); GEORGE SHER, DESERT 6-8 (1987) (same); John Kleinig, *The Concept of Desert*, 8 AM. PHIL. Q. 71, 71-74, 76 (1971) (same).

111. See Kleinig, *supra* note 110, at 75-76 (explaining that desert claims rely on evaluations of actions or characteristics).

112. WOJCIECH SADURSKI, GIVING DESERT ITS DUE: SOCIAL JUSTICE AND LEGAL THEORY 117 (1985); see also Fred Feldman, *Desert: Reconsideration of Some Received Wisdom*, 104 MIND 63, 64-65, 68-69 (1995) [hereinafter Feldman, *Desert*] (discussing the connection between responsibility and desert); Fred Feldman, "Responsibility as a Condition for Desert," 105 MIND 165, 166-68 (1996) (same).

113. See Kleinig, *supra* note 110, at 77 (explaining that the principle of desert determines not only if a person should be rewarded or punished but also the extent of the reward or punishment).

114. See Miller, *supra* note 44, at 380-81 (explaining this distinction).

115. See AUSTIN DUNCAN-JONES, BUTLER'S MORAL PHILOSOPHY 137 (1952) ("When we say a man . . . has certain deserts, [we mean that] he has done a good or bad action . . . [and that] it is useful to apply certain sanctions . . . influencing his habits and other people's.").

116. See, e.g., Richard J. Arneson, *Egalitarianism and the Undeserving Poor*, 5 J. POL. PHIL. 327, 331 (1997) (explaining that just desert is based on the virtue of the person or the act, not on

Some have endeavored to link the requirement of input–output correlation with a seemingly more fundamental principle—that of preserving equilibrium between the benefits and burdens borne by individuals.¹¹⁷ Under this interpretation, desert negates and compensates for past efforts and sacrifices.¹¹⁸ The equilibrium theory is lacking for two reasons. First, one may deserve a reward for certain conduct, even if one considers that conduct beneficial or at least harmless to oneself. Second, preserving equilibrium cannot serve as a general justification for the principle of desert, because the latter may apply not only to conduct, but also to virtues or accomplishments; these may deserve rewards that are not correlated with any underlying efforts or sacrifices.

At any rate, it is unnecessary to decide whether an equilibrium theory underlies the principle of desert. First, as we explained above, this principle has a sufficiently strong moral appeal even without further explanation. It is arguably “fair” to give one his or her due, regardless of any consequence this may have. Second, even if desert is based on the notion of equilibrium, it remains a fairness-oriented concept. Third, replacing a pure desert theory with an equilibrium theory would not impair the validity of the argument that FIFO can be partially justified in terms of desert.

We now need to show that at least in some contexts FIFO maintains correlation between input and output. The “input” in FIFO-based allocations is the extra burden participants incur to secure a temporal advantage. This burden may include any effort and any cost needed to: (1) obtain a temporal advantage (that is, to arrive earlier than others); and (2) maintain this advantage. Note that while waiting time may be an important component of the burden in some contexts,¹¹⁹ it is not necessarily the sole or even dominant one. For example, if *A* arrives at a ticket counter several hours before opening, and *B* enters the lengthening queue a couple of hours later, we can say that *A* has not only invested more in getting to the point of allocation, but has also spent more time waiting. However, if *A* arrives after the counter opens, and *B* arrives after *A*, then *A* and *B* may spend an equal amount of time waiting, but *A* can still be said to have made an extra effort to enter the queue earlier.

the expected consequences); see also Feldman, *Desert*, *supra* note 112, at 63; Kleinig, *supra* note 110, at 73, 76; Miller, *supra* note 44, at 372.

117. See Miller, *supra* note 44, at 381 (discussing Wojciech Sadurski’s view); *id.* at 379 (discussing George Sher’s view and arguing that people must be rewarded for burdensome actions because “harm inflicted at one moment requires compensation by extra benefit at some later moment”).

118. See *id.* at 381 (discussing Wojciech Sadurski’s view).

119. See Schwartz, *supra* note 89, at 844 (“[Waiting] increases the investment a person must make in order to obtain a service.”); Wittman, *supra* note 10, at 80–81 (“The person is willing to pay in time just as ordinary market allocations go to the person who is willing to pay in money.”).

Two questions may arise at this point. First, arguably, people who reside or happen to be near the point of allocation may arrive earlier than distant participants with lesser efforts and costs, seemingly reducing the correlation between investment and time of entry. Nonetheless, this concern must be set aside. These people may have made an additional effort or incurred an extra cost to be in the area in the first place.¹²⁰ Moreover, in the information age, when people can participate in allocations from a great distance, physical location is of less importance. Second, people who enter the queue earlier may, in some cases, spend much less time waiting due to an increase in arrival rate at a later time. It may seem that in such cases early comers ultimately make a lesser effort. This apparently undermines the desert-based justification. However, such an argument underrates the other component of the input—efforts exerted to secure earlier entry. Entry before heavy congestion usually entails special efforts and costs, which may overshadow the additional waiting time during congestion. Otherwise, arrival rate would have been more evenly distributed within the relevant time window. For instance, entering a queue for passport issuance prior to opening hours may require waking up very early, skipping breakfast, and forgoing other morning activities. Furthermore, while in some cases specific early comers may actually invest less than latecomers, time of entry would generally remain a rough proxy for investment.¹²¹

The “output” is the personal benefit accrued. Recall that in some cases, the allocator cannot provide the resource to all contenders and confers benefits only on some. In other cases, the allocator cannot provide the exact same benefit to all, so individual benefits vary in accordance with some criterion. Yet in other cases, the allocator can provide a similar benefit to all participants, but not simultaneously, allowing some to enjoy the benefit earlier than others. In many real-life cases, allocators provide different benefits at different times to some contenders, while denying any benefit to others. For example, assume there are 10,000 seats in a football stadium. Each ticket confers a different benefit from others in accordance with the respective seat’s location. Thus, some people will not be able to buy tickets at all, whereas others will obtain tickets of varying values. In short, the benefit is determined by FIFO’s operation mode.

FIFO may be justified in some contexts as an attempt to maintain rough correlation between one’s investment and reward: those who “work” harder deserve more.¹²² All else being equal, a person who incurs an additional burden to secure prior entry into the queue and to maintain this position

120. Place of residence reflects, *inter alia*, a person’s preferences with respect to certain types of allocations.

121. If arrival rate and service time are constant, FIFO secures low variance in waiting time, making pre-entry effort the dominant component of total investment.

122. See Miller, *supra* note 44, at 379 (discussing Sher’s “view that those who work hard to achieve a particular goal deserve to succeed”).

deserves a greater benefit, such as preferential service.¹²³ One who arrives later has invested less and hence deserves less in return. In basing desert on effort, our argument is somewhat related, though not identical, to John Locke's theory of property, whereby entitlement derives from labor.¹²⁴

Commitment to desert-based fairness imposes a stricter constraint than that perceived at first glance. Assume that E_x is X 's effort and R_x is X 's reward. A enters the queue before B . We already explained that if $E_a > E_b$, then necessarily $R_a > R_b$: we must offer a greater reward for a greater effort. However, this condition is insufficient. We must also maintain rough proportionality between the magnitude of each person's reward and the extent of that person's effort.¹²⁵ Formally, we require that $R_x/E_x \approx c$ (or $R_x \approx cE_x$) where c has a morally defensible value. From this we can deduce rough equality between the ratio of participants' rewards and the ratio of their respective efforts: $R_a/R_b \approx cE_a/cE_b = E_a/E_b$. We can also deduce that the difference between two participants' rewards should be proportionate to the difference between their relative efforts: $(R_a - R_b)/(E_a - E_b) \approx (cE_a - cE_b)/E_a - E_b = c(E_a - E_b)/(E_a - E_b) = c$. These requirements may be consistent with a FIFO-based allocation, but also set the boundaries for its use.

Consider the following example: A enters a physical queue to purchase a concert ticket at 10:00 AM and gets to the counter at 10:30, while B enters the queue at 10:05 and gets to the counter at 10:35. The rewards (concert tickets) seem roughly commensurate with the efforts. A made an extra effort to enter the queue earlier, so $E_a > E_b$. The difference between the two in terms of effort is probably marginal, but because it exists B cannot obtain a better seat than A for the same price ($R_a < R_b$). Also, it will be unfair if, for a given price, middle first row seats are available to A , yet only the leftmost seat in the mezzanine is available to B ($R_a/R_b \gg E_a/E_b$). In this example, adherence to FIFO prevents both injustices, because it not only offers a greater reward for greater effort, but also maintains a reasonable ratio between rewards and efforts. If A arrives several minutes before B , and B arrives several minutes before C , then A will be able to obtain a slightly better seat than B , and B will be able to obtain a slightly better seat than C .

On the other hand, assume that the government uses FIFO to allocate a few parcels of land in a prime location. The earlier one submits an application, the better the parcel one acquires. Given the finiteness of the

123. See *id.* at 346 (“[I]f a person is willing to invest large amounts of time and suffering in an activity, people who believe there should be an appropriate fit between effort and reward will respect his right to priority.”).

124. JOHN LOCKE, TWO TREATISES OF GOVERNMENT 159–76 (5th ed. 1728). *But see* Epstein, *supra* note 17, at 1228–29 (discussing the two limitations of the Lockean proviso: there must be enough and as good left in common for others and before possession is taken, all things are held in common).

125. See Kleinig, *supra* note 110, at 77 (explaining that desert considerations determine the magnitude of the reward or the punishment).

allocated resource, latecomers may be left with nothing. Here, the outcome cannot be justified in terms of desert. Indeed, those who submit an application earlier make an extra effort, but the marginal reward is out of proportion to that extra effort. The fact that *A* fills out and submits a form several minutes before *B*, and that *B* submits a form several minutes before *C*, cannot justify, on desert grounds, the allocation of a superior parcel to *A* and possibly nothing to *C*. Applying FIFO does not maintain proportionality between the relative magnitude of one's reward and the relative extent of one's effort.

In order to address this apparent practical limitation of a desert-based justification, we wish to emphasize two points. First, the fact that in some cases FIFO cannot be justified in terms of just desert does not preclude this justification in other cases. Thus, arguably, FIFO may be more fairly used to allocate benefits of relatively limited and not significantly varied value, such as abundant resources, scarce resources that require a great deal of effort to utilize,¹²⁶ or relatively small portions of scarce and immediately usable resources. In such cases, the difference in the relative reward between different people in the line is small and may be justified by differences in times of entry. When allocating significant portions of scarce and immediately usable resources, FIFO might be less appropriate. This may impose some constraint on the use of FIFO in law, because the law often addresses allocations of usable scarce resources. Second, the fact that in some cases FIFO cannot be justified in terms of just desert does not necessarily imply that there are no other justifications for using it in these cases.

Upon concluding this Subpart, we concede that a desert-based justification might not be intuitive to some readers. However, the idea that adherence to FIFO may reflect some fair reward for investment occasionally emerges in real-life legal contexts.¹²⁷ For example, collective bargaining agreements usually give priority to employees with greater seniority with respect to layoffs, promotions, discharges, transfers, working hours, automatic progression of wages, vacations, sick leave, and pensions.¹²⁸ Courts often uphold seniority rules,¹²⁹ and some countries codify them into law.¹³⁰

126. See Berger, *supra* note 17, at 376–77 (discussing homestead laws in the nineteenth century—as an example for abundant resources—and water rights as an example for scarce resources that require efforts to utilize).

127. See, e.g., Schuck, *supra* note 40, at 561 (“Temporal priority . . . rewards those who take the trouble and initiative to assert their claims with dispatch.”).

128. Berger, *supra* note 17, at 384–87; see also Richard A. Posner, *Some Economics of Labor Law*, 51 U. CHI. L. REV. 988, 1000 (1984) (stating that unions insist that collective-bargaining contracts include a provision whereby workers must be “la[id] off in reverse order of seniority”).

129. See, e.g., *U.S. Airways, Inc. v. Barnett*, 535 U.S. 391, 394–95 (2002) (holding that the “reasonable accommodation” requirement under the Americans with Disabilities Act, 42 U.S.C. §§ 12101–213 (2000), does not trump the seniority system).

Seniority is substantively a manifestation of FIFO¹³¹—those who enter the queue earlier obtain greater benefits. This reality may be explained, in part, as rewarding investment, namely cumulative efforts and contribution, as well as continuous loyalty.¹³²

In the law of nuisance, the doctrine of “coming to the nuisance,” as enunciated by Blackstone, categorically favored the party who was first to operate in the relevant area.¹³³ While the rigid Blackstonian rule no longer applies, the fact that the defendant has operated in the area prior to the plaintiff’s arrival may support the conclusion that no actionable nuisance exists.¹³⁴ Likewise, the fact that the plaintiff has operated in the area first may support the opposite conclusion.¹³⁵ Conceivably, this principle can be defended in terms of desert. The first in time “engage[ed] in and expend[ed] substantial sums in furtherance of a lawful and economically useful activity,” and denying the fruits of these efforts is unfair.¹³⁶

First in time, first in right rules in property law (a special case of entitlement-determining FIFO) are sometimes explained as “offering the [first in time] a reward for efforts or productivity.”¹³⁷ While rewards for efforts may be explained as incentives for beneficial conduct,¹³⁸ they may also relate to the notion of desert. Thus, “the common law of first possession, in rewarding the one who communicates a claim, *does* reward useful labor; the useful labor is the very act of speaking clearly and distinctly about one’s claims to property.”¹³⁹ However, a desert-based justification for using FIFO in property law has an inherent weakness, as the court’s

130. See, e.g., David von Below & Peter Skogman Thoursie, *Last In, First Out? Estimating the Effect of Seniority Rules in Sweden* 3 (Inst. For Labour Mkt. Policy Evaluation, Working Paper No. 2008:27, 2008), available at <https://www.econstor.eu/dspace/bitstream/10419/45710/1/587127651.pdf> (“In [several countries], the law stipulates some kind of seniority-based rules regarding dismissals. In Finland and the US, seniority rules are often laid down in collective agreements. In Norway and the UK, seniority rules are . . . often used as an accepted custom. . . . In Sweden this . . . principle is one main cornerstone in the Swedish Employment Protection Act . . .”).

131. Although with respect to discharges seniority *formally* denotes last-in-first-out.

132. See, e.g., M. Kaye Joachim, *Seniority Rights and the Duty to Accommodate*, 24 QUEEN’S L.J. 131, 146 (1998) (“If everyone has an equal opportunity to join the employment queue, using length of service . . . to allocate work opportunities appeals to most people’s sense of fairness in the same way queuing does.”); see also *infra* notes 169–73 and accompanying text (discussing seniority from an efficiency perspective).

133. Daniel B. Kelly, *Strategic Spillovers*, 111 COLUM. L. REV. 1641, 1663–64 (2011) (presenting the historical rule); see also Donald Wittman, *Coming to the Nuisance*, in ECONOMIC ANALYSIS OF THE LAW: SELECTED READINGS 53, 53 (Donald A. Wittman ed., 2003).

134. RESTATEMENT (SECOND) OF TORTS § 840D (1979).

135. See Rohan Pitchford & Christopher M. Snyder, *Coming to the Nuisance: An Economic Analysis from an Incomplete Contracts Perspective*, 19 J.L. ECON. & ORG. 491, 492 (2003) (discussing a brothel’s action against a children’s dance studio).

136. Berger, *supra* note 17, at 379–80.

137. *Id.* at 354.

138. *Id.*

139. Carol M. Rose, *Possession as the Origin of Property*, 52 U. CHI. L. REV. 73, 82 (1985).

application of the FIFO rule in *Pierson v. Post*¹⁴⁰ demonstrates.¹⁴¹ In that case, the plaintiff was pursuing a fox, and the defendant, knowing of the chase, came across the fox and killed it. The court interpreted and applied the rule whereby property in wild animals is acquired by first occupancy.¹⁴² The court held that the first person to deprive the animal of its natural liberty becomes the owner, finding for the chance interceptor.¹⁴³ The minority judge opined that the first to be within reach of taking the animal (based on effort) acquires ownership, finding for the hunter.¹⁴⁴ Our first observation is that under the notion of investment–reward correlation, the hunter should have had the upper hand, as per the dissent.¹⁴⁵ However, even the minority opinion cannot be fully defended in terms of desert. Under this view, the interceptor, who entered the queue later but invested some effort, would have received nothing.¹⁴⁶ The difference in efforts between the hunter and the interceptor cannot justify such a significant difference in the rewards. Possible fairness-oriented adjustments might entail some sort of co-ownership, or allocating ownership to one party while compensating the other for some of the fox’s value, once a sufficient level of effort by the contestant has been established.¹⁴⁷

A more defensible application of FIFO from a desert perspective may pertain to the allocation of public housing or similar assets by the government, as opposed to a private dispute over a specific asset. Thus, with respect to the allocation of property rights to squatters in South Africa, one author explains that denying housing to squatters who have been waiting for a long period of time to receive housing is less fair than denying housing to the less deserving newcomers.¹⁴⁸ In this case, waiting time is the dominant component of the relative burden, and, all else being equal, a greater burden entails a greater desert.

II. EFFICIENCY

A. OVERVIEW

FIFO is often justified as being an efficient allocation mechanism. If this line of argument holds, the law should arguably protect and promote FIFO-

140. *Pierson v. Post*, 3 Cai. 175 (N.Y. 1805).

141. Efficiency analysis may provide a better understanding of the judges’ reasoning. See *infra* notes 184–87 and accompanying text.

142. *Pierson*, 3 Cai. at 177; Rose, *supra* note 139, at 75.

143. *Pierson*, 3 Cai. at 178–79.

144. *Id.* at 182.

145. See Epstein, *supra* note 17, at 1225 (explaining the dissent in terms of invested labor).

146. See *id.* (“Some labor goes unrequited when two pursue and one loses.”).

147. For a detailed discussion of the efficiency and fairness of applying an equal division rule to property in general, and *Pierson v. Post* in particular, see Gideon Parchomovsky et al., *Of Equal Wrongs and Half Rights*, 82 N.Y.U. L. REV. 738 *passim* (2007).

148. Gibson, *supra* note 40, at 705–06.

based allocations,¹⁴⁹ or at least not encumber FIFO processes from unfolding. An efficiency analysis involves various, sometimes even case-specific arguments, insights, and conclusions in different legal contexts. Still, such an analysis has several recurring themes, as well as surprising pitfalls. This Part aims to grasp and illustrate the complexity of an efficiency analysis of FIFO. To do so, we initially identify other resource allocation methods that are ostensibly efficient, prominent in the literature, and comparable to FIFO. A comparison to these alternatives will be very helpful in fleshing out FIFO's relative strengths and weaknesses. We then distinguish the various levels on which adherence to FIFO can generate special benefits or costs.

Then, we examine FIFO's impact on those striving to obtain the allocated resources. The analysis examines both *ex post* and *ex ante* effects. From an *ex post* perspective, we inquire whether those receiving the resources under FIFO are likely to use them in a welfare-maximizing manner, as compared to other allocation methods. An allocation that enables the parties to maximize the utility of the allocated resources would be an efficient one. In addition, the analysis examines how setting various allocation rules impacts *ex ante* behavior of the parties striving to obtain these resources and whether these changes increase or reduce aggregate welfare. Further, we discuss the costs of administering, monitoring, and policing the allocation. These costs must be subtracted from the benefits addressed above in comparing various allocation methods. This analytical juncture is where FIFO demonstrates its greatest and most intuitive strength, although such strengths vary across contexts. As already obvious from this brief overview, FIFO's efficiency on this level is an insufficient basis for a finding that it is preferable to the alternatives. In addition, we examine the effects of applying FIFO on the allocator's incentive to expand the allocated resource. Finally, we examine the impact of the allocation method on broader social objectives, such as innovation, free speech, and democracy, using two-sided information markets as a test case.¹⁵⁰

B. FIFO'S ALTERNATIVES

We begin by identifying FIFO's alternatives to demonstrate through comparison FIFO's relative strengths and weaknesses. While an allocation could be carried out along countless lines, we will focus on participants': (1) willingness to pay; (2) need or expected enjoyment; (3) skills; and (4) service time.¹⁵¹ First, resources can be allocated based on the price

149. For instance, by prohibiting circumvention strategies. *See infra* Part III.C.

150. These effects are analyzed in contemporary law-and-economics literature. *See infra* note 282 and accompanying text.

151. Allocation methods based on these criteria are seemingly efficient and very common in the literature. Consequently, they are FIFO's most promising alternatives. *See, e.g.*, SANDEL, *supra* note 15, at 41 (discussing need and merit); Wittman, *supra* note 10, at 79–81 (discussing price, skill, and service time). Another method, which is based on some form of intensity, is “the

parties are willing to pay for them in an open market. This can be established by auctioning or selling resources off to the highest bidders. In theory, and absent various costs and failures that are never truly absent, such a process should lead to a welfare-maximizing allocation. Those who expect to derive the greatest utility from the allocated resource will be willing to place the highest bid.¹⁵² In some instances, however, willingness to pay does not reflect utility, so pricing will not optimize the allocation.¹⁵³ In other cases, pricing and commodification are unfitting in view of social perceptions or notions of fairness.¹⁵⁴ It should be noted that even when resources are allocated via queue for a price, the price paid is *lower* than the price that would have been paid in an auction or open market.

Allocation can also be carried out on the basis of need or expected enjoyment. Based on participants' own statements (assuming reliability) or on objective criteria, the allocator would rank participants according to their need for the underlying resource or their expected enjoyment from it in light of their respective tastes. The allocator would then carry out the allocation according to this ranking. While need and enjoyment are conceptually distinct,¹⁵⁵ they represent two possible manifestations of the resource's value or utility for each participant, and the borderline between them is blurry.¹⁵⁶

A third method may be premised upon participants' skills. Here the resource is allocated in accordance with the extent to which participants have the relevant skills to exploit the resource by using or developing it. Allocating a resource to the most skillful participants may increase its value, and therefore aggregate welfare.¹⁵⁷ Note, however, that applying a need- or skill-based allocation method is apt to be a challenge, considering the paucity of information available to allocators for properly assessing relative needs or skills.

Finally, in some instances, allocation might be carried out in inverse proportion to the projected service time, namely the duration of being served and occupying the allocator or the resource. This factor is most relevant in the allocation of renewable or sharable resources, such as physician appointments, highway usage, or even supermarket checkout. A

law of the jungle," whereby the strongest obtain priority. Because this method seems to be an analytical straw man, we do not discuss it here.

152. See Wittman, *supra* note 10, at 79.

153. See Daphna Lewinsohn-Zamir, *Identifying Intense Preferences*, 94 CORNELL L. REV. 1391, 1400 (2009) ("People's willingness to pay depends, at least partially, on their ability to pay, and thus on the existing distribution of wealth in society.").

154. See SANDEL, *supra* note 15, at 17-41 (addressing the tension between queues and markets).

155. We adopted the distinction between need and enjoyment as explained by Yaari & Bar-Hillel, *supra* note 40, at 8-15.

156. *Id.* at 14.

157. See Wittman, *supra* note 10, at 80 (explaining why skill-based allocations increase welfare).

“heavy user” blocks many others’ usage for an extended period of time. Allocating rights to heavy users first, while the others remain idle, might prove inefficient.¹⁵⁸ Instead, preference may be given to participants with shorter service times (“SST”), reducing the average waiting time and waiting-related costs.¹⁵⁹

Allocation according to these factors will strive to increase the economic pie. A policy aiming at optimal allocation will probably include some synergistic mix of these factors, with their specific internal balance set in accordance with various social understandings and objectives. Below we will examine how FIFO measures up to these four allocation strategies. Before continuing, however, we note a fifth strategy—random allocation, also referred to as random selection for service (“RSS”).¹⁶⁰ Here the allocation is a matter of chance, and the various factors mentioned above, as well as temporal advantage—the determining factor in FIFO allocations—are not significant. This method had been utilized more than once for important processes. For instance, in the 1980s, the United States used lotteries to allocate cell phone licenses to applicants.¹⁶¹ We are also witnessing some gains in the use of this strategy for event ticket distribution.¹⁶² As apparent from the actual use of this method in various contexts, it might sometimes prove the most efficient,¹⁶³ particularly where information problems significantly increase the administrative costs of other methods, or make them unfeasible.

C. IMPACT ON RECIPIENTS

Subjecting potential and actual recipients to various allocation methods generates different impacts, which in turn affect social welfare. In this Subpart, we address these impacts, while distinguishing between those unfolding before and after the actual allocation takes place. We begin with the latter, inquiring whether those receiving the resources via queues will use them in a welfare-maximizing manner, while explaining how individual responses to allocation mechanisms provide proxies for the resources’ objective or subjective value. We then move to address *ex ante* effects,

158. See RANDOLPH W. HALL, *QUEUEING METHODS FOR SERVICES AND MANAGEMENT* 316, 418 (1991) (explaining that serving those requiring shortest service first minimizes average waiting time for remaining queuers).

159. *Id.* at 334, 418.

160. See SANDEL, *supra* note 15, at 42 (discussing random allocation); Wittman, *supra* note 10, at 81 (same); see also NEIL DUXBURY, *RANDOM JUSTICE: ON LOTTERIES AND LEGAL DECISION-MAKING* 1 (1999); JON ELSTER, *SOLOMONIC JUDGEMENTS: STUDIES IN THE LIMITATIONS OF RATIONALITY* 36–39, 62–78 (1989).

161. See Thomas W. Hazlett & Robert J. Michaels, *The Cost of Rent-Seeking: Evidence from Cellular Telephone License Lotteries*, 59 S. ECON. J. 425, 425 (1993) (describing this method and its detriments).

162. See *supra* note 85 and accompanying text.

163. See Wittman, *supra* note 10, at 81 (explaining that random allocations may be efficient).

explaining how applying FIFO allocation rules leads to both benefits and waste resulting from the queue and resulting behaviors.

1. *Ex Post* Effects

On its face, the time one enters a queue does not correlate with price, need, or skills, which are often used for structuring efficient allocation schemes. Thus, to the extent that resources should be allocated to those who derive the greatest utility from them, FIFO appears to be a poor choice for an allocation rule. Upon closer examination, acquiring and maintaining a temporal advantage can at times serve as a crude proxy for some of the above factors. In these cases, FIFO will allocate resources to the parties that will exploit them most effectively with some precision and success. When adding these aspects to FIFO's low administrative costs, the overall advantage of FIFO becomes clear. The strengths of using temporal advantage as a proxy vary from one context to another. In some instances, it operates as a proxy for the individual's subjective understanding of his or her skill in exploiting the relevant resource, need for it, or value from using it. In others, it provides an objective indication of skill or value, which does not derive from individual perceptions.

A temporal advantage may serve as a proxy for subjective perceptions. Although an individual might arrive at a relevant queue before others due to dumb luck, a temporal advantage is often an indicator of efforts made to obtain the allocated resource, that is, an investment of time, energy, and money.¹⁶⁴ The fact that someone has achieved a temporal advantage may indicate that his or her efforts were greater than those of the competitors. In turn, effort serves as a proxy for three of the four factors specified above. Effort, as price, reflects the individual's expected utility from using the allocated resource.¹⁶⁵ Rather than outbidding others, individuals gaining a temporal advantage simply outrun them and might even be spending more money than others to get there first, while forgoing other lucrative opportunities. Effort may also be closely correlated with subjective perceptions of need and skill. That is, if an individual has a specific need for an asset or a specific skill for using it he or she will probably make a greater effort to enter the queue earlier.¹⁶⁶

164. Put differently, a temporal advantage may reflect the "opportunity costs" of queuers' time. *But see* Oberholzer-Gee, *supra* note 88, at 428 ("[T]he positions of individuals in the queue do not reflect their opportunity cost of time.").

165. *Cf.* Wittman, *supra* note 10, at 80–81 ("While the currencies of time and money are not very convertible, time is a reasonable proxy for price when the pricing system is not available. If someone is willing to wait in line, that reflects his intensity."); *see also* SANDEL, *supra* note 15, at 32 (arguing that standing in line is sometimes a better indicator of subjective valuation than willingness to pay).

166. *See, e.g.*, Edna Erez, *Random Assignment, the Least Fair of Them All: Prisoners' Attitudes Toward Various Criteria of Selection*, 23 CRIMINOLOGY 365, 373 (1985) (observing that those who preferred FIFO-based allocations ("First Come, First Served") believed "those who come first

At times, a temporal advantage is an objective proxy for skill, beyond the subjective perception that respective effort signals. For instance, this argument may be applied to seniority-based advantages in labor relations, in conjunction with the fairness justification outlined above.¹⁶⁷ Unions often endeavor to protect senior workers, insisting that the last employees to join the firm should be the first out.¹⁶⁸ This is substantively a FIFO-based policy.¹⁶⁹ Seniority rules might not reflect sound economic policy, but rather the political economy within unions and unions' political and economic power vis-à-vis employers. Nonetheless, some scholars argue that seniority rules must be adopted because they are efficient and therefore in the interests of society and even the relevant employers.¹⁷⁰ *Inter alia*, the employees' seniority, or their temporal advantage, indicates a higher level of skill and experience.¹⁷¹ Employers may respond that seniority rules are inefficient. In doing so, they need not reject the idea that holding a relevant position for an additional time period enhances an employee's skill. They should merely argue that the marginal increase in utility due to seniority is lower than the marginal increase in salary and benefits.¹⁷² Law enforcement is a key example in these debates, because the employees' accumulated skills are valuable not only to the employers, but also to the broader public.¹⁷³

In other contexts, such as conflicting transactions in property,¹⁷⁴ FIFO may serve as a proxy for the objective value of the allocated resource to the

need it more" (internal quotation marks omitted)). Admittedly, effort reflects the subjective perception of need or skill, rather than an objective evaluation of these factors (e.g., by an allocator). This is one of the reasons for the proxy's inaccuracy. *See also* ELSTER, *supra* note 160, at 70–72.

167. *See supra* notes 128–30 and accompanying text.

168. Posner, *supra* note 128, at 1000.

169. *See supra* note 131 and accompanying text.

170. *See, e.g.*, John Armour & Simon Deakin, *Insolvency and Employment Protection: The Mixed Effects of the Acquired Rights Directive*, 22 INT'L REV. L. & ECON. 443, 446 (2003) ("[E]mployers may choose to reward length of service with seniority bonuses as a part of a general incentives scheme aimed at enhancing loyalty and effort . . . where asymmetric information makes it problematic to link wages directly to individual output.").

171. *See* Seth D. Harris, *Re-Thinking the Economics of Discrimination: U.S. Airways v. Barnett, the ADA, and the Application of Internal Labor Market Theory*, 89 IOWA L. REV. 123, 157 (2003) ("[W]orkers increase their stock of both firm-specific and general skills and knowledge over time through on-the-job learning. Greater seniority thereby brings more skills and greater knowledge, which effects higher productivity that, in turn, begets higher wages.").

172. *See* Posner, *supra* note 128, at 1001 ("[F]or every older worker whom job security encourages to share his know-how . . . there is at least one other older worker . . . whom job security protects at the expense of a more efficient younger worker.").

173. *See, e.g.*, Martin H. Malin, *The Paradox of Public Sector Labor Law*, 84 IND. L.J. 1369, 1379 (2009) ("[S]eniority rules . . . would harm national security by precluding TSA's ability to assign the best screeners to the most sensitive jobs and would inhibit TSA's ability to keep screeners motivated.").

174. *See* Menachem Mautner, "The Eternal Triangles of the Law": *Toward a Theory of Priorities in Conflicts Involving Remote Parties*, 90 MICH. L. REV. 95, 134–38 (1991) (discussing the law applicable to conflicting transactions in property).

various recipients. Assume that *A* undertakes to sell an asset or a property right to *B*, and then undertakes to sell a conflicting right to *C*, without *B*'s knowledge. In these cases, especially with regard to land, the governing common law rule is "first in time, first in right,"¹⁷⁵ with several exceptions for bona fide purchasers.¹⁷⁶ Menachem Mautner explains that one of the reasons for giving preference to *B* (first in time) over *C* is that *B* probably suffered greater reliance and restitution damages.¹⁷⁷ The first in time (*B*) had, by definition, more time to engage in transactions and to undergo obligations regarding the underlying property. Therefore, a rule giving preference to *B* reduces reliance and restitutional losses to a greater extent than a rule giving preference to *C*. This rationale is clearly limited to instances in which a reliance interest develops prior to the actual allocation of the resource.¹⁷⁸

On the other hand, there are instances where a temporal advantage is not correlated with the alternative factors associated with welfare, such as need.¹⁷⁹ In these cases, FIFO does not produce an efficient allocation. For instance, medical resources in an emergency department cannot be allocated in accordance with temporal advantage, which does not serve as a good proxy for medical need. In such cases, allocators prefer and often use triage systems.¹⁸⁰

2. *Ex Ante* Effects

An efficiency analysis of FIFO or any other allocation method must take into account not only the method's impact on recipients' welfare after the allocation, but also its impact on potential recipients' conduct *ex ante*—that is, before they receive the resource or even enter the queue.¹⁸¹ An allocation method can provide incentives for welfare-generating strategic behavior, thereby enhancing its relative advantage. On the other hand, even if the allocation is efficient, the rule might not be welfare-maximizing, because the method may provide incentives for welfare-reducing strategic behavior. This segment of the analysis operates under the non-trivial assumption that individuals change their behavior in view of the incentive structure set out

175. See *id.* at 135 (discussing the concept).

176. See *id.* at 109–29.

177. *Id.* at 140 ("The rule granting priority to the party first in time. . . treats antecedence in time as a proxy for greater reliance and restitution losses." (footnote omitted)).

178. One might make a similar point about seniority in labor law: Senior workers attach greater value to their jobs because they have deeper roots in the workplace environment.

179. For a discussion of the faults of queues as signaling mechanisms, see Surajeet Chakravarty & Todd R. Kaplan, *Optimal Allocation Without Transfer Payments*, 77 GAMES & ECON. BEHAV. 1, 1–3 (2013).

180. See, e.g., Gerard FitzGerald et al., *Emergency Department Triage Revisited*, 27 EMERGENCY MED. J. 86, 87–89 (2010) (discussing triage systems).

181. Applying FIFO can also affect allocators' conduct. See *infra* note 227; *infra* Part II.E.

by law.¹⁸² It is fair to believe that this assumption will hold true when the parties are more sophisticated and the assets allocated are of greater value.¹⁸³

In some instances, adherence to FIFO promotes welfare-generating strategic conduct. This may occur where early utilization of the resource generates a greater societal benefit or reduces societal costs. Consider property law, where resources are often allocated on the basis of the “first in time, first in right” rule. A simple example is that of claiming an unclaimed chattel by capture, depicted in the renowned case of *Pierson v. Post*.¹⁸⁴ In this case, the parties and judges famously disagreed as to the proper rule for deciding who first captured the “noxious beast[] called a fox.”¹⁸⁵ Yet, it was clear to all that the proper allocation method was that of FIFO.¹⁸⁶ FIFO incentivizes individuals to gain a temporal advantage by awaking early and commencing hunting. As the dissent explains, such conduct increases aggregate welfare by leading to the “destruction of an animal, so cunning and ruthless in his career” as early as possible.¹⁸⁷

FIFO may also induce welfare-generating strategic behavior in a more sophisticated way, again most apparent in property law. Let us return to conflicting transactions, where a “first in time, first in right” rule with several exceptions is used to decide who will triumph and gain title.¹⁸⁸ Scholars have argued that such a rule efficiently allocates risk among the parties.¹⁸⁹ Assume again that *A* undertakes to sell an asset or a property right to *B*, and then undertakes to sell a conflicting right to *C* without *B*’s knowledge. Generally, *B* will be given preference. Arguably, *C* can limit his or her risks by investigating and learning about *A*’s earlier transaction, which is something that *B* cannot do, because the transaction between *A* and *C* transpires after the transaction between *A* and *B*. For that reason, *C* is the efficient bearer of

182. *But see* ROBERT C. ELLICKSON, ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES 144–45 (1991) (discussing how individuals frequently lack knowledge of the law).

183. This Subpart does not compare FIFO to alternative allocation methods, because a comparative analysis at this point would provide limited insights. Generally, random allocations do not induce strategic behavior given their unpredictable nature. Need- and skill-based methods generate limited incentives for strategic conduct because manipulating these factors entails extensive costs. Skill-based allocations of valuable resources, such as land or licenses, may indeed lead participants to acquire skills, but such conduct can more accurately be described as a direct and intended response to governmental incentives, rather than as “strategic behavior.” Becoming especially needy to obtain priority in a need-based allocation seems even less likely. *See also infra* note 203.

184. *Pierson v. Post*, 3 Cai. 175 (N.Y. 1805).

185. *Id.* at 175; *see supra* notes 142–44 and accompanying text.

186. Berger, *supra* note 17, at 354–55; Epstein, *supra* note 17, at 1224–25.

187. *Pierson*, 3 Cai. at 180–81 (Livingston, J., dissenting).

188. *See supra* notes 174–76.

189. Mautner, *supra* note 174, at 100–02.

risk.¹⁹⁰ By applying FIFO, the law incentivizes all the parties to engage in a positive form of strategic behavior—reasonably gathering relevant information and acting upon it.¹⁹¹ A transacting party will investigate if there are other transactions pertaining to the specific resource to assure that he or she is indeed the first in time and otherwise refrain from the relevant transaction. This form of strategic behavior also contributes to aggregate welfare: Decisions premised upon more information will better reflect individual preferences and prevent wasteful conflicts. The law nonetheless favors the second in time if he or she is a bona fide purchaser—that is, a purchaser for value without notice. Such an exception is not inconsistent with our theoretical argument. In the case of a bona fide purchase, the second in time could not have reasonably obtained information about a prior transaction. Thus, the second in time is not the better risk bearer, and other considerations must determine who should gain title.¹⁹²

In some instances, however, FIFO induces strategic conduct that entails additional costs. Those ought to be taken into account.¹⁹³ For example, resources expended on possession have alternative uses. Hence, assets that gradually increase in relative value (compared to alternative investments), such as land in developing areas, should not be acquired before the yield exceeds the cost of maintaining possession.¹⁹⁴ Yet, a FIFO-based allocation of such assets may induce premature possession, namely withdrawal of resources from superior alternatives to secure possession before one's competitors in view of a future surplus: "The anticipation of capturing property of future value induces abandonment of alternative pursuits of positive current productivity."¹⁹⁵ This problem may arise only with respect to

190. *Id.* at 100 ("[If] one of the two competing parties could have clearly prevented the occurrence of the conflict *ex ante* by incurring expenses relatively smaller than the value of the interests at stake (e.g., by informing potential second-in-time competing parties of his claim . . . or, having acquired knowledge of the existence of an earlier conflicting claim, by avoiding a conflicting transaction), taking into account the probability of the occurrence of a conflict, priority should be accorded to the other party.").

191. A similar rationale was voiced with respect to claims processing. *See* Schuck, *supra* note 40, at 561 ("Temporal priority . . . rewards those who take the trouble and initiative to assert their claims with dispatch. Thus it creates desirable incentives to obtain information and to act upon it.").

192. *See* Mautner, *supra* note 174, at 109–29 (discussing the good faith purchase exceptions and their rationales).

193. *See* Wittman, *supra* note 10, at 79 (explaining that the negative incentives a rule of thumb may generate should be examined by those setting the allocation rule when contemplating its use).

194. Another example discussed in the literature addresses the internal allocation of fishing areas. FCFS models of allocation caused fisherman to head out earlier to place markers—a wasteful activity. In response, these communities adopted a strategy of allocation through rotation. *See* John R. Boyce, *Allocation of Goods by Lottery*, 32 *ECON. INQUIRY* 457, 473 (1994).

195. David D. Haddock, *First Possession Versus Optimal Timing: Limiting the Dissipation of Economic Value*, 64 *WASH. U. L.Q.* 775, 776–77, 783 (1986).

known assets of growing relative value. Moreover, it may be limited by strategically setting the starting point of the race. Finally, according to some economists, the dissipation is mitigated when claimants are heterogeneous, as is frequently the case in real life.¹⁹⁶

Additionally, a FIFO-based allocation of a specific asset may generate wasteful races; that is, duplicative investments by competitors aiming to secure the same asset.¹⁹⁷ Allocating such specific assets at a relatively early stage, when claimant heterogeneity is still large, can partly resolve this problem.¹⁹⁸ Thus, in a shipwreck salvage case,¹⁹⁹ the court granted first salvor rights on the basis of “telepossession,” that is, “a combination of live imaging [of the shipwreck] coupled with the capability [and intent] to manipulate the environment through teleoperated or robotic vehicles.”²⁰⁰ Granting rights at this relatively early stage prevented duplication of the subsequent salvage process by competitors.²⁰¹

Another example is event ticket sales and scalping. Organizers often sell tickets on a “first-come-first-served” basis.²⁰² In terms of enhancing welfare, the ideal yet clearly unworkable allocation method would be to allocate tickets to those who value them the most, namely those who will appreciate and enjoy the event to the greatest extent or, in some cases, use the knowledge gained or inspiration drawn from the event to create something valuable for society. In the past, the box office adhered to FIFO, where prospective patrons waited in an actual line. Today, tickets are mostly sold on the Internet, where websites, such as ticketmaster.com, allocate them on a first-come-first-served basis. The fact that tickets are allocated on the basis of FIFO, rather than willingness to pay or other measures of value, has given rise to scalping—a secondary market for event tickets.

Whenever a secondary market exists, FIFO-based allocations motivate some people to obtain a temporal advantage only to be able to resell the resource. In these cases, a temporal advantage is a very weak proxy for the

196. Lueck, *supra* note 9, at 400–03.

197. Haddock, *supra* note 195, at 780. A very recent example of such wasteful races are massive investments in computer and telecommunications infrastructure to enable the quickest form of trading—which led to an arms race among entities involved in high frequency and speed trading on financial and commodity markets. See Frank Pasquale, *The Emperor’s New Codes: Reputation and Search Algorithms in the Finance Sector* 51–54 (Apr. 16, 2013) (unpublished manuscript), available at <http://governingalgorithms.org/wp-content/uploads/2013/05/2-paper-pasquale.pdf>.

198. Lueck, *supra* note 9, at 417–18.

199. *Columbus-America Discovery Grp., Inc. v. Unidentified, Wrecked & Abandoned Sailing Vessel, S.S. Cent. Am.*, 1989 A.M.C. 1955, 1958 (E.D. Va. 1989).

200. *Id.*

201. Lueck, *supra* note 9, at 413.

202. However, this strategy is being reconsidered, and a shift to other allocation methods (such as lotteries) is possible. See Happel & Jennings, *supra* note 85, at 448.

subjective value the purchaser attaches to the resource.²⁰³ Of course, secondary markets may supplement all allocation methods and may have some benefits. At this point, we are merely pointing out that adherence to a raw version of FIFO may induce strategic behavior that loosens the relation between temporal advantage and value. Whether the existence of a secondary market leads to efficient (and fair) outcomes is a difficult and thorny issue, which will be addressed below.²⁰⁴

At any rate, if proven economically harmful, several countering mechanisms could be introduced to undermine the secondary market. For example, anti-scalping laws may limit scalpers' strategic conduct.²⁰⁵ Additionally, ticket distributors can shift to paperless tickets, requiring patrons to identify themselves with credit cards when entering the venue.²⁰⁶ Biometric verification can follow suit, further encumbering the secondary market.²⁰⁷ With no secondary market allowed or available, strategic players will exit the queue, leaving space for those correctly signaling their subjective valuation of the resource.²⁰⁸

D. TRANSACTION AND ADMINISTRATIVE COSTS

Although acquiring and maintaining a temporal advantage may serve as a crude proxy for welfare-sensitive factors, FIFO's most apparent efficiency-oriented strength is its low administrative costs, including the costs of explaining the method, monitoring compliance, and resolving disputes. As Richard Epstein explained in the context of property law, a solution based on temporal advantage to an extremely difficult and explosive dispute can be quite easily applied.²⁰⁹ To administer FIFO, the allocator need not explain complex intricacies of the allocation method to the participants; setting forth the principle of "first-come-first-served" is sufficient. Moreover, monitoring and adjudicating disputes in a FIFO-based system entails neither

203. Similar incentives may arise under price-based allocation methods, assuming secondary markets are allowed by law.

204. See *infra* Part III.C.2. For further discussion, see also Yoram Barzel, *A Theory of Rationing by Waiting*, 17 J.L. & ECON. 73, 83–84 (1974). Barzel here explains that prices in secondary markets that follow a primary allocation via queue will produce prices that are higher than alternative settings, as these prices will now include the pricing of the waiting time those who obtained the resources on the primary market incurred. Discussing the intricacies of instances when these dynamics will and will not transpire is beyond the scope of this Article.

205. See Happel & Jennings, *supra* note 85, at 449.

206. See, e.g., *Ticketmaster Credit Card Entry*, TICKETMASTER, <http://www.ticketmaster.com/creditcardentry> (last visited Mar. 21, 2014).

207. See, e.g., Karen Harmel, *Walt Disney World: The Government's Tomorrowland?*, NEWS 21 (Sept. 1, 2006), http://news21.com/story/2006/09/01/walt_disney_world_the_governments (discussing biometric identification at Disney World).

208. See SANDEL, *supra* note 15, at 32 (explaining that standing in line may be a better indicator of subjective valuation than willingness to pay).

209. Richard A. Epstein, *Past and Future: The Temporal Dimension in the Law of Property*, 64 WASH. U. L.Q. 667, 670 (1986); see also Epstein, *supra* note 17, at 1222–23.

intensive surveillance nor expensive fact-finding and decision-making processes. Applying FIFO merely requires a calendar or a watch and minimal observation. Moreover, FIFO is so simple to understand and easy to apply that it is sometimes conducive to regulation and enforcement by the queuers themselves, without any legal intervention. This is an important benefit in itself, given the cost of governmental enforcement.

Thus, from an administrative costs perspective, FIFO stands in sharp contrast to the alternative allocation methods set forth. Deciding who has greater skill, need, or even willingness to pay, is far more complicated for the allocator.²¹⁰ Additionally, self-regulation and enforcement by queuers is less likely, as queuers may have different subjective perceptions of skill, need, or the like.²¹¹ FIFO might indeed call for some exceptions,²¹² but implementing them would be far less costly than a systematic evaluation of all potential recipients.

Even establishing a temporal advantage, however, can be difficult. At times, it is unclear what a person must do to be deemed “first.” For example, should a land title be given to the first person to record a transaction or the first to provide notice about it?²¹³ Should a patent be granted to the “first-to-file” or the “first-to-invent”?²¹⁴ In the context of *Pierson v. Post*,²¹⁵ should a property right be awarded to the first person to intercept the fox so as to “render escape impossible”²¹⁶ or to the first to have a “reasonable prospect . . . of taking” it?²¹⁷ Should ownership of a whale be granted to the

210. Robert Ellickson makes a similar argument when discussing the differences between a traditional property regime pertaining to parcels with clear borders and a commons regime involving complex rules for joint use. See generally Robert C. Ellickson, *Property in Land*, 102 YALE L.J. 1315, 1323–32 (1993). He shows that the administrative costs of the former are far lower than those of the latter. *Id.* For instance, very simple technology, such as a fence or a dog, may be sufficient for enforcing property rights, but “useless in enforcing a group’s internal rules of conduct.” *Id.* at 1329.

211. This argument may be inapplicable to willingness to pay, which is sometimes easier to establish than temporal advantage.

212. See *infra* Part III.B.

213. See JESSE DUKEMINIER ET AL., PROPERTY 667–69 (7th ed. 2010) (distinguishing “race statutes,” whereby the first to record wins, “notice statutes,” whereby a subsequent purchaser prevails if she had no notice of the prior conveyance, and “race-notice statutes,” whereby a subsequent purchaser prevails if she records first without knowing about the prior conveyance); see also *supra* notes 199–201 and accompanying text.

214. Compare Charles L. Gholz, *First-to-File or First-to-Invent?*, 82 J. PAT. & TRADEMARK OFF. SOC’Y 891 (2000) (advocating a first-to-file system), with Stephanie Gore, “Eureka! But I Filed Too Late . . .”: *The Harm/Benefit Dichotomy of a First-to-File Patent System*, 1993 U. CHI. L. SCH. ROUNDTABLE 293 (advocating a first-to-invent system).

215. *Pierson v. Post*, 3 Cai. 175 (N.Y. 1805).

216. *Id.* at 178.

217. *Id.* at 182 (Livingston, J., dissenting); see also Epstein, *supra* note 17, at 1225 (explaining that the court focused on “what counts as taking first possession”).

first to fasten it to the ship (the “fast-fish, loose-fish” rule)²¹⁸ or to the first to affix a harpoon (the “iron-holds-the-whale” rule, adopted in *Swift v. Gifford*²¹⁹)? Moreover, it is not always clear whether the allocated asset is part of the flow from a certain source or the source itself. For example, should we grant ownership of a single barrel of oil to the first person who brings it to the surface or grant ownership of the entire reservoir to the first successful driller? Social or even legal norms must, and indeed do, respond to such questions in order to enable self-rule by the parties. Thus, these difficulties do not undermine the relative advantage of FIFO.

Beyond these general observations, we wish to note four settings in which FIFO is an even more attractive option, owed to its relatively low operating costs: (1) frequent allocations requiring very quick decisions; (2) ongoing allocations of resources for immediate use; (3) cases in which FIFO is a default that most parties would opt for; and (4) cases where social norms reject deviation from FIFO. FIFO’s advantages in these contexts are not set in stone and are subject to changes due to technological advances. We will discuss each of these special settings in turn.

Frequent Allocations. First, FIFO saves significant costs when allocation decisions must be made quickly with respect to given sets of participants, due to their very high frequency. Using examples as mundane as a four-way traffic stop, Donald Wittman demonstrates that establishing who arrived first is quicker and easier than administering any alternative rule.²²⁰ Other rules would generate substantial waste and inefficiency by slowing down all parties for a lengthy deliberation or negotiation. Now imagine the aggregate cost of even a one-minute delay at every four-way traffic stop. In technical terms, FIFO limits the idleness of the allocation participants. It also limits the idleness of the resource (the road) that may be left unattended as the allocation proceeds.²²¹

Technology constantly challenges this line of argument. New innovations may render some of the alternative methods cheaper to implement. Automated communications and computer data processing allow individuals to quickly and easily signal their needs, skills, and willingness to pay in real time, and allocators to easily aggregate and utilize the data. These innovations lower the time and costs of establishing relative need or willingness to pay and could make a shift away from FIFO a viable option. A simple example pertains to highways. In the past, highway traffic was governed by one simple rule: FIFO. The first car on the road got ahead

218. Lueck, *supra* note 9, at 425 (discussing whaling laws); *see also* HERMAN MELVILLE, *MOBY-DICK* 459–63 (George Stade ed., Barnes & Noble Classics 2003) (1851) (providing a literary treatment of the whaling customs of fast-fish and loose-fish).

219. *Swift v. Gifford*, 23 F. Cas. 558, 559–60 (D. Mass. 1872) (No. 13,696).

220. Wittman, *supra* note 10, at 80–81.

221. *See* Schwartz, *supra* note 89, at 843 (discussing the tremendous costs of delay and congestion).

first. There was no other way to determine who should travel the highways first. Nowadays, some highways are allowing price to regulate the highway queue (traffic). This is achieved by introducing special toll lanes that allow quicker access,²²² a pattern already taking hold in amusement parks and airline check-in systems.²²³ A more recent development is a system in which tolls fluctuate based on demand, corresponding to some extent to a market-based allocation with limited administrative costs.²²⁴ One might speculate that in the not-so-distant future, signaling need and willingness to pay may become feasible even at the four-way traffic stop. Accordingly, the four-way stop signs and relevant traffic laws could be replaced by an automated traffic signal governing traffic flow priorities in real time, unless there are other normative reasons to refrain from doing so.

Ongoing Allocations for Immediate Use. Second, FIFO may reduce administrative costs when there is a continuous flow of allocation participants, and the resource is allocated on an ongoing basis for immediate use.²²⁵ For example, consider the allocation of parking spots at a coveted parking lot downtown. At 10:30 AM a parking space was made available. At 10:31 AM Alice took the spot, left her car, and went for a leisurely walk. At 10:32 AM Bob arrived, but the lot was full. Bob was late for an urgent meeting that could cost him his job. In this scenario, the allocation is premised upon temporal advantage, which is a crude (and in this case, wrong) proxy for the respective needs of Alice and Bob. However, a method striving to allocate this resource in accordance with participants' relative needs might require stalling the allocation until all applications for the resource are put forward. Thereafter, the rule would set priorities among the applicants and allocate accordingly. For instance, the parking lot might decide that all parking spaces made available between 10:30 and 11:00 AM will be allocated at 11:01 AM through an auction. At this point, the allocator will select several fortunate drivers among those who congregated at the entrance between 10:30 and 11:00 AM. If that were the case, then Bob, rather than Alice, would receive the space. Setting aside the costs of processing and prioritizing applications at 11:00 AM, FIFO provides a substantial benefit in its ability to fill vacant spaces immediately. It limits the idleness of the allocator, the participants, and the resource itself. Other

222. SANDEL, *supra* note 15, at 20–21.

223. *Id.* at 17–18.

224. For example, Washington State operates the SR 167 high occupancy/toll (“HOT”) lanes, in which toll rates vary with the level of congestion. See *SR 167 HOT Lanes*, WASH. STATE DEP’T OF TRANSP., <http://www.wsdot.wa.gov/Tolling/SR167HotLanes/default.htm> (last visited Mar. 21, 2014). For a general discussion of HOT lanes, see FED. HIGHWAY ADMIN., U.S. DEP’T OF TRANSP., *A GUIDE FOR HOT LANE DEVELOPMENT* (2003), available at http://ntl.bts.gov/lib/jpdodocs/repts_te/13668_files/images/13668.pdf; Strahilevitz, *supra* note 54, at 1249–51.

225. Peter Stone makes a related argument, noting the benefits of queuing when the precise number of claimants is not known in advance. See generally PETER STONE, *THE LUCK OF THE DRAW: THE ROLE OF LOTTERIES IN DECISION MAKING* (2011).

methods would leave parking spaces empty for up to thirty minutes. From the participants' perspective, the idleness is reflected not only in the relatively lengthy process of choosing the recipients, but also in waiting up to thirty minutes for the allocation process to commence. A similar problem would arise if doctors' appointments were allocated only after all applications were put forward, as both the doctor and the patients would remain idle in the meantime. As opposed to the previously discussed setting, technological innovations that enable quick signaling and data processing do not make a real difference here. The cost of idling includes not only that arising from the extensive selection process, but also that arising from the wait for it.²²⁶

The advantage of reducing idleness must be balanced against the cost of immediate allocation to the "wrong" parties, namely the less needy, less skillful, etc. Therefore, FIFO may be attractive when the costs of its alternatives—in terms of idleness of the allocator, the participants, or the resource—are higher than the cost of allocating to the wrong parties through FIFO. Consider, for example, organ transplants. Any delay in the allocation process may affect the participants and the resource. Waiting for better matches can cause harm to ailing patients and to available organs. Allocating organs based on FIFO rather than waiting for the best matches has some merit, and temporal advantage is indeed taken into account in such allocations.²²⁷

Mass tort litigation is a more difficult case.²²⁸ Should a given compensation pool, such as the BP Deepwater Horizon oil spill compensation fund, be allocated on an ongoing basis to those presenting claims, running the risk of emptying prematurely and leaving late-claimants without any relief? Or should the allocation be stalled for a lengthy period until all claims are submitted? While the costs of idleness of the allocator and the resource are limited, participants' idleness costs vary and may be substantial. In some cases, individual idleness cost is limited to the loss of interest on expected compensation. In others, where the funds are needed to pay urgent medical bills or reopen the family business, the idleness cost

226. Technology, in particular data gathering and analyzing tools, enables allocators to engage in price discrimination, thereby achieving more efficient allocations while limiting idleness. For example, allocators may be able to predict with greater precision when high-value customers are due to arrive and be able to reserve resources for them. In fact, many parking lots are already setting a low early-bird price in the morning, leaving spaces for late-coming full-price customers.

227. See ELISABETH BUGGINS, ALLOCATION OF ORGANS TO NON UK EU RESIDENTS 23–30 (2009), available at <http://www.bts.org.uk/Documents/Publications/Buggins%20Report%20-%20ALLOCATION%20OF%20ORGANS%20TO%20NON%20UK%20EU%20RESIDENTS.pdf> (explaining that in the UK organs are generally allocated by the duty office at the National Health Service Blood and Transplant (NHSBT) based on FIFO, with the exception of "super urgent cases with blood group or age compatibility").

228. See Chavkin, *supra* note 4 (discussing BP's compensation fund).

may be quite high. Depending on the prevalence of such cases FIFO may be either set aside or applied with a “special need” exception.²²⁹

FIFO as a Default. Third, setting a FIFO rule may sometimes reduce participants’ transaction costs. In other words, allocation through FIFO may reflect the common preferences of participants, making it a defensible default mechanism. To explain, we return to property law, this time focusing on secured transactions. Assume that a debtor (*A*) provides two creditors (*B* and *C*) with a secured interest in the same property. The creditors are ranked in accordance with a “first in time, first in right” rule,²³⁰ set forth in Article 9 of the UCC.²³¹ “First” here denotes first-to-file a financing statement or perfect a security interest.²³² Therefore, in most cases, the second in time (*C*) could have learned about the prior secured transaction, but nonetheless chose to create the subsequent lien. The applicable rule can be easily defended on various grounds discussed above, such as the senior creditor’s greater reliance²³³ and the need to incentivize creditors to seek out prior filings.²³⁴ Yet Jackson and Kronman approach the rule from a different perspective. They argue that both current and future creditors, if asked to negotiate priorities *ex ante*, would opt for a “first in time, first in right” rule: All would choose a process that limits their exposure to future occurrences they cannot control, and all would assume the risk of non-payment due to prior secured loans. Subsequent creditors would respond to the encumbrance of the property with a superior lien by adjusting the required interest rate on their loans.²³⁵ Jackson and Kronman further note that as FIFO in this context is merely a default rule, the creditors are free to contract around it.²³⁶

Admittedly, FIFO will relatively rarely be an acceptable default. In many cases, at least one of the parties will object to using FIFO, preferring another allocation method that is more beneficial to him or her. The unique attribute of the situation addressed by Jackson and Kronman is that the parties entering the queue know their position in advance and can presumably take actions to mitigate their subordination to others, or they can refrain from entering the relevant queue, taking their money elsewhere.

229. See *infra* Part III.B.2.

230. See WHITE & SUMMERS, *supra* note 5, § 33–3; Thomas H. Jackson & Anthony T. Kronman, *Secured Financing and Priorities Among Creditors*, 88 YALE L.J. 1143, 1162 (1979) (discussing the codification of the version of U.C.C. § 9–322 then in force). Jackson and Kronman also discuss some of the rule’s exceptions. *Id.* at 1144–45 n.7, 1162 n.65.

231. U.C.C. § 9–322(a)(1) (2011). Jackson and Kronman, *supra* note 230, discuss an older version of this Section.

232. Jackson & Kronman, *supra* note 230, at 1178.

233. See *supra* note 177 and accompanying text.

234. See *supra* notes 190–91 and accompanying text.

235. Jackson & Kronman, *supra* note 230, at 1162–63.

236. *Id.* at 1168–69 n.83.

FIFO as a Social Norm. Fourth, applying FIFO may prevent a loss of welfare whenever its application complies with a common perception of fairness.²³⁷ The benefits are twofold. The cost of administering a rule that is almost second nature for many people might be lower than that of other methods. Using a method that is inconsistent with common perceptions of fairness may lead to discontent and disobedience among participants. The allocator might be required to invest heavily in monitoring and enforcing a method with which participants are less likely to voluntarily cooperate. Moreover, employing an allocation method that coincides with common perceptions of fairness lowers operating costs in another way. When participants are obligated to take part in a process that deviates from such perceptions, they experience aggravation. The disparity between reality and their expectations lowers the utility that they derive from the process.²³⁸ Adherence to FIFO reduces this cost.

Presumably, voluntary cooperation with an allocation process is highest, and social enforcement mechanisms are most powerful, when the process is visible and transparent. A salient example would be physical waiting lines, where reciprocal monitoring is possible.²³⁹ The importance of visibility also means that any argument that hinges on FIFO's compliance with common perceptions of fairness should be taken with a grain of salt. Through architectural techniques, allocators can manipulate participants' reactions to FIFO violations. For example, an allocator may keep VIP queues out of sight of ordinary customers, thereby reducing participants' awareness of FIFO's violation, limiting their resistance, and minimizing the consequent loss of welfare.²⁴⁰ This caveat is even more pertinent to virtual queues, as in computerized service systems and inbound call centers. Here, queuers cannot see or communicate with each other, so social norms are almost muted.

In summary, applying FIFO instead of other allocation methods might reduce administrative costs. We must emphasize, however, that this clear benefit cannot in itself justify the use of FIFO. One must also consider whether FIFO allocates the resources to those who will use them most efficiently. Any gain on the administrative costs level should be balanced against the potential loss of welfare due to improper allocation. We also

237. See *supra* Part I.B.

238. See Kaplow & Shavell, *supra* note 18, at 1035 (“[I]ndividuals may have tastes for a notion of fairness, and, to that extent, a welfare economic analysis of legal rules takes their tastes into account.”).

239. See Anat Rafaeli et al., *Queues and Fairness: A Multiple Study Experimental Investigation* (2003) (unpublished manuscript), available at <http://ie.technion.ac.il/Home/Users/anatr/JAP-Fairness-Submission.pdf> (explaining that queuers monitor the queue).

240. See David H. Maister, *The Psychology of Waiting Lines*, in *THE SERVICE ENCOUNTER: MANAGING EMPLOYEE/CUSTOMER INTERACTION IN SERVICE BUSINESSES* 113, 120–21 (John A. Czepiel et al. eds., 1985) (discussing this technique).

showed FIFO's special advantages in four settings. These benefits are unstable and limited. Therefore, in analyzing novel situations, one must keep in mind the intricacies of our analysis, rather than quickly assuming that FIFO should be applied.

E. INCENTIVIZING THE ALLOCATOR TO EXPAND THE RESOURCE

Selecting an allocation method has additional, far-reaching effects. Recent studies of infrastructure and telecommunications regulation show that the allocation method may have an impact on the extent of the allocated resource. Our argument is limited to allocations that meet the following prerequisites: (1) the allocated resource is renewable or reusable (for instance, once a vehicle passes through a highway, another can use it);²⁴¹ (2) the resource is finite, but expandable at a high cost (again, consider a highway); (3) the allocator is a private entity; and (4) the allocator, rather than the regulator, determines the extent of the allocated resource. Under these circumstances, the firm's decision to expand the allocated resource may depend on the allocation method. Moreover, this Subpart assumes *arguendo* that infrastructure investments are efficient: The positive externalities of infrastructure enhancement²⁴² (e.g., reducing congestion²⁴³) often exceed the required investment, making it efficient. Admittedly, in some cases expanding infrastructure can lead to economic waste,²⁴⁴ even bankruptcy.²⁴⁵ Yet here we focus on the former setting.

An analysis of the impact of allocation methods on allocators' investment incentives has recently emerged in the net neutrality ("NN") debate, but can be applied to all cases of network infrastructure.²⁴⁶ This polarized and politicized discussion focuses on broadband providers. As Tim Wu explains, NN is a "network design principle," whereby "a maximally useful public information network aspires to treat all content, sites, and platforms equally."²⁴⁷ Therefore, the relevant network—such as the

241. See BRETT M. FRISCHMANN, *INFRASTRUCTURE: THE SOCIAL VALUE OF SHARED RESOURCES* 137 (2012) (introducing the defining elements of infrastructure resources).

242. See ORG. FOR ECON. CO-OPERATION & DEV., *THE ROLE OF COMMUNICATION INFRASTRUCTURE INVESTMENT IN ECONOMIC RECOVERY* 4-5, 32-34 (2009), available at <http://www.oecd.org/internet/broadband/42799709.pdf> (discussing these benefits).

243. See FRISCHMANN, *supra* note 241, at 155 (explaining that infrastructure congestion could be addressed by capacity expansion).

244. See *id.* at 143 ("[M]aintaining excess capacity may be wasteful.").

245. See, e.g., David Ehrhardt & Rebecca Burdon, *Free Entry in Infrastructure* 37, 40, 49 (World Bank, Policy Research Working Paper No. 2093, 1999), available at http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/1999/06/04/00009496_99042010294293/Rendered/PDF/multi_page.pdf (explaining that in the late-nineteenth century, wastefully duplicative investments in infrastructure drove many railway companies to bankruptcy).

246. See FRISCHMANN, *supra* note 241, at 136-58.

247. Tim Wu, *Network Neutrality FAQ*, TIM WU, http://timwu.org/network_neutrality.html (last visited Mar. 21, 2014). Wu explains that although the NN principle is a relatively recent

Internet—must be constructed in a way that provides end users (websites and other application providers) with non-discriminatory access to all other users or content providers,²⁴⁸ subject to limited exceptions.²⁴⁹ In particular, broadband providers cannot prioritize information received from or for specific users. Put differently, they cannot offer internet service on several tiers of quality, assuring that information packets from some content providers receive priority over others on their way to end users.

Wu and others argue that adherence to NN is one of the main reasons for the Internet's remarkable success and its great contribution to technological innovation over the last two decades.²⁵⁰ Wu concludes that if the NN principle is compromised, the law should enforce it.²⁵¹ NN opponents respond that some Internet applications, such as telemedicine, HDTV live sports broadcasts, and some forms of teleconferencing call for a "Quality of Service" ("QoS") guarantee.²⁵² These applications require high-quality video in real time and are therefore sensitive to delays. If all bits are treated equally, latency and congestion may ensue. A QoS tier of communications assures that the service is properly provided. In addition,

development, its origins date back to the early days of the Internet. NN closely resembles the end-to-end ("E2E") design principle. See J.H. Saltzer et al., *End-to-End Arguments in System Design*, 2 ACM TRANSACTIONS ON COMPUTER SYS. 277 (1984) (discussing the E2E principle). Some argue that the origins of NN date back to the "common carrier," which was required to provide non-discriminatory access to all customers. See, e.g., Brett M. Frischmann, *An Economic Theory of Infrastructure and Commons Management*, 89 MINN. L. REV. 917, 963 (2005).

248. See 47 C.F.R. § 8.7 (2011) ("A person engaged in the provision of fixed broadband Internet access service . . . shall not unreasonably discriminate in transmitting lawful network traffic over a consumer's broadband Internet access service."); *In re Preserving the Open Internet Broadband Indus. Practices*, 25 F.C.C. Rcd. 17905 (2010) (introducing the regulations). NN imposes additional requirements, such as the prohibition against blocking "lawful content, applications, services, or non-harmful devices." 47 C.F.R. § 8.5.

These rules were partially vacated in *Verizon v. Federal Communications Commission*, No. 11-1355 (D.C. Cir. Jan. 14, 2014). However, the FCC intends to rewrite these rules based on the court's guidelines so that they fit the agency's mandate. See Statement by FCC Chairman Tom Wheeler on the FCC's Open Internet Rules (February 19, 2014), available at http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0219/DOC-325654A1.pdf.

249. 47 C.F.R. § 8.7 ("Reasonable network management shall not constitute unreasonable discrimination.").

250. Letter from Timothy Wu, Assoc. Professor, Univ. of Va. Sch. of Law, & Lawrence Lessig, Professor of Law, Stanford Law Sch., to Marlene H. Dortch, Sec'y, FCC 5-6 (Aug. 22, 2003), available at http://faculty.virginia.edu/timwu/wu_lessig_fcc.pdf (discussing Ex Parte Submission in CS Docket No. 02-52).

251. Wu, *supra* note 247 ("[W]hen carriers are interested in discriminating for one of various reasons . . . a law may be necessary.").

252. See Christopher S. Yoo, *Network Neutrality and the Economics of Congestion*, 94 GEO. L.J. 1847, 1863 (2006) ("[E]nd users are more frequently using applications that are sensitive to delay Thus, guaranteed throughput rates have become increasingly important at the precise time that increases in the volume of traffic are making quality of service harder to maintain.").

there seems to be strong opposition to legal enforcement of NN.²⁵³ Thus, NN has sparked fierce battles in law reviews,²⁵⁴ in courts,²⁵⁵ and even within the FCC.²⁵⁶

At least one aspect of the NN debate can be framed as a discussion about FIFO: Must broadband providers treat data transferred online on a first-come-first-served basis, or are they allowed to consider other allocation methods? Indeed, the protocols used for routing data online, which currently adhere to the NN principle, implement a model with some resemblance to FIFO, with embedded exceptions that account for differences in service time.²⁵⁷ NN opponents might be understood as advocating prioritization of data transfers on the basis of alternative criteria addressed in Subpart II.B: price, need, skill, and service time.²⁵⁸ Conceptualizing the NN debate in this manner, it becomes apparent that the vast literature on NN may be highly relevant to a broad discussion of FIFO.

Before showing how the NN debate can enrich the theoretical analysis of FIFO, an important caveat is appropriate. The NN principle, as its name implies, is rooted in a broader notion of equality—allowing all users and content providers to participate in online communications on equal grounds. FIFO has been used not only because it can achieve this goal, but also because it could be easily implemented in this particular context.²⁵⁹ Consequently, NN theorists have not compared FIFO to other egalitarian

253. *Id.* at 1897 (discussing “[t]he [d]anger of [p]rophyllactic [i]ntervention in the [f]ace of [u]ncertainty”).

254. *See, e.g.*, Brett M. Frischmann & Barbara van Schewick, *Network Neutrality and the Economics of an Information Superhighway: A Reply to Professor Yoo*, 47 JURIMETRICS J. 383 (2007); Barbara van Schewick, *Towards an Economic Framework for Network Neutrality Regulation*, 5 J. ON TELECOMM. & HIGH TECH. L. 329 (2007); Tim Wu, *Network Neutrality, Broadband Discrimination*, 2 J. ON TELECOMM. & HIGH TECH. L. 141 (2003); Tim Wu, *The Broadband Debate, A User’s Guide*, 3 J. ON TELECOMM. & HIGH TECH. L. 69 (2004); Christopher S. Yoo, *Beyond Network Neutrality*, 19 HARV. J.L. & TECH. 1 (2005); Yoo, *supra* note 252.

255. *See, e.g.*, Verizon v. FCC, No. 11-1355 (D.C. Cir. Jan. 14, 2014); Comcast Corp. v. FCC, 600 F.3d 642, 644 (D.C. Cir. 2010) (discussing the FCC’s authority to regulate NN).

256. *See In re Preserving the Open Internet Broadband Indus. Practices*, 25 F.C.C. Rcd. 17905 (2010).

257. The extent to which the Internet has adhered to FIFO is a complex and controversial issue. *See* Yoo, *supra* note 254, at 8, 21 (explaining that “TCP/IP routes packets anonymously on a” FIFO basis); *see also* Edward W. Felten, *The Nuts and Bolts of Network Neutrality* 4 (July 6, 2006) (unpublished manuscript), *available at* <http://citpsite.s3-website-us-east-1.amazonaws.com/oldsite-htdocs/pub/neutrality.pdf> (“You might expect the router to send the packet that has been waiting the longest—a first-come, first-served rule. Often that is what happens, but the Internet Protocol doesn’t require routers to forward packets in any particular order. In principle a router can choose any packet it likes to forward next.”).

258. *See supra* Part II.B.

259. *See* Kai Zhu, Note, *Bringing Neutrality to Network Neutrality*, 22 BERKELEY TECH. L.J. 615, 620 (2007) (“[I]t is very easy to implement FIFO, and thus FIFO became ubiquitous in older routers and is still dominant in modern routers.”).

methods, such as RSS, which were unfit for telecommunications but might be feasible in other contexts.²⁶⁰ The NN debate cannot help determine whether FIFO is generally preferable to such methods. Nonetheless, this debate can unveil and highlight some of the strengths and weaknesses that FIFO might have in comparison to allocation methods based on price, need, skill, and service time.

A specific subset of the NN debate that pertains to our analysis concerns the impact of the allocation method on broadband providers' incentives to further develop their infrastructure. NN opponents explain that allowing broadband providers to deviate from a NN allocation model and to structure a tier-based system (offering a QoS feature) provides them with an additional surplus, because they can extract higher rents from websites and perhaps end users.²⁶¹ Given the intense competition among broadband providers, they are motivated to invest the additional surplus in enhancing infrastructure.²⁶² In other words, the allocation method affects the firms' ability and incentives to enhance existing infrastructure. To the extent that investment in infrastructure is cost-justified, adherence to a non-discriminatory allocation method, such as FIFO, might be inefficient.

While deviating from NN clearly nets broadband providers a greater surplus, not all agree that more investment in infrastructure follows. Some studies indicate that deviating from NN does indeed lead to additional investment in infrastructure,²⁶³ whereas others show that firms prefer to pocket the additional funds rather than investing them.²⁶⁴ Furthermore, some scholars contend that implementing NN policy, not deviating from it, better incentivizes infrastructure investment.²⁶⁵ These scholars speculate that under the NN rule, infrastructure firms cannot extract rents by discriminating among users, and therefore must develop their business in a different direction—by expanding their capacity. This enables them to provide a higher quality of services for which they can charge higher fees.

260. RSS is generally problematic in cases of an infinite, ongoing allocation.

261. See Nicholas Economides & Joacim Tåg, *Network Neutrality and Network Management Regulation: Quality of Service, Price Discrimination, and Exclusive Contracts*, in RESEARCH HANDBOOK ON GOVERNANCE OF THE INTERNET 121 (Ian Brown ed. 2013) (explaining that allowing prioritization enables rent extraction).

262. Nicholas Economides & Joacim Tåg, *Network Neutrality on the Internet: A Two-Sided Market Analysis*, 24 INFO. ECON. & POL'Y 91, 93 (2012) (“[D]espite assuming network congestion, [Economides & Hermalin] find that network neutrality is welfare-superior to bandwidth subdivision and prioritization They also find that the incentive to invest in bandwidth is greater when the ISPs can price discriminate, and investment in bandwidth may mitigate or even reverse the welfare losses of departures from network neutrality.”).

263. Economides & Tåg, *supra* note 262, at 128.

264. *Id.* at 127–28.

265. See Hsing Kenneth Cheng et al., *The Debate on Net Neutrality: A Policy Perspective*, 22 INFO. SYS. RES. 60, 74–75 (2011) (“The incentive for the broadband service provider to expand under NN is mostly higher than the incentive to expand when the principle of NN is abolished.”).

The literature is, therefore, inconclusive. However, the innovative insight is worth emphasizing: Selecting an allocation method affects not only participants' welfare and behavior, but also allocators' conduct, and possibly the extent of the allocated resources.

F. BROADER SOCIAL BENEFITS

The comparison between FIFO and other allocation methods can be carried out on another, more general, level. When the resource allocated involves the creation and flow of information, the allocation method can arguably affect the production of knowledge, innovation, the marketplace of ideas, or even free speech and democracy-related interests.²⁶⁶ These elements are distinguishable from the effects of FIFO discussed thus far because they represent the allocation method's *direct* impact on third parties and the public at large, not only on those taking part in the allocation process.

Such effects are extensively discussed with respect to patent law, which generally applies one of two versions of FIFO to patents: first-to-file or first-to-invent.²⁶⁷ In this context, promoting innovation is the primary goal, not one of the relevant effects or side-effects. The literature also addresses the possible drawbacks of patent races, including the likelihood of excessive innovative activity, duplicative research efforts, and reinforcing inefficient industrial structures.²⁶⁸ Scholars offer interesting solutions to some of these concerns. For instance, the problem of costly duplicative research may be mitigated by governmental rewards for releasing preliminary information about significant progress, which would induce cooperation among competitors.²⁶⁹ We have decided not to elaborate on patent law, given its exclusive focus on information goods and innovation policy. Rather, we discuss FIFO's less obvious and indirect contributions to innovation and broader social goals.

To do so, we turn back to recent scholarship on net neutrality, and demonstrate FIFO's impact on third parties and the public at large in a unique setting: a two-sided platform operated by broadband providers, who serve as middlemen between content providers and end users.²⁷⁰ NN

266. See Jack M. Balkin, *The Future of Free Expression in a Digital Age*, 36 PEPP. L. REV. 427, 432–39 (2009) (explaining how NN relates to free speech, the First Amendment, and “democratic culture”).

267. The U.S. will be shifting to a first-to-file regime in the coming years, as stated in the Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011).

268. Michael Abramowicz, *Perfecting Patent Prizes*, 56 VAND. L. REV. 115, 183–90 (2003).

269. *Id.* at 188–89.

270. See David S. Evans & Richard Schmalensee, *The Industrial Organization of Markets with Two-Sided Platforms*, 3 COMPETITION POL'Y INT'L 151, 152 (2007) (“[Two-sided platforms] serve distinct groups of customers who need each other in some way, and the core business of the two-sided platform is to provide a common (real or virtual) meeting place and to facilitate interactions between members of the two distinct customer groups.”).

proponents have argued that routing data in accordance with the NN principle, which is currently implemented in a manner that resembles FIFO, is preferable to other allocation methods, given the way it empowers independent content providers.²⁷¹ Adhering to the NN principle assures that all content providers using broadband infrastructure can reach all end users with equal success. This feature is crucial for small and independent content providers who have neither capital nor contacts to ensure that broadband providers place their content at a higher tier, should the NN principle be set aside. NN proponents further argue that NN policy not only benefits these small and independent players, but also society in general, by promoting innovation and generating knowledge.²⁷² Again, while such arguments hinge on the egalitarian nature of NN, and therefore cannot distinguish between FIFO and other egalitarian methods, such as RSS, they do help substantiate FIFO's superiority to other prominent allocation methods, such as willingness to pay or need.

The alleged advantages of NN seem most obvious in relation to a price-based method for internet data transfer, which allows some content providers to pay an additional fee in order to be placed on a premium tier. A price-based method has two effects. First, it leaves less affluent parties with a limited ability to widely distribute their content. Second, it enables broadband providers, by applying discriminatory pricing, to extract greater consumer surplus from content providers, leaving those who pay the special fees with fewer resources to develop content, innovate, and generate knowledge. The existence of these two effects does not necessarily mean that deviation from NN decreases welfare. It merely shows that such allocation methods as FIFO, which conform to the NN principle, transfer wealth and opportunities from one segment of the economy (broadband providers) to another (content providers, in particular independent players).

The difficult question that follows is whether such a transfer truly affects innovation. NN opponents argue that it does not.²⁷³ In their view, the surplus must be left in the hands of broadband providers, so that they can promote technical innovation,²⁷⁴ in addition to enhancing infrastructure.²⁷⁵ NN proponents respond that leaving the surplus in the hands of independent content providers is crucial in terms of innovation policy. For

271. van Schewick, *supra* note 254, at 382–83.

272. *Id.* at 383 (“[T]he increase in application-level innovation is socially beneficial and . . . these benefits are more important than the costs.”).

273. *See, e.g.*, Yoo, *supra* note 254, at 24 (“There is no reason to believe a priori that giving preference to innovations operating at the network’s edge over innovations in the network’s core will prove to be beneficial in all cases.”).

274. *Id.* at 43 (“[T]he network . . . can itself represent an important source of innovation.”).

275. *Id.* at 65 (“[N]etwork neutrality can actually harm consumers by forcing network owners either to delay deployment of new technologies . . . or . . . by forcing them to forego deploying the full increase in capability made possible by a particular innovation.”).

example, Barbara van Schewick contends that independent creators are best suited to provide society with high-quality information goods, and thus promote aggregate welfare.²⁷⁶ She claims that given the spread of talent across the entire population, there is a greater chance of important innovations coming from outside the broadband providers' realm than from broadband providers and their affiliates.²⁷⁷

NN proponents further contend that the negative impact of deviation from NN on the promotion of innovation and generation of knowledge is not limited to the use of a price-based method. Allocation methods based on need or skill can also disproportionately harm independent and start-up content providers. These methods require the ranking of content providers by end users' broadband providers. Even assuming that the allocation is carried out in good faith by the latter, this process will generate uncertainty. A content provider may be unable to ascertain in advance how broadband providers will classify the allocation and what its expected exposure is. Any uncertainty will translate into additional costs, such as risk-related premiums.²⁷⁸ Uncertainties may be more acute in the case of independent content providers, due to their relative lack of experience and familiarity with broadband providers' practices. Thus, these content providers will incur greater costs. Moreover, any uncertainty cost is likely to have a greater impact on independent content providers, who are frequently short on funding, and a lesser impact on established businesses. Adherence to FIFO limits the uncertainty and leaves independent content providers more resources, to be used for promoting innovation and generating knowledge.

NN proponents add that the implications of adherence to NN are far more significant. Not only does a FIFO rule facilitate the production of more innovation and knowledge, but it empowers the public at large to generate content, and in that way promotes important values of free speech and democracy. This boost to content and speech follows from NN policy, given the number and diversity of sources that NN promotes by treating all users equally. On the other hand, deviating from NN would allow broadband providers to give preference to content produced by a small group of players.²⁷⁹ In other words, the transfer of surplus to independent content providers assures greater diversity of speakers, and consequently a proliferation of views and ideas. In addition, it shifts the control over

276. van Schewick, *supra* note 254, at 381–83.

277. *Id.* In her view, the additional innovation by content providers generates greater social utility than any infrastructure-related innovation that may ensue if broadband providers keep the surplus. *But see* Economides & Tåg, *supra* note 262, at 128 (“Creating lanes with prioritized delivery of content may help small content providers who are sensitive to the quality of service.”).

278. van Schewick, *supra* note 254, at 379.

279. LAWRENCE LESSIG, *THE FUTURE OF IDEAS: THE FATE OF THE COMMONS IN A CONNECTED WORLD* 31–33, 138 (2001); Balkin, *supra* note 266, at 431.

content from a closely-knit group (broadband providers and affiliates) to a diversified one (independent content producers). Thus, NN promotes free speech and democracy.²⁸⁰ While these last benefits might not be intuitively conceived as economic benefits, it can be easily argued that a broader marketplace of ideas generates various social benefits, with far-reaching implications.²⁸¹

III. EVASION

A. OVERVIEW

In this Part, we assume that FIFO is justifiably applied in a particular context. Even where FIFO is generally defensible, specific individuals or groups may evade it. In some cases, evasion takes the form of a defensible exception, unrelated to participants' socioeconomic status and willingness to pay. Some people may be allowed to jump the queue, because there seems to be a special reason for different treatment. In such cases, FIFO is legitimately violated. Subpart B discusses the primary reasons to permit violation: mutual consent, special need, special merit, and special skill. In other cases, individuals or groups with the financial means can obtain the allocated resource without entering or waiting on the queue. Evasion then takes one of two forms. First, affluent participants may pay an additional fee to obtain special treatment by the allocator, in violation of FIFO. This occurs, for example, in the case of a separate VIP queue. Although the separate VIP queue was established by the allocator, it still constitutes an evasion when used. Resources that could be allocated via a single egalitarian queue are now allocated firstly and at times exclusively to those willing to pay a premium to enter the preferred queue. Second, affluent people may pay others who obtain the resource on their behalf, thereby circumventing the queue without formal violation of FIFO. For instance, they can pay others to stand in line for them or obtain the resource from scalpers. Subpart C critically evaluates these strategies. Given space constraints, we discuss these issues succinctly with the intent to elaborate on them in a follow-up article.

B. WEALTH-BLIND EXCEPTIONS

1. Consent

Consent seems to be the most natural exception in a FIFO-based allocation. For example, UCC Section 9-322(a)(1) provides that conflicting security interests in the same collateral rank according to priority in time of

280. Balkin, *supra* note 266, at 432, 438.

281. See, e.g., Eyal Zamir & Barak Medina, *Law, Morality, and Economics: Integrating Moral Constraints with Economic Analysis of Law*, 96 CALIF. L. REV. 323, 378 (2008) (“[Economists] have analyzed the ‘speech market’ and its regulation.”).

filing or perfection (FIFO); but a prior secured creditor can subordinate his or her interest in the collateral to that of a subsequent creditor.²⁸² As in other contexts, consent may also be implicit. This might be the case where *A* passes *B*, and *B* does not contest the violation of FIFO. Similarly, a person who leaves a physical queue is generally assumed to have waived his or her position, so if that person wishes to reenter, he or she must go to the back of the line. However, those waiting in “marathon queues,” or queues that are exceedingly long, are allowed to briefly leave the queue to purchase food or use the restroom, and then reassume their original position in the queue.²⁸³ Brief leaves of absence are presumably permitted based on a shared understanding among participants. Since every queuer may need to leave for a short while, everyone implicitly agrees that others can do the same without jeopardizing their position.

Justifying a consent-based exception seems simple. If all queuers explicitly let another person cut in, there seems to be no fairness-based reason to object. Consent generally trumps any complaint regarding unfair treatment.²⁸⁴ In particular, a person can waive a temporal advantage as well as just desert. However, a closer analysis reveals a somewhat more complicated picture. To be normatively valid, consent must be free and informed. When there is a significant risk of pressure or mistake, the law can preclude a consent-based exception. Unfortunately, pressure and mistakes are common. People may feel compelled to let others cut in even though the intrusion aggravates them. Social pressure may exacerbate the likelihood of reluctant consent. After all, no one wants to be viewed as the only “bad” or un-chivalrous person in the queue. Moreover, people may consent without fully realizing the intruder’s motivation or the full implications of the intrusion. For instance, a person trying to jump a queue may mislead the other queuers to believe that he or she has a special need or that by cutting in he or she will not significantly affect the availability of the resource for the others.

To the extent that FIFO aims to secure blindness to irrelevant criteria, the question arises as to whether effect should be given to the consensual grant of priority based on an irrelevant trait. For example, should celebrities be allowed to jump the queue at the post office if all other queuers happily concede? While theoretically interesting, this seems to be a purely hypothetical question. It is very unlikely that all queuers will let another person cut in without a substantive justification, such as necessity or merit, in the absence of duress, mistake, or incomplete information. If they

282. U.C.C. § 9-339 (2011); Jackson & Kronman, *supra* note 230, at 1168–69 n.83.

283. See Mann, *supra* note 22, at 345–46, 352 (discussing short leaves of absence in marathon queues).

284. Cf. Horacio Spector, *A Contractarian Approach to Unconscionability*, 81 CHI.-KENT L. REV. 95, 99 (2006) (“[E]xcept under special conditions, informed and free consent cleanses transactional unfairness.”).

nonetheless agree, they cannot complain about having been treated unfairly.

Consensual deviation from FIFO might also generate efficiency concerns. This claim seems counter-intuitive: If individuals agree to let another person cut in, they presumably do so following the collection of sufficient information, and upon realizing that they should give priority to someone else—at times after receiving appropriate compensation. Such a transaction seems efficient. In addition, imposing restrictions on consensual modifications of a queue would be difficult and costly to enforce.

Yet consent does not guarantee efficient allocation if it is premised upon partial information.²⁸⁵ Additionally, individuals often exercise bounded rationality, or are subjected to manipulation and social dynamics that impede their judgment.²⁸⁶ Thus, recipients may fail to properly understand the costs they stand to incur by consenting and the actual benefits accruing to those jumping the queue. Therefore, strictly enforcing FIFO and prohibiting consensual queue jumping can sometimes serve as a surprising measure of consumer protection, saving individuals from their own judgment errors. However, given the difficulty of such enforcement, and society's respect for personal autonomy, disallowing modification by consent should probably be rare.

Even if fully informed rational individuals made all consented modifications, negative externalities could ensue. First, allowing queuers to negotiate may cause allocator and resource idleness if the queue is held up. Additional costs might be incurred if a queue is being reshuffled. For instance, imagine a multiple-stage FIFO allocation process.²⁸⁷ At a certain point, the allocator becomes aware of the participants' order and starts handling their applications accordingly. A consensual change at one of the stages might generate an additional administrative burden and sometimes even confusion and errors.

2. Special Need

Another possible exception in FIFO-based allocations is that of special personal need. Special need arises when an individual may incur serious and irreparable harm unless given priority. For example, a hospital will often breach FIFO to handle emergencies;²⁸⁸ an ambulance will violate FIFO on

285. See Shmuel I. Becher, *Asymmetric Information in Consumer Contracts: The Challenge That Is Yet to Be Met*, 45 AM. BUS. L.J. 723, 734 (2008) (“Contracts will systematically increase welfare if, and only if, contracting parties have the information necessary for an informed evaluation of all transactional aspects.”).

286. See Shmuel I. Becher, *Behavioral Science and Consumer Standard Form Contracts*, 68 LA. L. REV. 117, 120, 133, 167–68 (2007) (addressing bounded rationality and manipulations).

287. See, e.g., EHN & LÖFGREN, *supra* note 73, at 48 (discussing three-stage FIFO-based allocations in the former Soviet Union).

288. See *supra* note 180 and accompanying text.

the highway to get a patient to the hospital in time; and special slots will be reserved for the handicapped in a parking lot.²⁸⁹

Most people agree to give way when they face a special need case.²⁹⁰ Thus, from a positive fairness perspective, this case is similar to that of consent. Even in the absence of explicit or implied consent, there is sufficient normative basis to give preference to the needy. From an equality perspective, people should be treated equally unless there is a special reason relevant to the allocation to treat one or more person unequally.²⁹¹ Special personal needs that are relevant to the allocation give rise to moral claims for differential treatment.²⁹² In fact, recognizing a need-based exception may be regarded as “an attempt to remove inequality arising from extraneous causes.”²⁹³ Moreover, personal need may actually render the needy person’s time more valuable than that of others, because any delay may cause serious and irreparable harm. Therefore, an exception for cases of special personal need is consistent with the equality theory.

On the other hand, a personal-need exception might conflict with a desert-based system. The former aims to secure a future benefit, whereas the latter rewards past investment. Thus, allowing an exception for special need will likely contravene a desert-based policy. In such a case, lawmakers need to consider whether one’s special need outweighs another’s desert. Consider, for example, the British demobilization policy following World War II, which was generally based on FIFO. Soldiers were discharged from the armed forces in the order in which they enlisted.²⁹⁴ This rule was slightly modified, with age considered a relevant criterion in determining the order of discharge, under the assumption that military service and absence from home were a greater hardship for older people.²⁹⁵ In other words, the modification was based on a claim of special need. While a need-based exception in this case may be consistent with the equality theory, it is difficult to defend from a desert perspective, as it enables people who invested less (a shorter service) to obtain a greater reward (an earlier discharge). Desert theory may support strict adherence to FIFO: soldiers who served more time should be discharged earlier.

289. Oberholzer-Gee, *supra* note 88, at 439 n.9.

290. See McCormick, *supra* note 2, at 304 (explaining that people sometimes find going to the head of the line without waiting for one’s turn acceptable in cases of need); Oberholzer-Gee, *supra* note 88, at 432–33, 437–38 (arguing that individuals are willing to make small sacrifices when there are considerable benefits from doing so).

291. See Raphael, *supra* note 83, at 120–22 (explaining that exceptions to equality must derive from relevant reasons).

292. See *id.* at 122–23 (discussing special needs).

293. *Id.* at 126.

294. *Id.* at 124.

295. *Id.*

Still, a need-based exception is not always inconsistent with the theory of desert, as the following example demonstrates. Peter Schuck noted that asbestos cases were being “docketed, like civil litigation generally, more or less in the order in which the plaintiffs’ lawyers file and prosecute the cases during the pre-trial and trial phases,”²⁹⁶ that is, in accordance with the FIFO principle. He explained that “[i]f FIFO remains the rule, to the extent that the asset pool is smaller than the claims’ value, some claimants will receive their full entitlement while others filing in the same jurisdiction and possessing equal or stronger claims will receive little or nothing.”²⁹⁷ Although seriousness of the claimants’ injuries seem to support a higher priority in case processing, it transpired that asbestos victims who file relatively late, and consequently receive a lower priority under FIFO, often do so because of the latency periods associated with more serious impairments.²⁹⁸ A solution would probably entail some preference for more serious cases. Schuck suggested that “the court establish and administer a two-track docketing and calendaring system,” one for exposed but unimpaired victims, and another for impaired victims, adhering to FIFO within each track.²⁹⁹ This method ensures that funds are allocated to the most serious claims first.³⁰⁰ Similarly, the BP Deepwater Horizon oil spill compensation fund generally processed claims “in a single queue that operates on the principle of ‘first in, first out,’” but allowed claimants confronting financial need to skip to the front of the line.³⁰¹ In both cases, desert would not constitute an obstacle to a need-based exception, because more serious claims may actually require greater efforts to prepare, making their “time of entry” a relatively weak proxy for investment.

In some instances, efficiency may also justify a need-based exception to FIFO. FIFO’s strengths in terms of efficiency partially derive from the correlation between temporal advantage and need.³⁰² Where a temporal advantage is substantially misaligned with need, an exception may be introduced. In cases of special personal need, adherence to FIFO may subject the needy to an unacceptable level of idleness and ensuing costs. When FIFO merely has a simple ordering effect, these costs are relatively low, with the exception of time-sensitive needs, as in the case of an ailing individual seeking medical care. When FIFO has quality- or entitlement-determining effects, the impact of idleness on recipients, including those in need, may be more substantial. A latecomer may receive a degraded resource or not obtain the resource at all.

296. Schuck, *supra* note 40, at 560.

297. *Id.* at 561.

298. *Id.* at 565.

299. *Id.* at 571–72.

300. *Id.* at 580.

301. Chavkin, *supra* note 4.

302. *See supra* Part II.C.1.

The costs of idleness to the needy should be balanced against the various costs of implementing a need-based exception. These include the administrative costs associated with identifying the needy, distinguishing them from malingering claimants, maintaining a separate queue, and verifying that only those in real need use it. To the extent that need-based exceptions are truly exceptional and readily discernible, these costs should be limited. In some cases, deviating from FIFO may involve an additional cost—the idleness of the allocated resource. Implementing an exception might require setting some resources aside for those in need and not distributing them on an ongoing basis. For example, several parking spaces may be left vacant for the entire day awaiting handicapped drivers to utilize them, and emergency frequencies may be left unused and unallocated.³⁰³ A limited shift away from FIFO can also generate idleness for potential recipients. For instance, queuers might be required to wait until the allocator establishes the identities of the needy.

Beyond these costs, recognizing a limited need-based exception will not generate substantial negative externalities. This exception would probably be aligned with social norms.³⁰⁴ Therefore, the negative outcomes of implementing rules that diverge from social norms³⁰⁵ are avoided. Additionally, a need-based exception should not normally induce negative strategic conduct. Individuals will most likely not bring themselves to a state of special need for purposes of gaining an advantage in the allocation process. Finally, recognizing an exception is not expected to compromise innovation or the production of knowledge, so long as it is only applied on a limited basis.³⁰⁶

3. Merit

Special personal merit, namely a commendable trait, ability, achievement, or conduct, may give rise to claims for differential treatment.³⁰⁷ Thus, giving priority based on special merit may be consistent with the equality theory. Moreover, it may be consistent with a desert theory, because rewarding merit is exactly what the desert theory aspires to secure. However, two types of merit must be distinguished. The desert theory of

303. See *Emergency Communications*, FED. COMM'NS COMM'N, <http://www.fcc.gov/guides/emergency-communications> (last visited Mar. 21, 2014).

304. See *supra* note 291 and accompanying text.

305. See *supra* note 238 and accompanying text.

306. In the NN context, recognizing a need-based exception for emergency communications is relatively acceptable, although some fear it might be improperly expanded. See K.A. Taipale, *Is Net Neutrality Bad for National Preparedness?* (Ctr. for Advanced Studies in Sci. & Tech. Policy, CAS Research Brief No. 06-14, 2006), available at http://www.information-retrieval.info/PTP/net-neutrality/CAS_Research_Brief_0614.pdf; see also *In re Preserving the Open Internet Broadband Indus. Practices*, 25 F.C.C. Rcd. 17905 (2010).

307. Raphael, *supra* note 83, at 122–23.

FIFO requires correspondence between the investment made to obtain the resource and the accrued benefit. It supports prioritization of participants whose merit can be defined in terms of queue-related investment. On the other hand, the desert theory of FIFO cannot underlie merit-based arguments referring to deeds or achievements that are unrelated to the particular allocation. While such arguments may be legitimate, they are conceptually different. Merit-based exceptions to FIFO that do not hinge on queue-related investment are inconsistent with both the equality and desert theories of FIFO and may be justified only in broader public policy terms, such as rewarding or incentivizing conduct or achievements that are external to the queue.

For example, it was argued that the British government should have given some preference in discharge from the army following World War II to those who served overseas, reflecting a claim of merit related to the specific allocation of discharges.³⁰⁸ Similarly, the Israeli Organ Implantation Law gives priority in organ allocation queues to those who donated organs while still alive or agreed to donate organs after their death.³⁰⁹ These exceptions to the generally applicable rules are consistent with the equality and desert theories of FIFO. The queue for organ donations is impacted by contributing to the organ donor pool. In contrast, allowing early discharge from the army or giving priority in organ allocations to those who won medals in the Olympic Games would be inconsistent with the equality and desert theories of FIFO, and only broader policy grounds could defend it, if at all. Past excellence in sports is completely unrelated to the queue for military discharge or organ allocation. At any rate, merit-based exceptions may generate some concern from an egalitarian perspective if acquiring the relevant attribute hinges on luck and is beyond some of the participants' control. For instance, those suffering from congenital medical conditions that preclude them from donating organs will be categorically barred from enjoying the exception.

An efficiency-oriented analysis is ambivalent about merit-based exceptions. Unlike the alternative allocation criteria mentioned above (price, need, skill, and service time), allocation based on merit does not necessarily put the resource in the hands of those who seem to derive the greatest utility from it (unless "merit" is defined in these terms). From that perspective, allocating to a meritorious recipient is problematic.³¹⁰ Merit-based exceptions also entail additional administrative costs, similar to those associated with need-based exceptions.

The advantage of a merit-based exception in terms of efficiency lies in the incentives it generates *ex ante* for positive behavior. Individuals striving to

308. *Id.* at 124–25.

309. Organ Implantation Law, 2008, Sefer HaHukim (Official Gazette) 236 § 9(b)(4).

310. *See infra* Part III.B.4 (discussing how skill might also be considered a source of merit).

place well in an allocation scheme are motivated to achieve what this process rewards. Of course, the incentive might not be required or effective in all cases. For instance, while a soldier might consider an overseas tour to receive an earlier release, as in the above illustration, he might not risk his life in combat just to obtain a similar reward.

4. Special Skill

In some cases, an exception to FIFO may be advocated in terms of a relevant and unique skill that can be used to efficiently utilize the allocated resource.³¹¹ Consider again the British government's policy concerning discharge from the army following World War II. Britain released construction workers earlier, based on the public interest in postwar reconstruction.³¹² Thus, handy workers could be discharged before those who had served for a longer period of time, or had stronger claims of need or merit. Such an exception may be inconsistent with any fairness-based theory of FIFO. It does not focus on the process or the ensuing allocation, but on secondary consequences external to the queue and the queuers. In effect, a skill-based exception may subject the interests of those who actually participate in the allocation to those of the public at large.

The efficiency analysis is similar to that performed with respect to need. As explained above, acquiring and maintaining a temporal advantage can sometimes serve as a crude proxy for having superior skills in using or developing the allocated resource. However, a temporal advantage might not serve as an adequate proxy for skill if those having the skills to efficiently utilize the resource have difficulties in signaling these skills by achieving a temporal advantage. In these cases, a skill-based exception might be justifiable on efficiency grounds. Again, the benefit of a more accurate allocation of the resource to skillful participants must be weighed against the ensuing administrative costs.

Two issues that were not discussed with respect to need may also arise. First, a skill-based exception may be inconsistent with public perceptions of fairness. Individuals waiting on a physical or a virtual queue might step aside without protest when called to do so for a fellow participant with greater need. But it is highly questionable if they would do so readily and happily for someone with greater skill. Introducing an exception that might be inconsistent with public perceptions of fairness generates a social cost.

Second, a skill-based exception might adversely impact overall innovation. When an allocator, even the government, is vested with the authority to decide which skills are best suited for enhancing a specific

311. In some allocations, the prospect of living longer may be considered a special skill. For example, in organ transplant queues, young people may get priority because they can "enjoy" the resource for a longer period of time. See Sack, *supra* note 103.

312. Raphael, *supra* note 83, at 125.

resource, inefficiencies might follow. We demonstrated this point in the context of telecommunications policy and the net neutrality debate. Proponents of NN would probably object to a skill-based exception in the process of allocating broadband resources,³¹³ claiming that the users, rather than the allocators, should decide on the best way to utilize the network.³¹⁴ That could only be made possible by strictly adhering to FIFO. This point need not be limited to telecommunications. The government and other large entities might be very poor evaluators of the best skill set and technology at any juncture.³¹⁵ By picking “winners,” they might be steering the economy in an inefficient direction.³¹⁶ If these decisions were influenced by regulatory capture and other external influences, such choices would prove to be even worse.³¹⁷

C. WEALTH-RELATED CIRCUMVENTION STRATEGIES

1. Fairness and Values

Privileged classes may be able to obtain various advantages in FIFO-based systems. In many contexts, they may have the resources necessary to secure early arrival or more efficient use of their waiting time. Because this use of resources has already been addressed above, and because it neither violates nor bypasses the FIFO principle, we will not analyze it further here. More importantly, privileged classes may use their resources to obtain the allocated resource without entering or properly waiting in the queue. There are three prototypic modes of circumvention. First, the allocator or its competitors may establish alternative pricier queues with shorter waiting times. For example, business- and first-class passengers have special and shorter queues for screening, passport control, and boarding at airports; unaccompanied drivers can pay for the right to use express car pool lanes, etc.³¹⁸ Thus, more affluent participants pay an additional fee to obtain a superior product. If allowed, this phenomenon would constitute a wealth-based exception to FIFO.

313. See *supra* Parts II.E–F.

314. van Schewick, *supra* note 254, at 381, 383.

315. See JONATHAN E. NUECHTERLEIN & PHILIP J. WEISER, DIGITAL CROSSROADS: AMERICAN TELECOMMUNICATIONS POLICY IN THE INTERNET AGE 394 & n.19 (2005) (explaining that regulatory minimalists believe government intervention in the standard-setting process is dangerous, relying on an article by Michael Krauss); see also Michael I. Krauss, *Regulation vs. Markets in the Development of Standards*, 3 S. CAL. INTERDISC. L.J. 781, 797–99 (1994).

316. *Id.* (explaining that standards selected by regulators may be inferior to those emerging in the marketplace).

317. *Id.* (“[R]egulators may be swayed by politics and . . . might side with established interests or favored upstarts.”); Krauss, *supra* note 315, at 799 (“Where government purports to lay down standards for the protection of consumers, might it, in fact, be acting in the interest of existing producers?”).

318. SANDEL, *supra* note 15, at 17–21.

Second, affluent participants may pay others for waiting in the queue on their behalf. They can: (1) employ agents to stand in line and obtain the resource for them;³¹⁹ (2) pay others to serve as placeholders for some of the time;³²⁰ or (3) bribe other queuers to swap places with them.³²¹ In some of these cases, FIFO is violated because a person receives the resource from the allocator without waiting in line like other queuers. In others, the integrity of the queue is preserved, but the wealthy customer avoids the queue altogether by using an agent.

Third, interested parties may obtain a FIFO-allocated resource on the secondary market, either by bribing individuals who acquired the benefit for their own use or by purchasing the resource from professional speculators, such as event ticket scalpers.³²² In these cases, the resource is allocated in compliance with FIFO, and the end consumer obtains the resource without violating or contesting this principle.

In applying FIFO, one needs to determine whether circumvention tactics are at odds with the rationale for using this principle under the circumstances. If so, the law might prohibit or restrain the unwarranted types of conduct. In this analysis, fairness arguments might pull in opposite directions. The equality theory of FIFO, and its strong psychological underpinnings, may call for some constraints on circumvention strategies. For instance, fast queues for a fee discriminate against the less affluent and may cause resentment.³²³ As David Maister observed, because special service facilities for important customers may be deemed unfair, “many service facilities physically separate premium servers . . . from the sight of regular customers so that the latter will not resent the special service rendered.”³²⁴ Where it is crucial that the resource be allocated on a non-discriminatory basis, premium queues may be prohibited.³²⁵ Similarly, if people can pay others to enter and spend time on the queue on their behalf, or else buy the resource from another party, it is much more difficult for less affluent people to obtain the resource.³²⁶ Thus, the allocator or the law governing

319. *Id.* at 21–22; Schwartz, *supra* note 89, at 849.

320. SANDEL, *supra* note 15, at 21–24; Montopoli, *supra* note 90.

321. Oberholzer-Gee, *supra* note 88, *passim*.

322. SANDEL, *supra* note 15, at 24–25; Mann, *supra* note 22, at 353.

323. *See, e.g.*, Ramin Setoodeh, *Step Right Up!: Amusement-Park Visitors Pay Premium to Avoid Long Lines; Some Have-Not's Are Miffed*, WALL ST. J. (July 12, 2004, 12:01 AM), <http://online.wsj.com/news/articles/SB108959186347560947> (discussing expedited access in amusement parks). *But see* Strahilevitz, *supra* note 54, *passim* (discussing the lack of objection to express toll lanes).

324. Maister, *supra* note 240, at 120; *see also* SANDEL, *supra* note 15, at 17–19.

325. *But see* SANDEL, *supra* note 15, at 24–28 (showing that fast lanes also exist with respect to medical services).

326. *Cf. id.* at 8 (“In a society where everything is for sale, life is harder for those of modest means.”).

the allocation can prohibit participation by proxy and curtail the secondary market.³²⁷

On the other hand, a desert theory of FIFO, whereby correlation must exist between investment and reward, might be more tolerant of circumvention tactics, which seemingly change only the form of the investment and not its relative size. In the case of a VIP queue, people purchase a different—superior—product at a higher price. They invest more and arguably deserve more. Moreover, a person may either enter the queue early and remain in it or pay another party to do the same. The amount paid arguably reflects the agent's investment, so correlation still exists between the investment and the ensuing reward. Finally, the scalper does not violate or circumvent FIFO in purchasing the ticket, and the person who buys the ticket from the scalper pays a sum that reflects that person's investment in obtaining the ticket.

In ascertaining the legitimacy of circumvention tactics, policy makers must consider two additional and conflicting factors. On the one hand, all tactics are based on consensual transactions in free markets. A libertarian may argue "people should be free to buy and sell whatever they please, as long as they don't violate anyone's rights."³²⁸ Any legal constraint on contracting around FIFO arguably undermines liberty. On the other hand, as Sandel theorizes, allowing circumvention may sometimes "corrupt" the allocated resource, namely "treat it according to a lower mode of valuation than is appropriate to it."³²⁹ In particular, corruption arises where a system that is expected to serve the public good is abused for private gain.³³⁰

2. Efficiency

Prima facie, introducing pricing mechanisms into the allocation process should enhance efficiency. After all, acquiring and maintaining a temporal advantage is merely a crude proxy. While not without problems, price is considered a more accurate mechanism for signaling value.³³¹ If individuals are willing to set forth the costs of bypassing the cheap and crude proxy, and opt for the more costly and accurate one, this in itself could be understood as a market signal that price-based allocation is more efficient. In other words, even though the use of price would entail various transaction costs, the fact that these transactions take place seems to indicate that the costs are lower than the benefits of FIFO. This basic intuition leads economists to

327. See, e.g., *id.* at 36 (observing that the National Park Service prohibits resale of campsite reservations); see also *supra* notes 92, 205–08 and accompanying text.

328. SANDEL, *supra* note 15, at 29.

329. *Id.* at 34.

330. *Id.* at 35, 37–39.

331. But see *id.* at 32 (arguing that sometimes standing in line is a better indicator of subjective valuation than willingness to pay).

promote secondary markets when FIFO governs the primary market and to strongly oppose anti-scalping laws.³³²

However, circumventing FIFO might also have negative effects on aggregate welfare.³³³ First, our analysis of the consent-based exception is applicable here with limited adjustments.³³⁴ Circumvention might lead to inefficiencies due to problems with the transaction underlying the particular circumvention tactic, such as the parties' bounded rationality. Any idleness that negotiations among queuers might yield should also be considered.

Second, while circumvention mechanisms may facilitate efficient allocations *ex post*, they generate additional transaction costs.³³⁵ For instance, the existence of secondary markets motivates those interested in quick profit, rather than those who can utilize the resource most efficiently, to acquire a temporal advantage. This generates transaction costs in the secondary market, where those who can best utilize the resource purchase it from speculators who participated in the primary allocation.

Third, negative externalities arise when legal and business practices clash with common perceptions of fairness. Substituting payment for temporal advantage may be upsetting for large segments of the population,³³⁶ and this sentiment decreases aggregate welfare.³³⁷ Such popular discontent may be echoed in anti-scalping legislation.³³⁸ However, as explained above, firms can mitigate these externalities through architectural manipulation.³³⁹

Fourth, the insertion of a middleman into the allocation process might deplete other resources of the allocator, especially its brand, goodwill, and public standing. In some cases, resources are allocated to individuals well below the price they are willing to pay.³⁴⁰ This occurs, for example, in many

332. *Id.* at 28–30 (attributing such views to Greg Mankiw).

333. Due to space constraints, this Subpart acknowledges but does not discuss the self-evident costs of enforcing anti-scalping laws on the one hand and dispute-resolution costs ensuing from secondary market transactions on the other hand.

334. *See supra* Part III.B.1.

335. *See supra* Part II.C.1.

336. *See* SANDEL, *supra* note 15, at 17–42 (discussing several cases in which queue circumvention generated public discontent).

337. *But cf.* Duncan Kennedy, *Cost-Benefit Analysis of Entitlement Problems: A Critique*, 33 STAN. L. REV. 387, 398–400 (1981) (explaining scornfully that taking into account “psychic effects” as negative externalities may be used to construct “an efficiency argument for every . . . state intervention[] the conservatives claim [is] paradigmatically inefficient”).

338. *See* Caleb Halberg, Note, *The Secondary Market for Tickets: A Look at Ticket Scalping Through an Economic, Property Law, and Constitutional Framework*, 6 DEPAUL J. SPORTS L. & CONTEMP. PROBS. 173, 178 (2010) (explaining how the notion of unfairness motivates the enactment of anti-scalping laws).

339. *See supra* notes 240, 325 and accompanying text.

340. SANDEL, *supra* note 15, at 38–39; Oberholzer-Gee, *supra* note 88, at 427–28.

sporting and entertainment events.³⁴¹ The allocator might choose not to capture the entire consumer surplus available from the ticket sales and instead decide to leave some in the pockets of its customers. This might be a wise business decision if it establishes good will, strengthens the brand, and drives future business, as well as profits in other markets, such as merchandising or music sales.³⁴² The goodwill flows from the understanding that the allocated resource is not out of reach for interested parties. FIFO allocation mechanisms strengthen such an understanding. This sophisticated brand-enhancement strategy is undermined by circumvention tactics that enable third parties to pocket some of the surplus that the allocator intended its customers to receive. Such tactics may forestall the goodwill and brand enhancement that allocators are striving to generate as well as any ensuing benefit. For that reason, circumvention tactics may prove inefficient.³⁴³

In other cases, circumvention tactics may degrade the allocated resource. This occurs where part of the resource's value derives from its exclusive availability through the tedious FIFO process. Such resources are presented and perceived as resources that "money can't buy." This unique trait signals exclusivity. Consider, for example, a very prestigious restaurant that benefits from having the public know that the privilege of dining at it is not for sale. The diners obtain a resource that is beyond any monetary wealth. Circumvention tactics, by undermining the "money can't buy" trait, reduce the resource's value for consumers. This loss of welfare must be taken into account.³⁴⁴

Fifth, in some instances, more distant negative effects might result from circumvention. Net neutrality demonstrated this point.³⁴⁵ In that context, the allocated resource is access to third parties, as in most two-sided markets. The NN debate is, to a great extent, analogous to a discussion of VIP queues. It highlights the broader implications of allowing money to play a role in allocating access to telecommunications or any other information infrastructure. Deep-pocketed established firms will outcompete start-up firms given the superior speed and bandwidth they can now obtain, even though the latter may be best positioned to substantially promote

341. See SANDEL, *supra* note 15, at 35–39 (discussing Bruce Springsteen concerts and Pope Benedict XVI's visit to the United States).

342. *Id.* at 38–39.

343. Admittedly, forestalling brand enhancement will not always be inefficient. Although it may reduce consumption of certain products or services, it may also lead to investment in more valuable opportunities. It is, of course, impossible to provide a general prediction of the outcomes.

344. See SANDEL, *supra* note 15, at 34–35 (explaining how money can corrupt resources). Again, it is difficult to determine the exact impact of "resource corruption" on aggregate welfare.

345. See *supra* Part II.F.

innovation, generate knowledge, and even contribute to free speech and democracy.

CONCLUSION

This Article provides an innovative theoretical framework—integrating fairness and efficiency—for assessing FIFO’s role in resource allocation. In doing so, it presents a smorgasbord of legal applications, ranging from traditional private law disputes concerning ownership, secured transactions, and nuisances, through more extensive allocations, as in the cases of employees’ seniority benefits, mass torts, and military discharge, all the way to social and organizational practices that are sometimes regulated by law, such as organ allocation policies, event ticket sales, and data transfers over the internet. Whenever relevant, FIFO’s strengths and weaknesses are contrasted with those of its most promising competitors, namely allocation methods based on price, need, skill, service time, and random selection.

The Article started off by examining FIFO’s fairness on two interrelated levels. On the positive level, FIFO may be supported in terms of perceived fairness. Empirical evidence confirms that people are more satisfied when the principle of FIFO is followed than when it is violated, and express their objection to violations. On the normative level, the Article expounded three justifications for adherence to FIFO: preserving indifference to participants’ irrelevant traits (the formal egalitarian argument); validating the equal value of participants’ time; and maintaining correlation between personal investment and reward (desert). The Article identified each justification’s weaknesses, thereby delineating the boundaries of its applicability.

The Article proceeded to examine whether FIFO could be justified in terms of efficiency on four distinct levels. First, it explained FIFO’s impact on those striving to obtain the allocated resources—their *ex post* well-being, as well as their *ex ante* incentives. Second, it compared the administrative costs of FIFO and other allocation methods. *Inter alia*, it discussed costs associated with the idleness of various parties involved in the allocation process. Third, it examined allocation methods’ impact on allocators’ incentives to expand the allocated resources. Fourth, it considered allocation methods’ possible impact on broader social goals—innovation, free speech, and democracy.

We note here that the balance between fairness- and efficiency-based arguments might differ among contexts. Generally, one might argue that fairness-based arguments are more compelling when the allocation is carried out by the government, while efficiency-based arguments have greater pertinence to private parties. However, this heuristic has exceptions as well.

Finally, the Article introduced an additional layer of complexity to the analysis. Even if a thorough examination of FIFO’s strengths and weaknesses supports its use in a particular context, one must still consider whether and to what extent certain individuals and groups may be allowed to evade it. In

some instances, individuals may be allowed to jump the queue with other queuers' consent or based on these individuals' special need, merit, or skill. Perhaps even more interestingly, affluent people may strive to utilize their wealth to circumvent FIFO, either by securing special treatment from allocators (e.g., through VIP lines) or by paying others to obtain the resource for them. The law can play a critical role; it can facilitate such evasions, ignore them, or even prohibit them if deemed unfair or inefficient.

The innovative nature of our project need not stop here. This Article provides a novel and robust foundation for numerous future projects. For instance, it provides tools for thorough analyses of existing and possible applications of FIFO in law and legal practice. Moreover, it can help identify instances in which FIFO erroneously migrated from one context to another due to inertia or problematic analogy. This Article also opens the door to important empirical and experimental work that will test people's commitment to FIFO in various contexts, as well as the social acceptability of exceptions and circumvention strategies. Such work can unveil instances in which common perceptions and preferences regarding FIFO underlie legal or social norms and practices that are unfair, inefficient, or both. We hope to develop at least some of these ideas in future research.