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The More Things Change: Improvement Patents, Drug Modifications, and the FDA

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I. INTRODUCTION

Polarized views engulf the pharmaceutical industry. “Big pharma,” as the sector is often called, has drawn both praise for supplying the world with life-saving drugs and scorn for keeping the prices of some of those drugs high and occasionally engaging in questionable business practices.¹ As one commentator noted, “despite the undisputed fact that for over a century the industry has made a major contribution to human wellbeing and the reduction of ill health and suffering, it is still regularly identified by the public in opinion surveys as one of the least trusted industries.”² Although the pharmaceutical industry continues to make remarkable advancements in the field of drug development,³ controversies ranging from the behavior of the “pharma bro”⁴ to the alleged role of the industry in the opioid epidemic⁵ continue to stoke negative opinions of drug makers and lead to calls for governmental interventions.

One pharmaceutical industry practice that has attracted the attention of regulators, courts, and the public is so-called “product hopping.”⁶ A product hopping strategy generally unfolds as follows. After receiving approval from the Food and Drug Administration (“FDA”), a brand pharmaceutical company typically markets a drug product exclusively, i.e., without any competition over that product from other manufacturers, thanks to patents covering the drug.⁷ As these “primary” or “pioneering” patents approach expiration, the company obtains new patents covering the drug’s modification—for example, so-called “extended-release” tablets—and secures a separate FDA approval for this version.⁸ The company then begins to advertise the new product heavily, while de-emphasizing the one that is about to go off-patent.⁹ In the more aggressive cases, the brand company might disparage the original form of the drug or even take it completely off the market, thereby forcing a switch to the modification.¹⁰

After the patents that protect the pioneering product expire, other companies—after undergoing their own, shortened FDA approval processes—can offer “copies” of the original product as relatively cheap, “generic” alternatives pursuant to the provisions of the Federal Food, Drug, and Cosmetic Act (“FDCA”).¹¹ This regime is reinforced by generic substitution laws, adopted in some form in every state, which essentially

authorize pharmacists to supply patients with a generic version of a drug even when physicians prescribe the more expensive brand.¹² But a product hopping strategy can render the original, off-patent form of the drug obsolete and cause a permanent shift to the newly patented, more expensive modification.¹³ Due to various defects in the market for prescription drugs, these follow-on versions may—and have—achieved significant penetration without credible evidence of any kind of therapeutic improvement over, or even meaningful clinical difference from, their predecessors.¹⁴ It has been argued, therefore, that product hops can contribute to drug prices that are unnecessarily high.¹⁵

Some product hops, particularly those involving so-called “forced” or “hard” switches—terms that refer to removal of the original product from the market—have prompted antitrust challenges. In one well-known case, *New York ex rel. Schneiderman v. Actavis PLC*, the Court of Appeals for the Second Circuit upheld a district court’s determination that the defendant brand pharmaceutical company likely violated § 2 of the Sherman Act, which prohibits actual or attempted single-firm monopolization.¹⁶ The court based this conclusion in part on a finding that the company stopped selling the pioneering version of an Alzheimer’s drug called Namenda shortly before patents covering it expired and replaced it with a follow-on purely for strategic reasons.¹⁷ Specifically, the record revealed that the firm engineered the switch from the immediate-release (“IR”) to the extended-release (“XR”) form of Namenda so as to prevent generic entrants from gaining market share that would have been possible thanks to patent expiration and generic substitution.¹⁸

The court determined that, having been compelled to make the switch to the XR version, physicians would be unwilling to revert to the cheaper generic IR due to the sensitivity of the Alzheimer’s patient population to continued shifts in their therapeutic regimens.¹⁹ In addition, the court noted that constraints associated with the generic companies’ business model—which depends on generic substitution rather than marketing—would make it difficult for generics to “cost-efficient[ly]” convince prescribers and patients to re-adopt the pioneering form of the drug in any event.²⁰ But the switch may have necessitated these inefficient marketing outlays after generic entry because, although no clinical difference between old and new versions of Namenda was demonstrated,²¹ pharmacists could not legally give patients the former when doctors prescribed the latter because the shift to the XR form precluded the application of generic substitution.²² Consequently, after faulting the brand for “withdrawing a successful drug from the market and introducing a reformulated version of that drug, which has the dual effect of forcing patients to switch to the new version and impeding generic competition, without a legitimate business justification,”²³ the court upheld a preliminary injunction ordering the company to continue selling the original, IR form of the drug.²⁴

As a matter of antitrust doctrine, “product hopping” monopolization theories have drawn a mixed reception from commentators. Some have offered qualified praise to the Second Circuit for providing a remedy against conduct that appears to sidestep the regulatory frameworks intended to foster cost savings from the introduction of generic drugs.²⁵ Others, however, have criticized the court’s approach for arrogating to the judiciary the power to police pharmaceutical product markets and even giving courts a seemingly unsuitable task of comparing health

benefits of different drug products.²⁶ Later decisions have followed *Actavis* with some caution, allowing antitrust claims to proceed in hard switch scenarios based on ostensible “consumer coercion,”²⁷ but generally dismissing cases in which plaintiffs alleged only a “soft switch”—that is, when defendants de-emphasized the old product but did not actually withdraw it from the market.²⁸

Thus, courts have been unwilling to use antitrust law to broadly condemn product hopping practices, perhaps out of concern that doing so might put them into an awkward quasi-regulatory role.²⁹ Indeed, although antitrust can have an important function even in a highly regulated industry such as pharmaceuticals,³⁰ decisions from the Supreme Court have recognized that in deciding whether to impose antitrust liability, “careful account must be taken of the pervasive federal and state regulation characteristic of the industry.”³¹ To be sure, an antitrust intervention may well be warranted when a regulatory regime is not “an effective steward of the antitrust function.”³² But even if this is so, a question worth asking is whether the regime can be fixed so as to reduce ex ante the prevalence of conduct that might otherwise draw antitrust scrutiny and to avoid enlisting courts as ex-post fixers of regulatory flaws.³³ Moreover, substantive, procedural, and practical constraints on antitrust actions further limit meaningful and timely inquiry into whether a product hop was problematic.³⁴

But what precisely is the problem prompting the need for a regulatory fix? A business model based on the strategy of product substitution seemingly for its own sake, with a new version exhibiting no proven clinical distinction from the original, presents an issue of potential public concern that the antitrust cases have uncovered. In *Actavis*, for example, the defendants’ CEO stated that “[w]e need to transition volume to XR to protect our Namenda revenue from generic penetration in 2015 when we lose IR patent exclusivity.”³⁵ In another case, *In re Asacol*, it was alleged that the brand engineered an “unnecessary modification” that ended up making the new version of the drug tougher to swallow for some patients and undertook a soft, and then a hard, switch away from the more convenient original to the more expensive follow-on.³⁶

To some of the more transparently strategic hops of this sort, prescribers and patients have responded by largely continuing to use the original—at least until the hard switch.³⁷ But in other cases, significant shifts to new and more expensive products took place without any data that might justify the change.³⁸ Such shifts can occur because of information gaps and other flaws in the market for pharmaceuticals, to be discussed throughout the Article, that antitrust law probably cannot fully correct.³⁹ Thus, leaving aside the threat of antitrust liability in particularly aggressive cases, incentives are in place for firms to modify existing products without also developing evidence tending to show that the change makes sense for patients.

The statutory frameworks that have pushed some pharmaceutical companies toward strategic product hopping encompass patent law and food and drug law. Patents are powerful rights, but when an existing drug is modified, a showing of clinical improvement, or even distinctiveness, is generally not needed to obtain a new patent.⁴⁰ For example, the utility requirement of § 101 of the Patent Act does not demand that the

applicant show that the new invention is in any way better or more useful than what is already available,⁴¹ and the requirement that a patent claim be non-obvious under § 103 focuses mainly on whether the claim embodies a sufficiently inventive cognitive leap over what is in the public domain.⁴²

Somewhat in tension with these aspects of patent doctrine,⁴³ results made possible by the patented invention that are unexpected in view of what was known in the field (e.g., the therapeutic profile of the previous version of the drug),⁴⁴ as well as other types of evidence that might stand in for improvements in patient care, can and do come into the non-obviousness analysis.⁴⁵ But patent applications are filed early in the research process⁴⁶—before much, if any, comparative data that can speak usefully to these issues has been developed.⁴⁷ Thus, the combination of established doctrinal rules and the often limited quality of the data available during the patent acquisition process (the official term for it is “patent prosecution”) ensures that examiners at the U.S. Patent and Trademark Office (“PTO”) do not see a full clinical picture of the difference between pioneering drugs and their follow-on versions.⁴⁸

To be sure, assuming the patent issues, the picture might become somewhat more complete by the time the validity of the patent is litigated in court.⁴⁹ And while some of the newly developed evidence can bolster the case for patentability, the adversarial process can also reveal flaws in prosecution and lead to the patent’s invalidation.⁵⁰ Indeed, litigation between brand and generic companies results in invalidation of patents covering follow-on drugs with some frequency,⁵¹ allowing the generic entrants to make and sell the follow-on form. The brand-generic litigation process, however, can take a significant amount of time until final resolution of generic company liability.⁵² Thus, even if the generics ultimately succeed in invalidating the asserted patents, the brand effectively enjoys a period of erroneously granted exclusivity while those patents are still in force.⁵³ This is yet another feature of the regulatory mix that can make patents the paramount inducer of drug reformulation efforts. Finally, it bears emphasizing that even if the decision-makers were to have perfect and timely evidence before them and could make patentability decisions with a high degree of accuracy, the fact remains that the relationship between non-obviousness and relative product quality is not a straightforward one as a matter of substantive patent law.⁵⁴

For its part, the FDA typically does not evaluate comparative advantages or disadvantages of new drug versions—and brand companies, sometimes referred to as “sponsors,” do not have to develop such information and provide it to the agency.⁵⁵ Modified drugs,⁵⁶ like all others, are generally governed by the standard approval requirement of proof of safety and efficacy⁵⁷ over a placebo.⁵⁸ The agency typically does not ask the sponsor to furnish any data suggestive of clinical distinctiveness between a drug’s new form and its previous one, and such data is often completely unavailable when the new version enters the market.⁵⁹ The FDA does have at its disposal some regulatory exclusivity mechanisms that could encourage and reward sponsor studies generating information of potential relevance to comparative safety and efficacy of the two

drug forms.⁶⁰ However, the lengthy term of patent protection and regulatory benefits that come with drug patents⁶¹ can dwarf any reward that the FDA is currently empowered to provide.⁶² As a result, exclusivities based on the submission of data to the FDA can be rendered unnecessary for brand companies that have acquired patents covering reformulated products.

Given these features of the Patent Act and the FDCA, drug product changes can sometimes be driven not by increased clinical benefits or even clinical distinctiveness, but principally by the possibility of obtaining patent protection for the drug's new version.⁶³ This is unfortunate because incremental pharmaceutical innovation, if properly channeled,⁶⁴ can be crucial for health outcomes.⁶⁵ Sometimes, for example, extended-release formulations can offer the same therapeutic benefit from a smaller number of tablets than immediate-release, which can in turn help increase patient compliance.⁶⁶ Moreover, such modifications can offer other comparative health benefits over "regular" versions—for example, reduced side effects due to the fact that the body is not "flooded" with the drug.⁶⁷ But for certain drugs, XR versions could also exhibit *reduced efficacy* compared to their immediate-release counterparts, potentially without offering any proven patient compliance or other benefits.⁶⁸ Comparative evidence, therefore, can play the critical role of informing the market by demonstrating advantages or disadvantages of the new drug product over the old.

In general, motivations for modifying existing drugs are straightforward enough to state—to better the pioneering drug in some specific dimension, such as improving compliance, ameliorating side effects, and so on. Nonetheless, as noted,⁶⁹ the sponsor does not have to actually demonstrate to the FDA that the modification would offer any of those advantages generally, or even for some particular patient sub-population. Furthermore, the fact that comparative pre-market data that may counsel for or against a drug switch is lacking can be obscured by forceful advertising, which can deepen the aforementioned information gaps.⁷⁰ To the extent that litigants and courts may help bridge them through antitrust law,⁷¹ they can only do so some time after the modified product was introduced. More importantly, given the coercion rationale, only the hard-switch scenario has been found actionable⁷²—so antitrust has so far played little, if any, information-forcing role in soft-switch cases. Thus, even if antitrust law were an effective tool for comparing benefits of drug products and fixing the information gaps,⁷³ the timing of the inquiry and the focus on coercion limit antitrust's role in this area.

Although the FDA appears to lack the authority to request comparative data from sponsors,⁷⁴ its value and importance have not been lost on FDA officials. In a speech to the Controlled Release Society made in 1993, Dr. David Kessler, then the Commissioner of Food and Drugs, exhorted his audience to "[t]hink in terms of clinical outcomes. Demonstrated, documented, and rigorously established improvements to patient care."⁷⁵ At a public meeting in 2017, Dr. Kathleen Uhl, the Director of the FDA's Office of Generic Drugs, asked an industry representative

whether a showing of some clinical benefit from a drug modification, such as increased patient compliance, would be a good idea.⁷⁶ These statements evince these officials' concern that, in the absence of a regulatory nudge, brand companies may not always focus on patient benefits when modifying existing drugs.

There may be some authority, after all, for the FDA to weigh in indirectly on such matters. For example, one fairly obscure provision of the FDCA empowers the agency to respond to PTO requests "to furnish full and complete information with respect to such questions relating to drugs as the Director may submit concerning any patent application."⁷⁷ Although the PTO has apparently never taken advantage of this subsection, it theoretically allows for FDA vetting of comparative data that a drug company submitted *to the PTO* in an effort to establish the patentability of a claimed formulation, perhaps under the "unexpected results" theory.⁷⁸ This provision even states that "[t]he Secretary is further authorized, upon receipt of any such request, to conduct or cause to be conducted, such research as may be required"⁷⁹—a power that the PTO most certainly does not have.

Nonetheless, leaving aside the inherent challenges of generating comparative information given early patent filings, one wonders if this subsection's apparent goal to enlist the FDA in the task of examining pharmaceutical improvements might be better served by another mechanism enabling the FDA to request and analyze the data directly. In a sense, we currently have it backwards: Instead of the FDA, it is the PTO, which is "a primarily technical agency with expertise in invention but not in the clinical trials that produce evidence of efficacy,"⁸⁰ that is charged with the responsibility of processing the information (if any) relevant to the relative utility of the new form of the drug.⁸¹ Although the legal questions that the two agencies ask are different, the ultimate goal of their respective efforts in the pharmaceutical space is improved quality of health care. Given that information relating to differences in clinical effect between two related drug products is clearly relevant to this general goal, it is surprising that the FDA—the agency with recognized expertise in data analysis and experimental design—is sidelined when it comes to such comparisons.

In this Article, I argue that rather than rely mainly on the backstop of antitrust litigation, completely rework patent law or patent institutions, or leave the matter exclusively to market forces, policymakers should consider addressing the phenomenon of product hopping through FDA-administered information-forcing and -transferring strategies. At present, drug modifications are driven largely by the carrot of patentability,⁸² but the regulatory mix lacks an effective stick against firms that undertake drug changes that are, at best, questionable in terms of their marginal clinical benefits.⁸³

A mild variation of a potential regulatory remedy for this omission could simply take the form of an FDA request that brand firms submit comparative pre-market drug data that would be relevant to prescriber decisions.⁸⁴ If the data is provided, the FDA would review the study, summarize it, and have the information thus revealed added to the drug package insert, a part of the drug's "labeling," for doctors, patients, and

payers to peruse.⁸⁵ This scheme would thus help create a centralized repository of disclosures of potentially high value to the market. In contrast, if no comparative study data is provided, the agency would require the appropriate labeling notation, putting the relevant audiences on clear notice of this fact (and on alert that a strategic product change might be afoot). While perhaps not a particularly powerful stick, this approach could still add value: Under the current regime, prescribers and patients are often left without adequate data to make informed treatment decisions (e.g., whether to adopt a new version of a drug, switch back from the modified version to the original as a generic, and so on), and payers may likewise be uncertain whether to cover the cheaper off-patent version of the drug, the more expensive patented modification, or both.⁸⁶

If this solution proves too mild, more significant interventions to differentiate between companies that attempt to develop clinically valuable drug improvements and those that do not are conceivable. For example, an important regulatory benefit afforded to brand owners is the listing of patents protecting the FDA-approved drug in the so-called *Orange Book*.⁸⁷ *Orange Book* listings give brands certain advantages during patent litigation and can, effectively, slow down the generics' path to market—even if the patents are ultimately invalidated.⁸⁸ This variation of the regulatory solution proposed in this Article, and fully developed in Part V, would empower the FDA with discretion to deny *Orange Book* listings to sponsors who fail to provide the relevant data to the FDA.⁸⁹ More so than clear labeling alone, the stick of denial of an *Orange Book* listing should generate incentives for sponsors to produce pre-market comparative information and perhaps ultimately lead to drug modifications that are more likely to offer added value for at least some patients.

The rest of the Article proceeds in five parts. Parts II through IV set the stage for this Article's proposal for the FDA's novel regulatory authority to induce the generation of comparative drug data from pharmaceutical firms, while the proposal itself is laid out in Part V and further discussed in Part VI, which addresses objections. Part II describes the federal statutory regime for the approval of branded and generic drugs, and also covers state generic substitution laws and their role in realizing cost savings associated with generic entry. Part III explains the function of patents in incentivizing the development of both pioneering and follow-on drugs, provides relevant background on patent law, and explains why substantive patent doctrine and systemic features of the patent system can lead to incomplete evaluations of relative drug product quality as a potential proxy for patentability. Part IV describes various forces that interfere with efficient functioning of pharmaceutical markets, enabling strategic product hops driven by secondary patenting.

Focusing on clear labeling, Part V develops two related approaches for enlisting the FDA's expertise to induce pharmaceutical companies to generate comparative data between closely related versions of drugs that they market. This Part also discusses prior examples of statutory or regulatory schemes under which the FDA has engaged in comparative analyses of drugs, sets forth mechanisms for implementing this Article's

proposal, and catalogues both immediate and downstream benefits of its adoption. Before the Article concludes, Part VI considers and answers some objections to the expanded role of the FDA in the inducement of comparative drug data development.

II. THE FEDERAL HATCH-WAXMAN REGIME AND STATE-LAW GENERIC SUBSTITUTION

The Drug Price Competition and Patent Term Restoration Act, an amendment to the FDCA often referred to simply as the Hatch-Waxman Act,⁹⁰ is a statutory scheme for regulating small-molecule drugs under which the FDA and the PTO play distinct but interrelated roles. The purpose of the Act is to balance incentives for the discovery and development of drugs against the goal of making those medicines available to consumers at reasonable prices.⁹¹ The Act contemplates two types of actors: brand and generic manufacturers.⁹² In short, the Hatch-Waxman Act, in conjunction with the Patent Act, provides for exclusive rights for brand companies to market new drugs that they develop, while also facilitating the entry of generic equivalents of the branded drugs once the exclusivities expire.⁹³

This general scheme reflects the relative burdens faced by brand and generic manufacturers. The brands do the work of identifying promising drug targets, synthesizing candidate chemical compounds in useful quantities and fully characterizing them, conducting in vitro and in vivo studies as well as several phases of human clinical trials to prove the drug's safety and effectiveness by "substantial evidence,"⁹⁴ engaging in the back-and-forth with the FDA in order to secure approval,⁹⁵ and establishing a market for the drug through extensive promotion and sampling to doctors and patients.⁹⁶ The task of the generics is simpler: They must make (or contract to have made) drug products that are essentially the same as those approved by the FDA and marketed by brand companies, while adhering to good manufacturing practices and passing certain tests confirming that their product is "bioequivalent" to the brand.⁹⁷ Crucially, generics need not conduct extensive clinical trials, and can simply rely on data developed by the brands as evidence that the product they are marketing is safe and effective. The difference between brands and generics is reflected in the respective monikers of the filings that these actors typically make with the FDA: Brands file New Drug Applications ("NDAs"), while generics file *Abbreviated* New Drug Applications ("ANDAs").⁹⁸ As even these terms suggest, the showings that generics must make are significantly less onerous than those of the brands.

In order to limit generic "free-riding" and thus provide incentives for brand companies to innovate, NDA sponsors are entitled to certain benefits. Under Hatch-Waxman, they receive FDA-enforced exclusivity for any new chemical entity approved to be marketed as a drug,⁹⁹ intended largely to serve as a backstop in the circumstances when patents are not available.¹⁰⁰ During this period, which runs five years from the date of NDA approval, the FDA is barred from considering ANDAs on drugs containing the new chemical entity, and generic manufacturers are thereby prevented from relying on the brands' clinical trial data during this time to obtain approval for their copies of the branded drug.¹⁰¹

Longer exclusivity can be achieved with patent rights, and that aspect of the drug-regulation regime constitutes the crux of this Article. In a PTO proceeding that is independent from the FDA drug approval process,¹⁰² sponsors may acquire patents covering, for example, chemical compositions embodying the newly invented drugs or new methods of using known chemicals to treat the indicated health conditions. For various reasons, brands apply for patents early in the development and drug approval process, which means that the drug is normally marketed for a period of time much shorter than the full patent term.¹⁰³ Although the term of one of the patents protecting a drug containing a particular active pharmaceutical ingredient can be extended to account for FDA regulatory delays, the extension is capped at five years, and in no event can effective patent life be longer than 14 years from the date of the FDA approval of the NDA.¹⁰⁴

The Hatch-Waxman Act mandates that sponsors submit information regarding certain patents covering their approved drugs, which the agency then lists in the *Orange Book*.¹⁰⁵ The *Orange Book* embodies a mechanism that constitutes a critical link between patent and FDA-regulatory aspects of pharmaceuticals.¹⁰⁶ Thus, the Act requires generic manufacturers wishing to market a drug under an ANDA to certify to the FDA that either no relevant patent information was submitted by the sponsor (Paragraph I) or, for each applicable patent, that the patent has expired (Paragraph II), will expire by the time the generic aims to market the drug (Paragraph III), or “is invalid or will not be infringed by the” commercialization of the generic drug (Paragraph IV).¹⁰⁷

For the purposes of this Article, the most interesting paragraph is Paragraph IV. A Paragraph IV certification indicates the generic’s wish to market its copy of the branded drug product under an ANDA before expiration of all the patents listed in the *Orange Book* as protecting the branded drug, which is possible only if the patent claims are invalid or not infringed by the ANDA-approved product. The filing of a Paragraph IV certification is deemed by statute to be an act of patent infringement that allows the parties to initiate a lawsuit in order to litigate the issue of the generic’s liability,¹⁰⁸ which in turn triggers an automatic 30-month stay against the approval of the ANDA.¹⁰⁹ If the generic obtains a judgment of invalidity or non-infringement of the relevant *Orange Book*-listed patents, it earns permission to market its product before the patents expire.¹¹⁰

The stakes of patent litigation built into the Hatch-Waxman regime are high. A finding of no patent infringement liability allows for generic entry and leads to smaller market shares and, typically,¹¹¹ lowered prices of branded drugs, causing significantly reduced profit margins for the sponsor firm.¹¹² Indeed, a judgment invalidating the *Orange Book* patents could be financially devastating for the firm unless it has other drugs in the pipeline.¹¹³ A similar result may follow when the patent covering a blockbuster drug expires, a phenomenon sometimes described as the “patent cliff.”¹¹⁴

Moreover, once the generics enter, the brand's losses are cemented by the generic substitution laws mentioned in the Introduction.¹¹⁵ Although their details vary by state, the basic aim behind these laws is to have pharmacists fill a prescription with a generic even when the doctor prescribes the more expensive brand, whether out of habit, loyalty,¹¹⁶ belief that the brand is somehow better,¹¹⁷ or for some other reason.¹¹⁸ In many states, substitution laws take a permissive form¹¹⁹—in other words, pharmacists may fill a prescription for a brand with a generic—but in some states, the switch is mandatory unless explicitly overridden by doctor's orders.¹²⁰ An analogy outside the drug context illustrates just how odd this scheme is: Suppose a customer wishes to buy a Softsoap-brand liquid hand soap at CVS and brings a bottle of it to the counter, only to have the cashier substitute Softsoap with the CVS house brand, Total Home.

Nonetheless, generic substitution laws are firmly entrenched, and they reinforce the intuition that prescription drugs operate in a market that is nothing like the market for normal products like liquid hand soap. These laws are motivated in part by some peculiar economics of brand-generic "competition,"¹²¹ and reflect the view that it is unrealistic to expect generic firms to conduct their own advertising given the commodity-like nature of generic drugs and the possibility that other generic entrants might free-ride on the efforts of competitor generic firms that decide to advertise. Although the ultimate result seems harsh on the sponsor, it does reinforce a result contemplated by the Hatch-Waxman scheme—lower drug prices.¹²² The idea is that at the expiration of all of the brand's valid exclusivities, the innovator has received all the reward that it was due, and the public can enjoy cost savings from generics.

Significantly, the states tie pharmacists' ability to substitute generics for brands to the FDA's determination that the two are "therapeutic equivalents," which is normally the case for brands and generics.¹²³ This standard requires, among other things, "identical amounts of the same active drug ingredient in the same dosage form and route of administration."¹²⁴ One corollary of this requirement is that if, for example, the dosing is different between the two drug products, they are no longer therapeutically equivalent and substitution is therefore not allowed.¹²⁵ Returning to this Article's central example of extended- versus immediate-release forms of Namenda, the drug modification that led to the *Actavis* antitrust case, one observes that the two are not substitutable because of the difference in dosing. IR was indicated for a twice-a-day 10-milligram (mg) dose administration (for a 20 mg total of the active drug a day), while XR was indicated for a once-daily 28-mg dose,¹²⁶ rendering the two therapeutically distinct under the FDA's rules.¹²⁷ The product hopping strategy discussed in the Introduction, then, is born of an interplay between state and federal drug regulatory regimes—but, as we will see in the next Part, is ultimately made possible by patent law. It is to patents, then, that this Article now turns.

III. DRUGS, PATENTS, AND PRODUCT CHANGES

A. PRIMARY AND SECONDARY PATENTS

The conventional wisdom has it that patents play a critical role in drug development and, more generally, that chemical and pharmaceutical patents are the success story of the patent system.¹²⁸ Because the pharmaceutical industry is one that typically requires a high amount in upfront investments, a drug maker's ability to recoup those outlays by charging supracompetitive prices made possible by patent exclusivity is critical for preserving incentives for pharmaceutical innovation.¹²⁹ Indeed, because many drug candidates fail to make it past the FDA approval process, brand companies' ability to "cash in" on those products that do get through and end up being blockbusters can offset the losses associated with drug candidates that are unsuccessful.¹³⁰ While the FDA's regulatory five-year new chemical entity exclusivity serves as a backstop that provides some reward when no patent can be obtained,¹³¹ by many accounts this period may simply be too short to give pharmaceutical companies sufficient return on investment¹³²—especially when the particular drug discovery effort is expected to demand considerable research and development expenditures.¹³³

In many cases, though not all,¹³⁴ new drugs represent significant advances in both science and health care. These products are frequently protected by broad patent claims directed to the newly discovered molecules¹³⁵—though, to be sure, such claims are certainly not guaranteed.¹³⁶ Generally speaking, though, patents that do cover new active drug ingredients tend to be fairly robust, and their validity is rarely challenged successfully by generics in Hatch-Waxman litigation.¹³⁷ Thus, the principal threat to the exclusivity these patents provide to brand companies entails the passage of time. On the front end, it is time lost in the process of FDA approval, when the patent clock is ticking but the product cannot yet be marketed.¹³⁸ On the back end, it is of course patent expiration.¹³⁹

Whether, even with statutory extensions, useful term length of brands' "pioneering" patents serves as an adequate incentive in the face of long research timelines and regulatory delays is an issue of considerable controversy. Indeed, some recent empirical work has shown that the patent term is probably too short to offer an adequate reward, particularly for certain difficult-to-develop drugs.¹⁴⁰ Several commentators have, therefore, proposed tying the length of the patent term to R&D expenditures, or at least to the amount of time needed to bring a product to market, so as to preserve incentives for long-term research in particular.¹⁴¹ In addition, and more closely related to this Article's proposal, Professors Gregg Bloche, Neel Sukhatme, and John Marshall suggested that patent term should be tied to the therapeutic value of the underlying drug.¹⁴²

But what about patents on follow-on products, such as extended-release versions of drugs? Consistent with the incremental nature of the innovation these products normally embody, brand companies tend to protect them with patents that are narrower than those directed to the pioneering versions. This dynamic is captured in the terminology that refers to patents on the original drug as "primary" and those on the follow-on as "secondary." Secondary patents, sometimes also referred to as "improvement patents,"¹⁴³ tend to be weaker than primary patents, and empirical research shows that they are challenged and invalidated more frequently in litigation.¹⁴⁴ Moreover, because these patents by

definition cover a variation of an already-approved drug, the approval of the underlying product generally does not take up nearly as much research and development time (and cost) as that of the drug's pioneering form.¹⁴⁵ But because it is a foundational principle of patent law that the length of the patent term does not vary depending on the patent's "strength" or the nature of the patented innovation,¹⁴⁶ even if those attributes could be somehow quantifiable, secondary pharmaceutical patents get the same term of twenty years from the effective date of the application as all others.¹⁴⁷ Also, like primary patents,¹⁴⁸ these patents are listed in the *Orange Book* (as covering the follow-on drug) and receive associated FDA-administered benefits, including both the requirement of a Paragraph IV certification if a generic wishes to market the new product before patent expiration and, normally, a 30-month stay after the brand-generic litigation commences.¹⁴⁹

To be sure, the very division of patents into primary and secondary categories is somewhat arbitrary—a patent is a patent, and it does not issue from the PTO with an ordinal label.¹⁵⁰ In the pharmaceutical space, though, a clear pattern of patenting has emerged that makes the distinction appropriate as a heuristic matter.¹⁵¹ A broad patent, often containing claims to a group of chemical compounds that includes the active ingredient of the drug, is followed some years later by a patent with new claims directed to the active ingredient mixed with so-called polymeric carriers, tablets containing the active ingredient that have certain dissolution rates, specific crystalline forms of the active ingredient, and the like.¹⁵² Although such claims can face an uphill battle at the PTO, brand companies devote significant resources to their prosecution and often overcome the initial rounds of rejections by patent examiners to obtain allowance. The issuance of the new patents is, in turn, sometimes accompanied by a strategic product hop. This pattern has appeared time and again: Even though the term "product hopping" was coined by Professor Herbert Hovenkamp in the previous decade,¹⁵³ Dr. Kessler expressed concerns about the practice in the 1990s.¹⁵⁴

For a concrete example of the primary-secondary patent dynamic, though one that could not be fairly characterized as a strategic product hop because the modification resulted in a provably better product,¹⁵⁵ let us consider a "simple" patent claim that appeared in an actual secondary patent: "A sustained release formulation comprising a gelling agent and 11-[4-[2-(2-hydroxyethoxy)ethyl]-1-piperazinyl]dibenzo-[b,f][1,4]thiazepine or a pharmaceutically acceptable salt thereof, together with one or more pharmaceutically acceptable excipients."¹⁵⁶ This claim was representative of those asserted in *AstraZeneca Pharmaceuticals v. Anchen Pharmaceuticals*, a case to which I will return in the next Section.¹⁵⁷ The phrase of particular note in this claim is "a gelling agent," the addition of which constitutes one of the reasons that it is patentable. The gelling agent makes it possible for the drug containing the active chemical ingredient quetiapine, a member of the so-called "thiazepine" class of chemicals, to function as a "sustained," i.e., extended, release formulation.¹⁵⁸ In contrast, the corresponding primary patent was much broader: It covered the quetiapine recited in the secondary patent as well as related thiazepine compounds, but without the gelling agent, and it supported exclusivity for the marketing of immediate-release quetiapine.¹⁵⁹

In patent terminology, the two patents have a “genus-species” relationship,¹⁶⁰ whereby the subject matter claimed in the narrower, secondary “gelling agent” patent is a “species” of the various embodiments encompassed by the broader, primary “genus” patent claims lacking the “gelling agent” limitation. Significantly, the extended-release combination of quetiapine and the gelling agent is covered by *both* the primary and the secondary patent belonging to the sponsor. Therefore, competitors are prevented from marketing *both* the XR version *and* the IR version of the quetiapine drug during the life of the first patent.¹⁶¹ After the first patent expires, the competitors can market the IR—though not XR,¹⁶² unless the second patent is invalidated or adjudged non-infringed.

This story is complicated somewhat by a subsection of the Patent Act that relieves firms from infringement liability for research “solely for uses reasonably related to the development and submission of information under a Federal law which regulates the manufacture, use, or sale of drugs,”¹⁶³ such as compliance with the FDCA required to receive FDA approval.¹⁶⁴ This provision, by its terms, can pertain to research designed to gain approval of a new (and perhaps improved) version of a branded pioneering drug by a company other than that drug’s sponsor. Although this research exemption does not permit a competitor to actually market a drug product covered by someone else’s patent,¹⁶⁵ the competitor is nonetheless allowed to obtain its own secondary patents¹⁶⁶ and use them to support the marketing of the reformulated product when the primary patents expire¹⁶⁷—as long as the sponsor of the original drug does not itself acquire secondary patents covering that particular modification.

Typically, however, the original drug’s sponsor will control both the pioneering drug and its improvements along with the corresponding patents.¹⁶⁸ Putting to one side the role of the dominant primary patent, this state of affairs likely stems from the fact that the discoverer of the new active chemical ingredient underlying the drug normally has an immense head start over others. In particular, the sponsor is often in possession of a great deal of know-how and data that remains undisclosed even as the relevant patent applications and other descriptions of the product, such as those in scientific articles, become public.¹⁶⁹ Accordingly, potential competitors face formidable obstacles in developing modifications that would threaten the original sponsor’s market position with respect to follow-on products.¹⁷⁰ This Article’s proposal does not concern the scenario in which a competitor develops the modification¹⁷¹—by definition, this cannot be a product hop. Instead, the examples discussed in the Article, including Asacol, Namenda, and Seroquel, all involve the more typical set of facts in which the pioneer and the follow-on are marketed by the same firm or by closely related entities, such as wholly-owned subsidiaries.¹⁷²

In the case of Seroquel, immediate-release quetiapine was a novel drug type that turned out to be particularly effective for bipolar depression, as well as for other conditions like schizophrenia and psychosis.¹⁷³ The version with the gelling agent, as the claim indicates, is the “sustained release,” otherwise described as “extended-release,” form of quetiapine.¹⁷⁴ The extended-release patent from which the representative claim above is drawn expired in 2017, while the pioneering patent on quetiapine expired in 2012.¹⁷⁵ The courts have upheld the validity of the

secondary, Seroquel XR patent based partly on evidence that the switch from IR to XR has led to certain therapeutic improvements.¹⁷⁶ To understand the relevance of such information on patentability—and to draw a further connection between secondary patents and the product hopping phenomenon—some background on the relevant aspects of substantive patent law is necessary.

B. PHARMACEUTICAL PATENTING AND PRODUCT CHANGES

1. The Sponsor's Non-Obviousness Challenge and "Unexpected Results"

Before returning to the substantive provision of the Patent Act of principal relevance to secondary patenting, it is useful to briefly review patent prosecution procedures. To obtain patent rights, inventors—or, more commonly, the firms those inventors work for—begin by filing patent applications with the PTO.¹⁷⁷ An application contains one or more claims, such as the illustrative “gelling agent plus quetiapine” claim above, desired by the applicant.¹⁷⁸ A patent examiner assesses the claims for compliance with the various requirements of patentability, typically a time-consuming process that involves multiple iterations of arguments between the applicant and the examiner.¹⁷⁹ Frequently, the claims as filed in their initial form are amended during this process.¹⁸⁰ The amendments usually narrow the claims, often enabling the applicant to overcome the examiner's objections to patentability.¹⁸¹ If the patent issues, the brand can use it to keep generics out until judicial invalidation (or adjudication of non-infringement), a determination of unpatentability in a PTO post-issuance review, or expiration.¹⁸²

Of the requirements of patentability, the one most difficult to overcome for the drug sponsor seeking to acquire a secondary patent is usually non-obviousness, codified in 35 U.S.C. § 103. While the novelty requirement of § 102 prohibits patents on subject matter that has become part of the public domain,¹⁸³ non-obviousness under § 103 essentially bars patents on claims that, although not identically disclosed by prior publications or activities, are so close to what is already known¹⁸⁴—the universe of references sometimes collectively described as “the prior art”—as to be within the public's grasp.¹⁸⁵ In relevant part, this section states:

A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.¹⁸⁶

Because the term “obvious” is not self-defining, the structure of the § 103 inquiry had to be developed by courts. Three of the four so-called *Graham* factors that guide analysis of patentability under § 103, set forth in the foundational Supreme Court case of *Graham v. John Deere Co.*, are “the scope and content of the prior art[,] . . . differences between the prior art and the claims at issue[,] . . . and the level of ordinary skill in

the pertinent art.”¹⁸⁷ The ultimate question is whether, given those differences, the fictitious “person having ordinary skill in the pertinent art” would readily bridge them,¹⁸⁸ either by combining multiple prior art references or modifying a reference to arrive at the claimed invention. Further glosses by the United States Court of Appeals for the Federal Circuit, the court with exclusive jurisdiction over patent appeals, have established that those challenging claims on obviousness grounds must typically show some motivation to combine or modify the relevant prior art to make the claimed invention,¹⁸⁹ and also demonstrate that the person of ordinary skill in the art “would have had a reasonable expectation of success” in discovering the patented subject matter at the time the application was filed.¹⁹⁰

In addition, as the fourth *Graham* factor, decision-makers evaluating patentability under § 103 consider “[s]uch secondary considerations as commercial success, long felt but unsolved needs, failure of others”¹⁹¹ and other pieces of evidence, such as industry praise and licensing,¹⁹² that are also sometimes collectively called “objective indicia of nonobviousness.”¹⁹³ Because, at the time when a patent application is pending before the PTO, a commercial product might not yet exist, such evidence typically plays a bigger role during litigation as opposed to prosecution.¹⁹⁴ In the Seroquel case, for example, proof of Seroquel XR’s commercial success and the long-felt need for effective treatments of bipolar depression were significant factors in convincing the trial court to uphold the validity of the XR patent.¹⁹⁵ Secondary considerations evidence can generally only help the patentee,¹⁹⁶ although the patentee must show some connection between the evidence and the patented invention to establish its relevance to a claim’s non-obviousness.¹⁹⁷ For example, if the commercial success of the claimed invention’s embodiments is attributable mainly to marketing rather than to the technical quality of the improvement over the prior art, then it may not help the applicant show that the claims are non-obvious.¹⁹⁸

The admissibility of secondary considerations, which reflect the experiences of pharmaceutical market participants, is somewhat in tension with the oft-stated principle that patent law is not concerned with the creation of inventions that work better than those already on the market.¹⁹⁹ In particular, case law interpreting the utility requirement of patentability, codified in § 101, includes forceful statements like “[a]ll that the law requires is, that the invention should not be frivolous or injurious to the well-being, good policy, or sound morals of society. . . . If it be not extensively useful, it will silently sink into contempt and disregard.”²⁰⁰ When it comes to the non-obviousness requirement, however, while some decisions hold that the case for obviousness based on the first three *Graham* factors can overwhelm secondary considerations,²⁰¹ the latter can sometimes still make a considerable difference in bolstering the patentee’s case.²⁰² Thus, proponents of patentability often introduce real-world data, which are often purported to speak to the objective qualities of the claimed invention in contradistinction to what came before, in order to develop secondary considerations in litigation or prosecution.²⁰³

Another way such data can come in is under the doctrine of unexpected results, which is of particular significance to this Article's proposal for eliciting comparative drug information.²⁰⁴ This doctrine, which occupies the murky space in the law of § 103 between the first three *Graham* factors and secondary considerations,²⁰⁵ holds that the case for patentability is strengthened when "the claimed invention exhibits some superior property or advantage that a person of ordinary skill in the relevant art would have found surprising or unexpected."²⁰⁶ Such evidence, presumably,²⁰⁷ can counter an assertion that an ordinary artisan would have had a reasonable expectation of success in developing a particular drug modification, such as a new formulation.²⁰⁸ According to one commentator, unexpected results are "the most prevalent form of evidence of nonobviousness relied on by patent applicants during patent examination."²⁰⁹ In one case, though affirming the PTO's rejection of a claim to a modification of a prior art chemical compound as obvious, the United States Court of Customs and Patent Appeals²¹⁰ explained:

When considering that minor advances in activity are eagerly sought in pharmaceutical chemistry, a showing of nine and six times more activity than the most active compound of the art is indeed most significant, representing a different order of magnitude, and is proof of unobviousness and unexpected beneficial properties in a new compound.²¹¹

Notably, a showing of unexpected results must be made in a comparison with "the closest single prior art reference."²¹² In a typical secondary-patent case raising the possibility of product hopping, the closest prior art against the desired claims will often constitute the patentee's own disclosures related to the subject matter of the primary patent, if not the primary patent itself.²¹³ Intimate familiarity with the prior art that it must overcome in order to obtain the secondary patent, and the concomitant ability to shape the presentation of any relevant comparative information,²¹⁴ likely gives the sponsor a significant leg up in the process²¹⁵—and may yet be another reason that competition for the development of follow-on drug versions is rarely observed.²¹⁶ The challenge of overcoming one's own prior art was, indeed, the general setting for both Seroquel and Namenda extended-release patents, but there are important contrasts between the two sets of product changes in terms what data was introduced before the decision-maker in order to develop unexpected results. I discuss the Seroquel example in the paragraphs that follow and focus on Namenda in the next Section.

In the Seroquel case, *AstraZeneca Pharmaceuticals v. Anchen Pharmaceuticals*, the district court began the analysis of the validity of the XR claims under § 103 by determining that the defendants put on fairly weak evidence of motivation to make the claimed "gelling agent" formulation.²¹⁷ Furthermore, it noted that there were general doubts in the literature that extended-release versions of psychiatric drugs like Seroquel would be safe and effective.²¹⁸ Thus, AstraZeneca started off with a strong case against obviousness, but the unexpected results helped it further. The court found, based on the testimony of experts, that "Seroquel XR has a sedation profile that is unexpectedly superior as compared to the sedation of Seroquel IR" and "is better tolerated than Seroquel IR in the treatment of bipolar depression."²¹⁹ The court

observed that “testimony regarding a reduction in sedation when using Seroquel XR is consistent with the results of two trials comparing Seroquel IR and Seroquel XR conducted by AstraZeneca,”²²⁰ which were post-marketing safety-focused trials that the FDA opted to require for this particular pair of drug products pursuant to its so-called “Phase IV” authority to condition approval on such studies in certain circumstances.²²¹

Notably, the court also credited testimony noting another relative benefit of Seroquel XR, which AstraZeneca established *before* this new form of Seroquel went on the market. This testimony related to the fact that XR can be more rapidly “titrated,” or ramped up, “to the maximum approved dose” than IR.²²² The court explained that, “[a]s compared to Seroquel IR, Seroquel XR shows a significant improvement in the speed with which it can be titrated according to the two drugs’ FDA approved labels.”²²³ Thus, comparative information on titration was developed at the pre-approval stage, reviewed by the FDA, and placed on the labeling—steps that are in line with this Article’s proposal.

All this evidence reasonably bolstered the case for the validity of the Seroquel XR claims, which the court ultimately upheld.²²⁴ The data offered in support of the patent that helped Actavis engineer the switch to Namenda XR presents a different story, which I cover in detail in the next Section. Although the comparative data for Namenda came in during prosecution, not litigation, it is still illustrative of what sorts of evidence might tend to support the case for unexpected results and, therefore, patentability under § 103. More generally, the Namenda XR prosecution history underscores the complex relationship between product-related data and patentability. It shows that the law and institutions involved in determining non-obviousness not only fail to uniformly induce the development of comparative information to establish patentability, but also allow for strategies that lead to the issuance of secondary patents based on questionable assertions of “improvement” made to the PTO that the FDA does not evaluate or even see. The next two Sections provide a detailed analysis of that history and, then, a further explication and evaluation of the legal regime that it illustrates.

2. Non-Obviousness in the Namenda XR Patent Prosecution

Forest Laboratories, which a few years ago became a wholly owned subsidiary of Actavis, had marketed an Alzheimer’s drug called memantine hydrochloride (or simply memantine) under the brand name Namenda IR.²²⁵ Namenda IR was covered by a patent that Forest had exclusively licensed from a German company called Merz.²²⁶ As noted earlier, this drug was approved for twice-daily administration of 10-mg tablets.²²⁷ One of the primary patents, U.S. Patent No. 5,061,703 (‘703 patent), was listed in the *Orange Book*²²⁸ and included claims to “[a] method for the prevention or treatment of cerebral ischemia comprising the step of administering, to a patient in need thereof,”²²⁹ memantine and other, closely related chemical compounds.²³⁰ Although containing method-of-use claims rather than more powerful claims on the

chemical compositions themselves, the ‘703 patent made it unscathed through Hatch-Waxman litigation after Forest settled with several generics that challenged its validity.²³¹ Under the terms of the settlement, the generics were set to enter the market with their versions of memantine as immediate-release tablets in early 2015.²³²

Meanwhile, Forest had filed applications for, and eventually obtained, additional patents related to memantine. These patents protect Namenda XR, which the FDA separately approved and which Forest currently markets along with Actavis. Among others, Forest was granted claims that were essentially directed to certain pharmacokinetics—specifically, rates of dissolution and absorption—of memantine in the human body. A representative claim in one of these new patents, U.S. Patent No. 8,039,009 (‘009 patent) recites “[a] method for treating Alzheimer’s disease comprising once daily administration of a modified release solid oral dosage form” (i.e., a tablet) that included an approximately 28-mg dose of memantine

and a pharmaceutically acceptable polymeric carrier substantially contributing to the modification of the release of the memantine or pharmaceutically acceptable salt thereof, said dosage form sustaining release of the memantine or pharmaceutically acceptable salt thereof from about 4 hours to about 24 hours following entry of said form into a use environment, wherein said dosage form has a single phase dissolution rate of less than about 80% after passage of about 6 hours following said entry into said use environment.
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Although it is much more complicated than the quetiapine “gelling agent” claim above, the general concept behind this claim is similar. The idea is—as the “extended release” phrase suggests—that these patents basically claim delayed bioavailability of the active pharmaceutical ingredient, though reciting actual dissolution rates.²³⁴ The representative claim includes a “polymeric carrier,” which—like a gelling agent—controls the release of memantine in the “use environment,” i.e., the human body, by metering the rate of the tablet’s dissolution over the time periods recited in the claim. As will soon become clear, it is also significant that the claim includes a “once daily administration” limitation.

Not unexpectedly, the closest prior art reference the examiner cited against Forest during prosecution was authored by scientists at Merz, the original assignee of the primary ‘703 patent²³⁵—as well as another publication describing “sustained” release formulations of closely related drug compounds.²³⁶ The main reference, Hartmann, was a post-marketing study that disclosed a therapy for Alzheimer’s with memantine. In the Hartmann study, “the majority of patients were treated with 20 mg/day memantine, the recommended daily dose,” though larger dosages (30

mg and beyond) were used on some patients and were apparently safe and well-tolerated.²³⁷ Although this aspect of the therapy was not explicitly discussed in Merz, the study's authors had to use multiple doses of 10 mg tablets—because, as in the United States, immediate-release memantine in Germany was approved as a therapy of 10 mg tablets taken twice daily.²³⁸

Relying on Hartmann in combination with the other reference, the examiner rejected as obvious an earlier version of Forest's desired claims covering Namenda XR, which recited "[a] modified . . . release solid oral dosage form for the treatment of Alzheimer's disease comprising . . . about 28mg memantine" after concluding that the publications in totality suggested "the practice of the instantly claimed invention with a reasonable expectation of success."²³⁹ In an attempt to overcome the rejection with evidence of unexpected results, the applicant submitted a declaration from a Forest scientist stating that "28 mg memantine modified release was statistically significantly superior to placebo,"²⁴⁰ in treating patients with moderate to severe Alzheimer's, but the examiner maintained the rejection because immediate-release memantine (i.e., Namenda IR) was likewise significantly superior to placebo for this population.²⁴¹

In its next filing, which finally convinced the examiner, the applicant responded with a claim amendment and an argument pointing to a supplemental declaration from the same scientist. The amendment modified the preamble of the claim to "[a] method for treating Alzheimer's disease comprising *once daily administration* of a modified release solid oral dosage form."²⁴² The declaration, crucially, "describe[d] that an oral dose of 20 mg memantine as *immediate-release* tablets given *once daily* to Alzheimer's patients was not significantly different from placebo-treated patients"—a result over which a treatment with once-daily 28-mg memantine XR, which *was* better than the placebo according to a prior declaration, was an improvement.²⁴³ The applicant thus urged that the two declarations established that, as amended, "the claimed methods for treating Alzheimer's disease comprising once daily administration of a modified release . . . form comprising about 28 mg of memantine are surprisingly and unexpectedly effective."²⁴⁴ The examiner then allowed the claims without comment.²⁴⁵

It is worth appreciating what got the claims to allowance. The asserted unexpected result was the "improvement" of using a single daily 28-mg extended-release dose over a single daily 20-mg immediate-release dose, even though the FDA had not approved the latter therapy. Indeed, the FDA had approved IR memantine only for a *twice-daily* administration (as two 10 mg tablets).²⁴⁶ As a matter of establishing relative patient benefit, the correct comparator was of course the actual Namenda IR as approved and prescribed. If only one tablet of IR a day were sufficient to treat Alzheimer's, that would mean that patients have been needlessly taking Namenda in two separate 10 mg doses, instead of a single daily 20-mg dose at once.

Nonetheless, this argument, coupled with the aforementioned amendment adding the phrase "once daily administration"—which is what Namenda XR was approved for²⁴⁷—sufficed to overcome the rejection. The patent's allowance was followed by a soft switch away from IR, and then a hard switch, during the two years prior to the scheduled generic IR entry in early 2015.²⁴⁸ The validity of the '009 and related

Namenda XR patents has not yet been fully tested in litigation: Some of the early infringement actions in which they were asserted settled,²⁴⁹ as has a more recently filed case.²⁵⁰

3. Beyond Namenda

Perhaps the most notable upshot of the Namenda XR prosecution is that the examiner's decision to grant the '009 patent to Forest, odd though it may seem from the perspective of a general audience, is not clearly²⁵¹ incorrect under substantive patent law. When a publication describing the product, rather than the product itself, is offered as the primary prior art reference, some Federal Circuit authority supports the notion that the formal unexpected results comparison should generally take place between the new product embodying the desired claim and the bare content of the reference.²⁵² When this is the focus, the difference between real-world utilities of the new and old inventions, as reflected in their respective commercial embodiments and other extra-documentary sources, might not come through.²⁵³

Indeed, the examiner's office actions and the Namenda XR patent prosecutor's framing of the unexpected results argument focused on the prior art publication, Hartmann, rather than on the prior IR product.²⁵⁴ Hartmann did not attach any significance to the fact that the treatments it disclosed involved multiple daily administrations, which is a feature of the reference that could perhaps give the prior artisan a reason to believe that a single daily 20-mg IR dose would have treated Alzheimer's just as well.²⁵⁵ Based on this line of reasoning, the fact that a single 20-mg IR dose does not work, but a single 20-mg XR dose is actually effective, could perhaps be fairly characterized as surprising. Thus, the focus on what is actually described in the particular publication chosen as the closest prior art, as opposed to the underlying product, has the potential to supplant the full picture of clinically relevant data in the unexpected results inquiry.²⁵⁶

Perhaps more troubling still, there is also precedent for the notion that scientific validity of the underlying data, whatever the basis for comparison, does not really matter in the unexpected results inquiry. In *Janssen Pharmaceuticals v. Watson Laboratories*, a district court noted that "[d]efendants have not persuaded this Court that a patentee faced with a validity challenge must provide evidence of unexpected results that passes muster under undefined high standards of scientific validity" and, further, faulted the defendant for "trying to insert a scientific validity requirement into Federal Circuit law."²⁵⁷ As to the defendants' argument that "1) the applicant 'obtained allowance of the [asserted patent] solely on assertions of unexpected results;' 2) the applicant relied on [a table containing a flawed cross-study comparison] to persuade the examiner of the unexpected results; and 3) [the table] does not constitute scientifically valid proof of unexpected results,"²⁵⁸ the trial court responded in part with the following point: "[T]here appears to be hidden in this argument an attempt to shift the burden of proof at this juncture onto Plaintiffs."²⁵⁹

The *AstraZeneca* case does offer a counterpoint to these examples. To support non-obviousness of claims covering Seroquel XR, the sponsor provided a credible product-to-product comparison and even FDA-vetted pre-approval²⁶⁰ data illustrating an advantage of XR over IR with respect to titration—even though, formally, the closest prior art reference of record was the prior art IR *patent*, not the product.²⁶¹ Besides the intuition that it just seems wrong to turn a blind eye to product-to-product comparison evidence, when it is available, to establish unexpected results, there is authority behind a product-focused analysis of unexpected results as well.²⁶² For example, as the Court of Customs and Patent Appeals explained in *In re Payne*, “[a] prima facie case of obviousness based on structural similarity is rebuttable by proof that the claimed compounds possess unexpectedly advantageous or superior properties. Direct or indirect comparative testing between the claimed compounds and the closest prior art may be necessary.”²⁶³ The *Payne* court went on to review the PTO’s evaluation of the applicant-submitted data on prior art compounds and those embodying the claims, including an evaluation of the compounds’ relative utilities for their intended purpose —“activity against aphid and housefly.”²⁶⁴

Nonetheless, the *Namenda* prosecution history and the seemingly more permissive²⁶⁵ line of authority that it reflects illustrate the larger point that patent law does not uniformly provide the incentive to generate comparative data useful to market participants, nor, indeed, do decision-makers consistently base patentability decisions on such data in the context of pharmaceutical product changes. Although this sort of information is often considered in patent cases, it does not always consist of “real-world” (i.e., product-relevant and clinically relevant) data, and the submissions that do come in are scrutinized by institutions—the PTO and courts—whose expertise is not focused on clinical trials anyhow. The *Namenda* XR patent prosecution and the *Janssen* case reflect a state of affairs that is arguably worse than the alternative approach under which comparative drug utility were simply irrelevant for patentability. Instead of adhering to a simple rule that “patented doesn’t mean better” and sending the clear “buyer-beware” message that this rule would imply, we allow government imprimatur to be attached to comparative assertions of dubious relevance to medical care and sometimes of dubious scientific validity, full stop.²⁶⁶

There is a governmental agency, the FDA, that has the expertise to scrutinize comparative data that may have clinical relevance, but under the current legal regime this agency does not get to use it unless special circumstances apply or the sponsor, such as *AstraZeneca* with its XR/IR titration comparison, decides on its own to go beyond the basic drug approval requirements. While 21 U.S.C. § 372(d), the FDA-PTO cooperation provision discussed in the Introduction,²⁶⁷ could be a vehicle for getting the FDA involved in looking at comparative results on the patentability side, this solution does not seem altogether satisfying. In prosecution, the data can be of intrinsically limited quality given the early stage of product development during that time,²⁶⁸ precluding a robust comparative utility analysis even if the FDA were helping the PTO with the examination. During litigation, when more developed data is more likely to be available, § 372(d) does not apply, and courts must rely

on party experts to evaluate this information in the shadow of the presumption of patent validity²⁶⁹—assuming, again, that applicable precedent even requires that the patentee make the proper product-to-product comparison and introduce unexpected results data that is scientifically robust.

In spite of the various legal and institutional limitations, the proffered comparative utility assertions that the PTO and courts do see can have a critical impact on patentability and, as a result, can in effect enable the sponsor to market the follow-on drug exclusively.²⁷⁰ This regulatory lacuna is partly responsible for generating perverse incentives for patent-driven product hopping onto new drug formulations that lack demonstrated clinical differences from the old. Although one possible fix might be to overhaul substantive patent law and equip the PTO with the tools to induce the development of comparative clinical trial data, my sense is that such massive systemic change would be very difficult, if not impossible, to accomplish. Such reform would require effectively remaking the PTO in the FDA's image and, perhaps, a major course-correction in the doctrine of unexpected results.²⁷¹

In addition, even if logistically possible, such reform of patent law and institutions writ large might simply might not be, perhaps somewhat ironically, worth the associated switching costs. This is because the product hopping problem has largely arisen due to, and reflects, the unique regulatory features of the pharmaceutical industry, which include pre-approval, the ANDA pathway, and generic substitution.²⁷² Thus, it stands to reason to fix the problem with a regulatory solution that is also pharma-specific.²⁷³ Accordingly, the approach I adopt in this Article leaves patent law alone and directly enlists the FDA's expertise to undertake a comparative analysis of the utility of related drug products independently from the PTO and courts.

To complete the Namenda story, it should be noted that the sponsor did perform some comparative work, though it was not helpful in differentiating XR from IR. While conducting safety and effectiveness studies needed to obtain approval for Namenda XR, Forest established that the so-called peak serum concentration of memantine from the proposed dose of XR was 1.5 times greater than that from the approved dose of IR.²⁷⁴ But that assessment was only a shortcut to showing that XR was safe based on the proxy of high IR doses, which gave the same peak serum concentration as the proposed XR dosage, that have been successfully tested for safety.²⁷⁵

Thus, at the time of the switch, there was “no study addressing the comparative efficacy” of IR and XR,²⁷⁶ and specifically “the clinical impact of [XR's distinct] pharmacokinetic properties is not known since it has not been studied in clinical trials.”²⁷⁷ Moreover, a post-marketing study found “conflicting” evidence for the assertion that switching to a once-daily regimen in a related therapy involving a combination of memantine with another drug would “increase treatment adherence and persistence[,] . . . meaning that the added cost of switching patients from generic options . . . may not always be justified.”²⁷⁸ This conclusion calls to mind an observation made by Blue Cross

Blue Shield in a comment after a recent public FDA hearing: “There are anecdotal signs that reformulated products may positively impact

adherence and that reformulations may improve patient outcomes, but payers need data that demonstrates improved adherence or other product benefits over existing therapies.”²⁷⁹ Needless to say, the data presented to the PTO during the prosecution of the Namenda XR patents does not speak to these issues.

In the ideal world, the Namenda strategy would be punished by the market. Although patent law, the primary driver of innovation in this area, does not always pass judgment on the relative quality of inventions, consumers certainly can. Various features of pharmaceutical markets, however, make rational decision-making difficult. Dr. Kessler voiced a concern with this dynamic in 1993, when he noted that some switches to “controlled release ma[de] little sense” and were instead driven “not [by] convenience or compliance but economics”²⁸⁰—that is, brand companies’ desire to charge higher drug prices thanks to follow-on patent protection. This is indeed what happened with Namenda XR, as significant numbers of prescribers made the transition away from IR, even before the hard switch, and apparently without evidence that would support this change.²⁸¹ The Part that follows describes some of the market pathologies that make strategic product hops possible even in soft switch scenarios.

IV. PRODUCT HOPPING AND PHARMACEUTICAL MARKET DEFECTS

Informational inefficiencies in the market for prescription drugs have been well-documented,²⁸² but are worth recapping here to underscore the need for the generation and disclosure of comparative data in the product switch context and to highlight its potential utility for this relatively well-defined information gap scenario. The causes of inefficiencies can be divided roughly into three categories. The first set of limitations has to do with economic misalignments that can lead to acceptance of more expensive products without a full inquiry into whether there is adequate evidence supporting the switch. The second concerns patent-driven structural limitations, already alluded to earlier in the Article, that limit meaningful competition over follow-on forms of a particular drug.²⁸³ The third relates to cognitive and practical constraints, intensified by vigorous advertising and the “credence-good” nature of pharmaceuticals, on rational decision-making in this market. These features of the market work together to contribute to the underproduction of socially valuable comparative data and can lead to strategic product hops.²⁸⁴

A. ECONOMIC INCENTIVES

Analysis of economic limitations relevant to product hopping begins with the insight of “price disconnect.”²⁸⁵ When a physician prescribes a drug, the patient rarely pays the full cost of the drug out of pocket. Instead, a third-party payer, such as the patient’s insurer, largely covers the expense in the usual case.²⁸⁶ The physician, of course, does not pay for the drug either—and, in the absence of a clear signal of the merits or demerits of the new and more expensive version, may in fact be motivated to prescribe it out of the belief that the modification represents the state of the art, provides greater patient benefit, and perhaps minimizes the risk of a malpractice suit.²⁸⁷ Thus, because it is often the case that

neither doctors nor patients “feel” drug price changes,²⁸⁸ one court explained in an ongoing antitrust product hopping case that “the ordinary market forces that would allow consumers to consider price when selecting a product are derailed.”²⁸⁹ Indeed, the widely enacted generic substitution laws reflect the existence of the price disconnect problem even in a context in which the competing suppliers offer products that are basically identical,²⁹⁰ suggesting that the problem is likely to be greater when drug products actually differ. Although proposals to control health care spending from the demand (i.e., patient and prescriber) side have been made²⁹¹ and the Affordable Care Act includes provisions that might further this goal,²⁹² the problem of price disconnect has proven difficult to address as a general matter.

On the payer side, incentives appear to be in place to control costs, but they too can be dampened by informational gaps and other forces. Professor Russell Korobkin explained that “[t]his dearth of information makes it extremely difficult for any insurer interested in marketing a policy that covers treatments that satisfy a cost-effectiveness standard to identify ex ante which treatments are, in fact, cost-effective.”²⁹³ In addition, government-based payers are sometimes legally forbidden from refusing to reimburse physician-prescribed treatments,²⁹⁴ and legal constraints can limit private payers as well.²⁹⁵ As a result, “health insurers now generally pay for any treatment recommended by a treating physician that offers the potential for any positive clinical benefit unless explicitly excluded from the contractual scope of coverage.”²⁹⁶ Summarizing this state of affairs in health care coverage as a whole, Professor Wendy Netter Epstein noted that “[u]nnecessary care is consumed because doctors prescribe it, patients consent to it, and payors pay for it.”²⁹⁷

Insurance companies, to be sure, typically use the services of so-called Pharmacy Benefit Managers (“PBMs”), which may be able to elicit comparative drug data from manufacturers by relying on the threat of exclusion of drugs from formularies—lists of drugs approved for reimbursement.²⁹⁸ In addition, PBMs can create formulary “tiers,” which are structured so as to pass some of the cost of a more expensive drug option, if selected, onto patients.²⁹⁹ But PBMs have also been criticized for entering into deals with drug makers with the effect of reducing generic penetration.³⁰⁰ As Professors Jonathan Darrow and Aaron Kesselheim have noted, the prescription drug market is characterized by “[p]ricing [that] is obscured by a labyrinthine system of rebates, spreads, discounts, coupons, and nontransparent business arrangements, particularly between pharmacy benefit managers and manufacturers.”³⁰¹ As a result, the efforts of PBMs have not consistently contributed to the production of pre-market information useful for differentiating between new and old versions of drugs.³⁰²

Other strategies for creating pressures on drug prices from the demand side include step therapy, which requires that the patient be prescribed the cheaper drug option first and only be allowed to move on to the more expensive one if the former proves ineffective, and prior authorization, which mandates that a physician receive an approval from the payer before prescribing a particular drug.³⁰³ Nonetheless, leaving aside the fact that these measures cannot generally be taken by public payers,³⁰⁴ it is not clear whether step therapy or prior authorization have contributed extensively to the generation of validated, meaningful³⁰⁵ pre-market comparative data that could be helpful in differentiating the benefits of

related drug products at the physician adoption stage.³⁰⁶ Although these measures have surely aided in the generation of post-approval comparative effectiveness information, which has the advantage of being drawn from actual clinical experiences rather than from clinical trials,³⁰⁷ the importance of pre-market data should not be minimized.³⁰⁸ Such data can provide concrete evidence for whether a more expensive drug is actually worth switching to, help shape downstream comparative research,³⁰⁹ and, ultimately, guide the market to rationally accept or reject drug modifications in combination with any available post-marketing information, which may have gaps of its own.³¹⁰

B. STRUCTURAL LIMITATIONS

As discussed in Part II, competition for follow-on innovation between the inventor of the pioneering drug and other firms can often be limited because of broad primary patents, undisclosed know-how, and the brand's head start advantages.³¹¹ Thus, there may be no one on the supply side to push the brand to build a case driven by pre-market data for why patients and prescribers should make the switch to the new form of the drug.³¹² Moreover, as a practical matter, robust advocacy for prescribers and patients to stay with (or return to) the original form after expiration of the primary patent is also infrequently encountered given the previously described generic business model shaped by substitution laws.³¹³ The brand, therefore, is normally free to promote the modification as vigorously as possible while staying within the boundaries of legality without fear of refutation from competitors.³¹⁴ While inter-brand competition could potentially serve as a check, evidence developed in some of the antitrust cases involving product hopping has shown that the original and the so-called "hopped" product can be a market unto themselves, without reasonable alternatives for treating a particular condition by a drug with a different active pharmaceutical ingredient.³¹⁵

To further understand the problem, some basic background on drug promotion and advertising is helpful.³¹⁶ Like general drug promotion, comparative drug advertising involving printed materials may be subject to the statutory prohibition on "labeling [that is false or misleading in any particular]."³¹⁷ An FDA regulation interpreting this and related provisions forbids "drug comparison that represents or suggests that a drug is safer or more effective than another drug in some particular when it has not been demonstrated to be safer or more effective in such particular by substantial evidence or substantial clinical experience."³¹⁸ By its terms, however, this regulation does not prohibit non-comparative advertising, or even comparative advertising that does not address safety or efficacy.³¹⁹ Thus, Forest's ad campaign touting Namenda XR without directly claiming superiority to IR, conducted through both direct-to-consumer television spots³²⁰ and multi-page spreads in medical trade journals,³²¹ was lawful. In addition, it was no violation of statute or any FDA regulation for Forest to make statements in press releases like the following: "[P]atient and caregiver response to the NAMENDA XR® product has been exceptionally positive, with caregivers and physicians clearly recognizing the benefits of the single daily dosing regimen."³²² While these ads and statements do not mention any evidence, such assertions can create something of a snowball effect of arguably unjustified switches.³²³

Although advertising can in theory be scrutinized from the demand side, a point that I will address further in the next Section, competition on the supply side can be crucial for highlighting comparative advantages and disadvantages of related drug products for prescribers and patients. Similarly, pressures from competitors can serve as a third-party check on communications between manufacturers and payers, whose permissible scope has recently been expanded under the 21st Century Cures Act.³²⁴ But because such competition is rare,³²⁵ market participants may be impeded in their ability to identify what may be a largely strategic product hop. Worse yet, the very existence of a patent on a new form of a drug can create an unjustified perception that the new form is better, despite a lack of evidence.³²⁶ These dynamics can contribute to the underproduction of valuable comparative information, lead to unnecessary and costly switches, and ultimately diminish incentives to make improved products.

C. COGNITIVE CONSTRAINTS

Well-documented cognitive constraints, combined with various pressures on prescribers, can reinforce these effects. Returning to the advertising example, it may well be accurate that some caregivers prefer Namenda XR to IR even though evidence does not support the switch,³²⁷ but busy physicians³²⁸ might not closely scrutinize the ad and erroneously come to believe that XR actually works better, or has replaced IR as the standard of care.³²⁹ The print ad did state in relatively small font that “[t]here is no study addressing the comparative efficacy” of Namenda XR and IR, but medical care providers do not always notice such disclaimers.³³⁰

For example, a recent study of perceptions of a print ad suggesting an “alternative” treatment found that only 44.9% of the physicians surveyed noticed the “context statement” declaring that “[t]he products in this price comparison may or may not be equally effective or safe.”³³¹ In contrast, a significantly larger percentage, 76%, noticed the price comparison that the advertiser intended for them to notice.³³² The study’s authors concluded that “[t]he context statement did not affect evaluations of the price-comparison claim’s importance or accuracy and did not have the intended effects on perceptions of uncertainty about drug interchangeability.”³³³ Indeed, “a realistic context statement to a physician-targeted prescription drug ad did not generate sufficient awareness of claim caveats to differentiate price-comparison response of those exposed to the context statement from those who were not.”³³⁴ Another study showed that journal advertisements and other forms of marketing have a greater effect on physician prescribing decisions than evidence in scientific articles.³³⁵ These findings are consistent with broader claims that so-called “schemas,” or biases, and other cognitive limitations—in addition to time constraints—can interfere with sound medical decision-making in the face of drug advertising.³³⁶

Although examples of limitations on human ability to scrutinize advertising messages can certainly be found outside the prescription drug context, pharmaceutical markets can make for a particularly challenging environment in which to make rational decisions. Drugs are a paradigmatic example of so-called “credence goods,” or products whose utility and quality consumers can have difficulty assessing, even after

consumption.³³⁷ By their nature, credence goods present the possibility of significant information asymmetries between manufacturers and even sophisticated medical professionals—let alone patients.³³⁸ The information gap, after all, is one of the reasons for the existence of the FDA and the pre-marketing approval process.³³⁹ Thus, when the other defects in this market are combined with powerful advertising and acknowledged cognitive constraints, the lack of transparency with respect to marginal benefits of the new drug version relative to the one that is already being used can cause considerable difficulties for the participants in this market.

The market, to be clear, has not collapsed. The Seroquel example illustrates that, in spite of these defects, drug modifications can lead to real improvements in patient care.³⁴⁰ Moreover, in switching from IR to XR, AstraZeneca generated some pre-market comparative data on titration—and was apparently also required to conduct post-approval comparative safety trials in that particular case.³⁴¹ Other examples when a drug change offered an improvement in the overall quality of care, an advantage for a particular patient subpopulation, or at least a demonstrably different therapeutic profile backed up by data developed before approval, can be readily found.³⁴² Nonetheless, antitrust litigation reveals that strategic switches also happen with some frequency. The fact, for example, that Actavis lost in the Second Circuit tells the story: Comparative evidence establishing some difference or advantage of Namenda XR over IR, if it existed, would have defeated a monopolization claim by supplying a non-pretextual “procompetitive justification” for the change.³⁴³

To reduce the incidence of such cases, a mechanism for forcing and transferring information is needed. I describe a proposal for implementing this goal, relying on the FDA as an information intermediary,³⁴⁴ in the Part that follows. Notably, firms that already undertake changes to newly patented products that are actually supported by pre-market comparative data are unlikely to be negatively affected by the proposal and, as I explain in Part VI, will probably be helped by it in some ways.³⁴⁵ The challenge, of course, is to the firms that do not. While such firms could still sell the modified version—the idea is not to withhold approval when the data does not exist or has not been provided to the FDA³⁴⁶—they would be subjected to certain disadvantages. The proposal, then, may end up disincentivizing the development and marketing of drug modifications that,³⁴⁷ despite the lack of supporting comparative evidence at the time of approval, might have advantageous properties, in general or for some group of patients, that come to light only after some period of use. More globally, the proposal might drive down the amount of research devoted to cumulative innovation in the pharmaceutical space, and thereby reduce the number of drug options available on the market.³⁴⁸

While I address the question of potential effects on cumulative innovation in Part VI, I emphasize here that firms that decide to forgo the costs of developing comparative data could still market the modified product and potentially achieve some degree of success. Thus, doctors could legally prescribe the new versions³⁴⁹ and justify insurance coverage in various ways: Perhaps, the other options have failed and this is the only alternative that remains, or there is particularized evidence that the follow-on form would work better for a specific patient—for example, an

extremely forgetful individual for whom a lower pill burden would be critical no matter what the countervailing considerations might be.³⁵⁰

The goal of this proposal is only to make clear to the market that, before approval, the sponsor developed no FDA-verified comparative data relevant to prescribing decisions so that physicians, patients, and payers can make decisions with this information in hand.³⁵¹ The approach will not fix all the defects in this market, but the knowledge that the new version might not be a demonstrated “state of the art” product after all may ameliorate some of their consequences,³⁵² such as unnecessary switches and unjustified spending on higher-priced drugs.³⁵³

V. INDUCING SUBMISSION OF DRUG-COMPARISON DATA TO THE FDA

As sketched out in the Introduction, the central feature of this Article’s proposal is an information-transferring mechanism through a drug’s labeling, and particularly via the printed material that comes with the drug as the package insert.³⁵⁴ The insert constitutes a centralized repository of information that officials at the FDA’s Center for Drug Evaluation and Research have vetted and required the sponsor to include with the drug as marketed for the benefit of prescribers, users, and payers.³⁵⁵

Currently, material on the insert includes notations such as the drug’s approved indication, dosing, side effects, contraindications, patient counseling information, summaries of the clinical studies conducted during the approval process, and so on.³⁵⁶ The labeling is not always read as carefully as one might hope, but the FDA has taken measures—such as adopting the so-called “Physician Labeling Rule”³⁵⁷—in an effort to make these inserts somewhat more user-friendly. Moreover, if the labeling is to include new kinds of information such as comparative data, prescribers can be alerted about it through physician education campaigns. The FDA has conducted such campaigns in the past in other contexts, including as part of an effort to inform physicians about cost-saving prescribing options.³⁵⁸ Finally, even if clinicians fail to examine the disclosures on the inserts,³⁵⁹ payers can point to it in making coverage decisions. The Sections that follow explain precisely what types of data the FDA would seek under this Article’s proposal, describe the sticks the agency could rely on to elicit the data from sponsors, and note which kinds of drug modifications would fall under the proposed regime, providing implementation details as needed. These Sections also explicate the benefits of the proposal.

A. THE THRESHOLD STANDARD AND THE FDA’S TASK

1. Theorizing Drug Comparisons

Before setting forth the sticks the FDA could use to nudge companies into the development of comparative data, it is essential to define the nature of the data that the agency should be seeking and the sorts of information that would go on the insert. At the outset, it bears emphasizing that the concepts of drug safety and effectiveness cannot be pinned down with precision in an absolute sense. Although FDA approval of a drug

requires “substantial evidence” of safety and effectiveness,³⁶⁰ the decision whether a product should be allowed on the market given its benefits and risks is ultimately a judgment call that the FDA must make based on this evidence.³⁶¹

Comparative drug analysis is even more difficult to perform because the comparisons can take place across a number of parameters.³⁶²

Between two or more drugs used to treat the same condition, relative safety or efficacy can vary depending on, for example, the sub-population of the patients under treatment.³⁶³

Two drug products that have different side effects are not readily comparable because such things can be basically incommensurable, and, even in theory, it may be difficult to make an absolute judgment as to which is “better” between two drugs, one of which is the safer and the other, more effective.³⁶⁴

Finally, how should one value improved convenience or adherence to a medication made possible, for example, by a different dosing schedule or a new drug delivery system? The sheer complexity of human health and the number of possible considerations involved in a choice between drug options make conclusive comparisons between two (or more) different drugs difficult.

³⁶⁵ Nonetheless, although data that can enable definitive comparative judgments even between closely related drug products can be difficult to generate, the relevant public can still benefit from knowing for sure that no such data is available, that some data exists but is inconclusive in some respects, or that the evidence shows promise for health outcome improvements, but only for particular populations or in certain treatment settings. In particular, when one deals with closely related drug products, the number of potential axes of difference should be reduced, making a comparison more manageable than between drugs with different active pharmaceutical ingredients.

Indeed, even without the theoretical possibility of a decisive comparative judgment between two drug versions, relevant data that can help physicians make informed, evidence-based decisions with respect to which drug form to choose in a particular scenario can still be developed.

³⁶⁶ Consider again the example of Seroquel and the pre-market evidence of more rapid quetiapine titration with XR as opposed to IR: If a patient comes in with an acute episode of bipolar depression, getting to the maximum approved dose as soon as possible may be a critical priority, justifying the use of XR instead of IR.³⁶⁷

Perhaps because of similar dynamics with other drugs, Dr. Kessler explained the value of examining the correlation between “blood levels of drug over time with the clinical outcomes”³⁶⁸ when a drug is converted from IR to XR, and highlighted the “need [for] clinical results in a variety of populations” taking XR products.³⁶⁹

Facilitation of tailored treatment decisions is a significant benefit even in cases where the data does not demonstrate that the new product is, to give an example of a standard that the FDA actually uses in another context, “clinically superior”—however that standard is to be operationalized.³⁷⁰

Finally, because drugs are typically modified with particular purposes in mind, and a specific modification type (e.g., switch to XR) should normally lead to a limited number of expected effects in the functioning of the active pharmaceutical ingredient, researchers can readily form hypotheses based on which differences between the versions would be framed, tested, and evaluated.³⁷¹

2. The Proposed Standard and How to Meet It

Since the concept of comparative efficacy is quite indeterminate—perhaps the better term is “clinical distinctiveness” given the challenge of absolute comparisons—the standard is best left open-ended. Thus, I frame the proposed standard as “data relevant to the relative performance of new product versions.”³⁷² Although a permissive-seeming standard, it is still a substantial shift from what is currently done. Given the present default of proof of safety and effectiveness over a placebo,³⁷³ the paradigm of using the previous drug as a so-called “active comparator” when a modification takes place might get firms to think in terms of documented differences in clinical value, rather than only in terms of what can be patented.³⁷⁴ This standard would also untie the hands of the FDA, whose officials have shown an interest in undertaking such inquiries.³⁷⁵

A significant number of companies already develop comparative data voluntarily³⁷⁶ or are required to do so by the FDA in certain special circumstances.³⁷⁷ A general authority for the FDA to request and analyze comparative drug information, however, could further curb strategic behavior and channel firms toward evidence-based drug modifications. In addition, it is important to grant the FDA the power to evaluate comparative data before marketing because, after approval, the agency loses a measure of control over both the sponsor and the product.³⁷⁸

The FDA’s task would be to determine whether the information that the sponsor submitted meets the proposed standard and to work with the firm to draft conclusions that the data supports under the traditional “substantial evidence” standard.³⁷⁹ While the entirety of the raw data would not be revealed to the public, a summary of the data and the corresponding conclusions would become part of the product’s labeling. If doubts concerning the information’s relevancy remain, FDA officials could request that the sponsor submit a clarifying explanation or, perhaps, further disclosures before settling on the labeling—just as the FDA does during the regular approval process.³⁸⁰ As with other FDA decisions, third parties (such as generic competitors) could weigh in by filing so-called citizen petitions aiming to persuade the agency that the labeling statements are not fully supported.³⁸¹ And if the FDA concludes that a sponsor submitted no relevant information, the agency would then mandate that the firm indicate this fact on the labeling in a prominent way.

If, for its part, the sponsor is dissatisfied with the FDA’s determination with respect to the content of the labeling, it could challenge the determination in court under the Administrative Procedure Act³⁸²—though, to be sure, courts tend to defer greatly to the FDA on such matters, and such challenges rarely succeed.³⁸³ Of course, the sponsor could also opt out of the system altogether and agree to the “no relevant comparative data was provided” notation at the outset. To reiterate, though, even if the firm chooses not to participate in the data submission regime or is dissatisfied with the content of the FDA-approved labeling, it is still free to market the product and to convince prescribers to utilize it in spite of the lack of comparative information. Just as it paves the way for advertising off-label uses generally (as long as truthful and non-misleading),³⁸⁴ the First Amendment would prohibit sanctions against some types of comparative assertions that find support outside the labeling proposed here.³⁸⁵ Still, as I explain further in the next Section, the proposed labeling could temper the effects of such advertising.

Significantly, the proposal does not task the FDA with engaging in cost-effectiveness evaluations, which would push beyond the agency's core competency of analyzing scientific data and into territory which it has historically been reluctant to enter.³⁸⁶ Instead, the standard demands only that the agency process and evaluate the submitted data in its role as an information intermediary and leaves the corresponding financial judgement calls to payers and others. As further discussed in the Section that follows, though, disclosures of comparative clinical effectiveness (or lack thereof) can help health care providers and patients make informed decisions with respect to whether a particular treatment is worth the cost—specifically, whether the evidence suggests that the more expensive, on-patent version of the drug may be worth switching to.

Consistent with the open-ended standard proposed here, data acceptable for meeting the proposed standard could come from a variety of study types. Data can of course be very costly to generate, with the randomized head-to-head general safety and efficacy clinical trial being the expensive gold standard for comparisons.³⁸⁷ Nonetheless, the proposal allows for some relatively inexpensive ways by which firms can surpass the “relevant to the relative performance” hurdle. Although the FDA would apply the proposed standard on a case-by-case basis, studies that could allow the sponsor to satisfy the standard include: (1) for extended-release products and new dosage forms in particular, studies examining and documenting improvements in patient compliance, reduction in the prevalence of a signature side effect associated with the original drug, differences in the impact of food consumption from that on the prior form,³⁸⁸ titration rates,³⁸⁹ and so on; (2) for certain products that embody “purer” versions of previously approved drugs, to be further discussed below,³⁹⁰ studies designed to determine whether the drug is more efficacious at the same amount of the active ingredient or whether there is a side effect reduction; (3) studies showing that the new drug version meets the “change in safety, purity, or potency” standard used to compare so-called “biologic” products, also to be discussed further below;³⁹¹ (4) so-called “indirect comparisons” via analysis of clinical trial data gathered separately for the original and modified products that tend to establish some therapeutic distinction between the two;³⁹² (5) so-called “non-inferiority” trials that the FDA currently requires for approval of new anti-infective drugs;³⁹³ and (6) any other information that the FDA deems relevant to the question of drug comparison, such as data on relative efficacy of the two versions in particular sub-populations. The labeling would make clear what specific study was done and describe its limitations.

B. THE PROMISE OF CLEAR LABELING, AND A FURTHER POTENTIAL STICK

1. Possible Benefits of Clear Labeling

Will clear labeling make a difference? Whatever the potential advantages of labeling, it will certainly not get rid of the price disconnect problem or eliminate schemas and other cognitive limitations of the market participants.³⁹⁴ In general, it is clear from many contexts that mandated disclosure is no panacea.³⁹⁵ Still, the labeling can harness the ability of medical professionals to act more effectively as “learned intermediaries” on behalf of their patients by cutting through the noise generated by advertising, which may currently be conducted in a way that

is largely unchallenged.³⁹⁶ While mandated disclosure can fail “[w]hen simple data will not do the job, when considerable information is needed to make a good decision, and when experience is required to use information well,”³⁹⁷ an insert that summarizes the comparative studies in a user-friendly way—and is perhaps accompanied by the above-mentioned education campaigns³⁹⁸—can go a long way in nudging physicians toward sensible prescribing.³⁹⁹ This dynamic can be reinforced if professional norms help the physicians build the instinct of “labeling first” when confronted with comparative advertising.⁴⁰⁰ Finally, if nothing else, the labeling would serve as a very clear signal for payers⁴⁰¹—and the decisions of the payers inclined to make side deals with manufacturers to continue selling higher-priced drugs may be viewed in a more skeptical light,⁴⁰² perhaps leading to public pressure that would discourage such deals.

Indeed, the complete absence of comparative data in particular could be highlighted in a highly conspicuous manner, similar to the “black box warning” one currently sees for particularly dangerous side effects of a drug.⁴⁰³ And while the labeling would not directly resolve the hard switch problem, one imagines that an antitrust case against firms that product-hopped against the background of demonstrable absence of comparative data should be particularly straightforward to make out, likely resulting in the remedy of having both products on the market.⁴⁰⁴ With the new information on the insert, moreover, physicians may be convinced to make the reverse switch more readily if that becomes necessary.⁴⁰⁵ Therefore, the required labeling could ultimately help the market reward those sponsors who have made a credible case that the new version provides a therapeutic advantage over, or at least a useful distinction from, the original. Conversely, sponsors who have failed to submit relevant comparative data may fare less well in the now better-informed market for pharmaceutical drugs,⁴⁰⁶ particularly when the modified form is significantly more expensive due to patent protection. In sum, the proposed disclosures can help ensure that therapies are not “prematurely adopted, outpacing the generation of evidence necessary to define the boundaries of where a drug or device offers clinical benefit.”⁴⁰⁷

In addition to the immediate value of fostering more rational selections between alternative drug forms, the proposed approach—if it succeeds in eliciting and transferring a substantial amount of comparative information between the versions—could have downstream benefits as well. Although pre-marketing data can be of more limited value than the real-world data actually developed after clinical practice begins,⁴⁰⁸ there is an important feedback mechanism between the two.⁴⁰⁹ For example, pre-approval comparative efficacy studies of ADHD drugs in Europe have yielded important information that was supplemented in the course of clinical practice,⁴¹⁰ and this dynamic has been observed in other instances.⁴¹¹ Thus, even when not definitive on the therapeutic effectiveness front, comparative studies performed by drug makers before marketing can serve as an impetus for future research and data analysis.⁴¹² In all, by “motivating the provision of information”⁴¹³ in the drug-comparison scenario, the FDA could help drive medical and scientific innovation in the pharmaceutical space.

In particular, disclosures generated under the proposed regime can contribute to the program of comparative effectiveness research (“CER”), which has become a major national priority in the past decade. The statute that significantly broadened CER⁴¹⁴ and brought it into the national spotlight, the American Recovery and Reinvestment Act of 2009, allocated 1.1 billion dollars toward research conducted in the two years since the statute’s passage.⁴¹⁵ A later statute,⁴¹⁶ the well-known Affordable Care Act, “established a permanent US CER entity called the Patient-Centered Outcomes Research Institute (PCORI) to guide the federal CER enterprise.”⁴¹⁷ PCORI’s mandate is comparative clinical effectiveness, not cost-effectiveness,⁴¹⁸ but Medicare administrators can consider its “CER findings for coverage decisions.”⁴¹⁹ Although the larger CER program, as administered through PCORI and elsewhere, is focused on post-marketing research, some commentators believe that a successful CER strategy requires production of “data prior to the widespread adoption of a drug or treatment.”⁴²⁰

Unsurprisingly, CER has generated controversy, with some commentators expressing concern that studies conducted under the aegis of the program would lead to rationing of care,⁴²¹ including denials of therapy options that are clinically justifiable but expensive. Although such critiques, while extremely weighty, are not insurmountable and have been addressed elsewhere,⁴²² it is important to reiterate that wide-ranging adoption of CER at the FDA is not the goal of this proposal.⁴²³ The focus, instead, is strictly on follow-on versions of already-approved drugs coming from the same firm.⁴²⁴ This emphasis is justified because the product hop pattern has demonstrated particular susceptibility to information asymmetries and resulting market failures,⁴²⁵ creating a need for mechanisms that could sort strategic conduct from genuine innovation.⁴²⁶ Under this Article’s proposal, treatment options that are likely to be less favored are those for which the sponsor provided no comparison with the prior option at all, suggesting (price aside) that the patient might not draw an incremental benefit from the change. Thus, the data developed under the proposal is unlikely to present ethically complex care rationing scenarios.⁴²⁷

2. The *Orange Book* Variation

If the FDA’s proposed authority for comparative data analysis and the corresponding addition to the labeling prove inadequate in eliciting the generation and forcing the disclosure of such data, a more vigorous stick against product hopping is available. This measure concerns withholding the privilege of having a patent covering a drug product listed in the *Orange Book* from firms that fail to produce the evidence needed to meet the “relevant to the relative performance” threshold. As discussed in Part II, the *Orange Book* constitutes an important linking mechanism between pharmaceutical patents and FDA approval.⁴²⁸ To obtain an *Orange Book* listing, brand companies

shall file with the [NDA] the patent number and the expiration date of any patent which claims the drug for which the applicant submitted the application . . . and with respect to which a claim of patent infringement could reasonably be asserted if a person not licensed by the owner engaged in the manufacture, use, or sale of the drug.⁴²⁹

To recap the patent litigation consequences of an *Orange Book* listing, the Patent Act deems the filing of an ANDA to market a generic version of a branded drug protected by one or more unexpired *Orange Book*-listed patents an act of patent infringement.⁴³⁰ To seek approval of an ANDA when such patents exist, the generic firm must file a Paragraph IV certification with the FDA, setting forth the basis as to why each patent is invalid or not infringed.⁴³¹ Once the brand initiates the patent suit typically triggered by such a filing, FDA approval of the ANDA is postponed for 30 months unless all of the asserted *Orange Book* patents are adjudged to be invalid or not infringed before that time.⁴³²

The certification requirement and the 30-month stay of approval are significant regulatory benefits for brand companies that gain approvals of their NDAs, and they apply to both pioneering and follow-on drugs.⁴³³ To create a stronger form of inducement for comparative data generation, the FDA could, in addition to requiring the new labeling disclosures, be given the power to exclude patents of sponsors who fail to provide relevant data from the *Orange Book*.⁴³⁴ Although one way to implement the proposal is to deny a listing every time a firm fails to meet the proposed standard, a more flexible approach that takes into account the particular circumstances of the switch may enable the FDA to use delisting more effectively as a deterrent.⁴³⁵ Thus, in addition to being given the authority to demand the new labeling disclosures, the FDA could be granted a discretionary power to deny an *Orange Book* listing in cases where the sponsor did not even attempt to surpass the threshold, or where the timing of the potential switch is particularly suggestive of a strategic product hop.⁴³⁶ The delisting authority would be a marked regulatory shift carrying with it the potential of reducing the incidence of such conduct—and, conversely, encouraging the production of comparative data.

Even without an *Orange Book* listing, to be sure, brand companies can sue generics for patent infringement under traditional theories of liability (i.e., outside the Hatch-Waxman framework) once the latter launch their ANDA-approved products.⁴³⁷ The generics would thus be exposed to the risks of monetary damages and potentially an injunction against further marketing of their products.⁴³⁸ Nonetheless, at least approvals of the ANDAs will not be delayed by Paragraph IV certifications and 30-month stays and, given that courts do invalidate follow-on patents with some frequency,⁴³⁹ the risks may be worthwhile for the generics to take. In some cases, moreover, the FDA's determination of no therapeutic difference between the original and follow-on products may be deployed to counter a theory of non-obviousness based on unexpected results, or at least used as a basis for questioning the data submitted by the sponsor in court.⁴⁴⁰ In addition, even if found liable, generic companies may convince courts that an injunction is unwarranted because the equities—and particularly the public interest factor, based on the deficient FDA submission⁴⁴¹—may generally favor defendants in such circumstances. And while the availability of monetary damages for infringement might discourage such “at risk” launches,⁴⁴² some generics could still be motivated to enter the market based on the probability of invalidation. Moreover, while generic firms may well balk at selling drug modifications for which the sponsor has demonstrated no provable difference from the old form, the proposal should at least facilitate generic sales of the off-patent product.

C. CATEGORIES OF QUALIFYING DRUG CHANGES

One critical task for the FDA under the proposed regime is to identify categories of drug changes that would be subject to the clear labeling requirement for dealing with potential product hops. While the determination is not straightforward one, it is encouraging that the FDA has already done some useful legwork by classifying New Drug Applications (“NDAs”) by product type. The different NDA product categories that the FDA recognizes include the “New Molecular Entity” category, which covers drugs having “an active ingredient that contains no active moiety that has been previously approved by [the FDA]” (Type 1); “New Active Ingredient” drugs, which involve relatively common chemical modifications of already-approved molecular entities with the active moiety unchanged, such as formation of so-called “esters” or “salts” (Type 2); “New Dosage Form,” a category that may include drugs having a composition identical to that of an already approved drug product (Type 3); “New Combination,” chemical or physical, of two separate drugs—a category that, as relevant here, includes two drugs both of which have already been approved (Type 4); and “New Formulation,” a category that, as relevant here, includes a product that embodies “changes in inactive ingredients that require . . . clinical studies for approval,” a product that “contains an active ingredient or active moiety that has been previously approved or marketed in the United States only as part of a combination,” or a product that “contains a different strength of one or more active ingredients in a previously approved or marketed combination” (Type 5).⁴⁴³

Therefore, in spite of relying on the “safe and effective” standard demonstrable over a placebo for most new approvals and carefully noting “[t]hese codes are not indicative of the extent of innovation or therapeutic value that a particular drug represents,”⁴⁴⁴ the FDA already acknowledges the reality that there are different kinds of drug inventions. While one of these categories, Type 1, calls out new molecular entities that cannot be fairly classified as new versions of known drugs, the rest of the recited categories (e.g., Types 3 and 5, which should cover newly approved extended-release and dosage-form drug products having known pharmaceutical ingredients) do not refer to products containing new molecules. NDA classification codes, therefore, provide an excellent starting point for an inclusive “product modification” class that would be subject to the proposed regime.

In addition to the categories identified by the FDA as Types 2 through 5, experience has taught of other recurring patterns of drug changes that may be made for strategic reasons. One contentious area includes a product change from so-called “racemate” drugs to pure “enantiomers,” which—to simplify the chemistry significantly—entails taking a drug initially marketed as a mixture into two distinct, closely related molecules, separating the mixture into its individual components, and marketing one of them as a new drug.⁴⁴⁵ In the context of deciding whether to grant a regulatory new chemical entity exclusivity, the FDA has struggled with classifying enantiomers, with Congress ultimately stepping in with a compromise solution of empowering the agency to grant exclusivity where the pure enantiomer is approved for new indications in a different

therapeutic class.⁴⁴⁶ The close chemical kinship between a racemate and one of its enantiomers, reinforced by decision-makers' unwillingness to treat purified enantiomers as full-on new molecular entities, suggests that such drug products should be treated as "modifications" of known drugs under this Article's proposal, triggering a comparative inquiry.

Moreover, as with extended-release formulations, the closest prior art to the enantiomer for patentability purposes is almost always its predecessor, the racemate, and unexpected results can play a similarly crucial role in the inquiry into whether the enantiomer overcomes the § 103 hurdle.⁴⁴⁷ The strong similarity between the racemate-enantiomer and original-reformulation dynamics suggests that enantiomers should

fall under the proposed regime. As with other modifications, the FDA's power to examine the data critically would be a weighty stick in this context.⁴⁴⁸ To be sure, starting with the infamous example of thalidomide,⁴⁴⁹ instances of enantiomers that offer significant clinical advantages over racemates abound,⁴⁵⁰ and such advantages should usually be demonstrable in scenarios where they are actually present.

An interesting example of a drug modification type that may not involve a clinical benefit, but could still be a bona fide upgrade, is a change that improves the drug's manufacturing process, makes it easier to store the drug by increasing its shelf stability, and so on.⁴⁵¹ For these sorts of changes, a separate "manufacturing improvement" category could be created, so that rather than submitting data tending to indicate a potential difference in clinical benefit between two drug forms, the sponsor would introduce evidence that shows improvements in handling and the like. Such information, though, does not traditionally go on the package insert (i.e., it is not a normal part of the labeling), and prescribers and patients are unlikely to care greatly about manufacturing changes in the clinical context anyway—unless, of course, the product is purer or somehow better for patients in other ways. Still, a clear "not proven different"-type notation may at least put the market participants, particularly payers, on notice that the change may be a strategic one.

In addition, it should be noted that some patents directed to manufacturing or handling improvements are not listable in the *Orange Book*.⁴⁵² While this regulatory feature may limit the appeal of a product hopping strategy using this method, it also means that delisting would obviously not be a stick in the FDA's arsenal in these circumstances. Thus, to the extent that strategic product hopping based on purported manufacturing improvements is a concern, a different regime—perhaps one involving more vigorous antitrust enforcement—may be required.⁴⁵³

One category of inventions that should be exempted from the ambit of the proposal, however, are newly discovered methods of use of known compounds.⁴⁵⁴ First, these inventions do not really involve a product change as such, and therefore do not fit into a product hopping model.

Second, allegations of "sham" new indications are not often made and would be somewhat incoherent because they do not involve a change in the underlying product. Third, if anything, patents on new methods of use of known compounds can be difficult to enforce effectively because merely manufacturing the drug is not an act of direct patent infringement⁴⁵⁵—so generics must be pursued under "indirect infringement" theories, which are more difficult to prove up.⁴⁵⁶ The alternative, and a very impractical one, is to pursue prescribing physicians as direct

infringers. Fourth, and finally, so-called “repurposing” or development of new indications of known chemicals has frequently led to highly significant health advances.⁴⁵⁷ In all, there are reasons to believe that new use inventions are under-incentivized under the current regime, and more importantly they are not normally understood as “product hops.” Thus, within the framework of this Article, a discovery of a new indication would be a “per se” clinical advance that easily satisfies the proposed relevancy standard—though for facility of administration it should be excluded from the scope of the proposal altogether.

D. IMPLEMENTATION MECHANICS

The FDA has not asserted a general authority to request data tending to show a distinction between new and already approved drug products, in product hopping cases or otherwise. Indeed, although FDA regulations allow sponsors to establish safety and efficacy of new drug products using active comparators, the agency has not attempted to make this method a general condition of approval.⁴⁵⁸ As suggested earlier, there are good reasons for this approach: If a drug product is determined to be safe and effective as a general matter, it seems extreme to deny the market an option to choose it altogether.⁴⁵⁹ Moreover, considering the FDA’s statutory mandate, a decision *not* to approve a product based on the fact that it is not proven to be therapeutically distinct from an existing product would present a conundrum for the agency. Because withholding approval means that the product failed to meet the safety and efficacy thresholds,⁴⁶⁰ such a decision would imply that the existing product, which is not demonstrably different from the one that has just been denied, is likewise not safe and effective and that its approval should also be withdrawn.⁴⁶¹ This cannot be a sensible result.

Nevertheless, the FDA has used evidence of a significantly *improved* safety and efficacy profile of a new product to withdraw approval for a previous version.⁴⁶² The rationale in such cases is often that, given the availability of the newly approved option, the risk-benefit calculus now militates against leaving the old product on the market at all.⁴⁶³ In addition, as the well-known example of opioid drugs lacking abuse-resistant forms illustrates, post-approval evidence concerning the original product can sometimes come to light to justify its withdrawal further.⁴⁶⁴ A perhaps cynical (though entirely plausible) take on this dynamic points out that companies have incentives to convince the FDA to pull an old product as part of a product hopping strategy—an outcome that would prevent generics from marketing the prior version altogether.⁴⁶⁵ While doing so without a good justification might amount to fraud—behavior that should be deterred by any number of legal regimes⁴⁶⁶—antitrust cases have revealed at least a milder variation of this strategy, which consists of disparagement of one’s prior product unaccompanied by an attempt to ask the FDA to withdraw approval.⁴⁶⁷

The proposed framework, to be clear, does not concern withdrawals of the old product based on insufficient safety or efficacy, but rather assumes that both versions are allowed to be marketed. To situate the proposal further, the scheme falls between the extremes of requiring comparative data for approval and the current approach under which the FDA does not typically conduct any analysis of therapeutic distinctions

between related drug products, even if the two have the same active pharmaceutical ingredient. On what basis, then, can the FDA implement the proposal? Although the FDCA does not currently vest the FDA with clear authority to solicit comparative data between drugs that meet the approval standard, history does show that the FDA has sometimes pushed the envelope on its statutory authority to pursue initiatives that it thought sensible. For example, confronted with widespread “off-label” use of drugs approved for adults in pediatric patients, the FDA in 1997 promulgated the so-called Pediatric Rule.⁴⁶⁸ This rule, which the agency attempted to justify under various statutory anchors that included the FDCA’s labeling provisions, imposed certain clinical study requirements with respect to a drug’s pediatric uses even where the sponsor had not sought an approval for any pediatric indication for the drug.⁴⁶⁹

Although a district court struck down the Pediatric Rule as in excess of the FDA’s statutory authority,⁴⁷⁰ Congress in 2003 codified certain features of the rule.⁴⁷¹ This story is not unique: Other initiatives, such as the so-called Priority Review “of applications for drugs that, if approved, would be significant improvements in the safety or effectiveness of the treatment, diagnosis, or prevention of serious conditions when compared to standard applications,”⁴⁷² were regulatory in origin but eventually garnered congressional ratification.⁴⁷³ While I do not wish to advocate for lawless regulatory action,⁴⁷⁴ one could argue nonetheless that it is not entirely inappropriate for an agency to test out a policy that has a plausible basis in the enabling statute, and may draw a response from stakeholders that is positive enough to lead to codification.⁴⁷⁵ Taking a page from its pre-statutory Pediatric Rule playbook, the FDA could argue that “adequate directions for use”⁴⁷⁶ must, in the product hopping context, include some information on what the drug switch would offer to patients or a statement that no distinction between the two forms has been demonstrated. Notably, although the decision striking down the Pediatric Rule took a particular issue with the fact that the Pediatric Rule *required* particular studies,⁴⁷⁷ no such mandate inheres in this Article’s proposal.

An amendment to the FDCA would, of course, be a legally surefire—though a politically much more difficult—route to the proposal’s implementation. Moreover, the variation of the proposal vesting the FDA with the discretion to deny *Orange Book* listings to certain patents might be particularly prone to opposition (and, at the same time, less likely to find support in the current enabling statute).⁴⁷⁸ But to the extent that one roadblock might entail questions about the FDA’s experience with evaluating data purporting to show differences between drug products,⁴⁷⁹ the suggested amendment’s proponents could point to numerous examples of the FDA’s exercise of such authority. The aforementioned Priority Review program is one example.⁴⁸⁰ Another is the FDA’s requirement of non-inferiority trials for approvals of certain classes of drugs, such as antibiotics. As the term suggests, such studies are designed to show that the proposed drug is at least no worse than some option that is already on the market.⁴⁸¹ Moreover, the FDA applies comparative standards in several other contexts involving drug

products, including the “clinically superior” standard under the Orphan Drug Act⁴⁸² and the “meaningful therapeutic benefit” standard under the Pediatric Research Equity Act.⁴⁸³ Finally, the FDA’s regulations explicitly contemplate approvals based on an active comparator as a control.⁴⁸⁴ These precedents can serve as platforms on which the FDA can build in further developing its product comparison expertise.

Still another example of the FDA’s product comparison authority is worth highlighting. The provision of interest appears in the Biologics Price Competition and Innovation Act (“BPCIA”), the statutory framework that roughly parallels the Hatch-Waxman scheme for small molecules but in the context of biologics,⁴⁸⁵ or large-molecule drugs.⁴⁸⁶ Like Hatch-Waxman, the BPCIA is concerned in part with both rewarding innovation and enabling competition by new entrants, who can market so-called “biosimilar” drugs without having to conduct extensive clinical trials that the brand must engage in to earn a pioneering drug’s approval.⁴⁸⁷ When a sponsor of a biologic product applies for a regulatory exclusivity to support a variation of a prior product that the sponsor is already marketing, the FDA must determine whether the structural change “result[s] in a change in safety, purity, or potency” relative to the predecessor product.⁴⁸⁸ In a Guidance for interpreting this subsection, the FDA explained that “[i]f the modified product affects the same molecular target as the previously licensed product, its sponsor should provide data to show that the changes in structure result in a change in safety, purity, or potency of the modified product when compared to the previously licensed product.”⁴⁸⁹ Similar to this Article’s proposal,⁴⁹⁰ this provision empowers the FDA to scrutinize differences between related products developed by the same firm and has been characterized by several commentators as a deterrent against strategic product changes.⁴⁹¹

Thus, the FDA must already compare drug products under various standards and does so in several instances with Congress’s explicit imprimatur. In addition to demonstrating Congress’s confidence in the FDA’s ability to deal with this kind of a task, these precedents constitute agency expertise that could be of benefit to the setting of this Article’s proposal. Perhaps more to the point, Congress has already recognized the reality of product hopping, though only in the context of biologics. The proposal described here, then, adopts a related approach for small-molecule drugs.

VI. OBJECTIONS

This Part briefly considers some anticipated objections to the proposal, including both that it goes too far and not far enough. Potential concerns are that the scheme set forth in this Article would diminish incentives for pharmaceutical innovation, would be avoided by sponsors or easily gamed, or would overwhelm the FDA in various ways. I address these objections in turn in the paragraphs that follow.

The first set of objections is rooted in the worry that the proposal would discourage cumulative pharmaceutical innovation, or even drug development generally. It may be argued that, faced with the Hobson's choice of generating costly data or becoming subject to the scarlet letter of "not proven different," pharmaceutical companies would just opt out of the drug modification business altogether. This result would be a loss for human health, as it has been observed that some of the most effective drug products on the market are "tweaks" of those that are already known.⁴⁹² A further objection is that, given the relatively abbreviated period of useful exclusivity that brand companies receive given the typically long approval times for pioneering drugs, brand pharmaceutical firms need the "secondary exclusivity" for hopped drug forms to recoup their research and development outlays.⁴⁹³

Several responses are possible to these objections. Data can of course be costly to generate, but the proposed standard provides for some relatively inexpensive ways, such as indirect comparisons, by which firms can meet the "relevancy" threshold.⁴⁹⁴ Accordingly, if the new version of the drug actually has something provably different to offer, sponsors could avoid the "not proven different" designation without financially crushing pre-approval efforts. In addition, firms meeting the standard would attain a number of added benefits that should boost incentives for follow-on research. Thus, the FDA's imprimatur would enable vigorous advertising of a drug's comparative benefit over the prior drug product⁴⁹⁵ (and perhaps a more surefire way to convince payers to cover the new one)⁴⁹⁶ and should likely shield the firm from facing antitrust liability in a case of a hard switch.⁴⁹⁷ Moreover, as the Seroquel case illustrates, comparative data developed in the process may even bolster the case for validity of the patents protecting the improved drug.⁴⁹⁸ As to the further objection, to the extent that maintenance of exclusivity through secondary patenting and product hopping is needed to provide an adequate period of protection for pioneering products,⁴⁹⁹ the solution is to lengthen the pioneering patent term to account for regulatory delay⁵⁰⁰ rather than encourage strategic behavior of the sort observed with Namenda.⁵⁰¹

A second set of objections concerns possibilities that firms would continue to develop drug modifications, but either refuse to opt into the scheme (i.e., by not developing any comparative data) or game it by demonstrating therapeutic distinctiveness based on some minor parameter.⁵⁰² To develop the former objection, one would maintain that, besides costs of information generation and transfer, there are other powerful disincentives for firms to perform comparative analysis between their own products. One, gathering data involving an already-approved product could uncover facts exposing the sponsor to tort liability,⁵⁰³ so long as the tort claims are not preempted by federal law or FDA regulations.⁵⁰⁴ Two, comparative analysis might show that the new product is unquestionably inferior, putting the sponsor in a tough spot.⁵⁰⁵ Three, although the fact that firms sometimes already compare their own products voluntarily suggests that concerns about unearthing negative information do not prevail in every case,⁵⁰⁶ the objector would maintain that the extant proposal would not alter the general cost-benefit calculus in this industry.

To address these concerns, I note that the market could well view a firm's refusal to opt into the proposed scheme as a signal that something is wrong with its products—either old, new, or both. Given the relative permissiveness of the standard and, particularly in the case of the proposal's *Orange Book* variation, the significance of the benefit being withdrawn,⁵⁰⁷ firms that fail to show meaningful differences between their products to the FDA would need to counteract the negative inferences likely to arise from their decisions. In order to do so, those firms may therefore still need to reveal some comparative information to other market participants. Although this route would sidestep the FDA's examination of the data, the ultimate result would still entail potentially useful disclosures, which is the overarching goal of the proposal. While concerns may arise about the quality of the data generated in these circumstances, the fact that the sponsor had the "FDA-vetting" option that it decided to forgo should at least lead payers, prescribers, and patients to discount the information accordingly.

As to the "gaming" aspect of the objection, the relevancy standard is undoubtedly permissive, though one that is deliberately so given the major shift in the FDA's role proposed here and the concern that a more rigorous standard, such as clinical superiority, could have a severely negative impact on drug development. In any event, if one is proceeding from the assumption that pharmaceutical firms are prone to gaming the regulatory system already, they are currently much more likely to escape consequences for such conduct if only one government agency, the PTO, ever gets to rely on comparative data as a possible factor in setting the brand company's level of incentive.⁵⁰⁸

As noted throughout this Article, the FDA has more experience with examining clinical trial data than the PTO, and wields the power (that the PTO lacks) to elicit information from sponsors beyond that which is submitted initially.⁵⁰⁹ Moreover, the FDA has the necessary expertise to examine the data and work with sponsors to limit comparative assertions to what the evidence actually supports.⁵¹⁰ The FDA's involvement ensures that if the firm conducted the bare minimum of experimentation to meet the proposed threshold of "data relevant to the relative performance of new product versions," then market participants would know that this was indeed the extent of scientific work that the sponsor carried out.

Significantly, an approach that seeks to characterize precisely the nature of the asserted therapeutic improvement, or at least a distinction, from an earlier drug version shifts the incentive structure for follow-on pharmaceutical innovation away from that fostered by the current, patent-dominated regime, which entails an all-or-nothing decision on patentability. And while the PTO has a role to play in tailoring the brand's right by determining the permissible scope of the patent claim in view of the prior art and other requirements of the Patent Act, the *Namenda XR* example shows that (putative) patentability does not always correspond to any actual benefit offered by the modification.⁵¹¹ Thus, while the standard could be gamed—and, if the result is to maintain *Orange Book* listings, the payoff of such a strategy would be considerable⁵¹²—the proposal would still succeed in at least forcing the transfer of *some* relevant information on what the drug change would offer.

A third set of objections relates to the FDA's various institutional limitations as potential roadblocks to this proposal's successful implementation. For example, even if the FDA has the technical expertise to conduct the necessary analysis, it might not have the budget or the time to do it properly.⁵¹³ Combining those concerns with the agency's well-known aversion to risk,⁵¹⁴ one might predict that the FDA would tend to conclude as a matter of course that no relevant difference was established for many of the comparative submissions it receives. And if the answer to the budgetary concern is to fund the initiative through user fees,⁵¹⁵ perhaps the FDA would then become more susceptible to capture and thus tilt toward the sponsors, issuing determinations that portray the modifications in an unduly favorable light.⁵¹⁶ Finally, the objector would note that even with its newfound power to elicit the generation and disclosure of comparative information, the FDA cannot do anything about hard switches.⁵¹⁷

Such objections are valid, but not insurmountable. Although it is true that the new authority would increase pressures on the FDA's resources, some of the added expense could be covered by outlays from the funds budgeted for CER.⁵¹⁸ The use of CER funding could be defended because pre-approval comparative analysis can dovetail with the CER conducted after the drug is marketed, driving drug adoption choices and supplying information for future research and thus justifying CER coverage. Even if the CER budget is unavailable for implementing the proposal, perhaps its costs would still be reasonable because comparative analysis would occur contemporaneously with, and rely on some of the same data as, regular (i.e., placebo-based) drug approval—as when the sponsor opts for the indirect comparison method. Finally, risk-averseness might not be a barrier to correct decision-making by the FDA here because the proposed determinations do not come with the same kind of pressure as the decision whether the product actually goes on the market.

As for hard switches, the FDA certainly has little power to stop them. If a company voluntarily decides to discontinue an approved product, it is not clear if the agency could do anything to keep that product on the market. As noted earlier, withholding product approval based on the lack of a demonstrable difference from an already approved product is not a viable strategy given the FDA's enabling statute, nor is it likely to be sound policy.⁵¹⁹ While antitrust actions remain as a weapon against hard switches with no demonstrated difference,⁵²⁰ the major concern here again comes down to gaming. Firms might do just enough to get over the relevancy hump—perhaps enabling them to avoid an antitrust action based on a flimsy procompetitive justification—and then pull the original product prior to expiration of the pioneering patents. Even if the FDA's involvement fixes the information gap, physicians would have no choice but to switch if there is no original product. Whether, after those patents do expire, a switch back is plausible is an open question to which the answer depends on the specifics of the situation, including the nature of the condition being treated, patient characteristics, and the therapeutic difference between the drugs that has been established by the

sponsor. At the very least, though, market participants should have a much better sense than before of the costs and benefits of this step—one of the goals of the proposal. And, in contrast to what happened with Namenda, one might actually see switches to drug products that are provably different, and perhaps better, than the original.

VII. CONCLUSION

Not all pharmaceutical products are alike. Some are completely new drugs, while others are incremental modifications of drugs already on the market. Both have value in their own right, but the goals with the latter are often much clearer: To better the pioneering drug in some specific dimension, such as improving patient compliance or reducing side effects. Sometimes, however, product changes coupled with follow-on patents can embody a strategy that is focused mainly on attempting to maintain the brand's exclusivity rather than on advancing the quality of patient care and human health.⁵²¹ The proposal in this Article enlists the FDA in the effort to encourage the latter—which, after all, is why the pharmaceutical industry exists in the first place.

1. [1]. For examples of recent leading works on the two sides of the debate, see generally David Healy, *Pharmageddon* (2012); Thomas P. Stossel, *Pharmaphobia: How the Conflict of Interest Myth Undermines American Medical Innovation* (2015). Even the titles are telling.
2. [2]. David Taylor, *The Pharmaceutical Industry and the Future of Drug Development*, in *Pharmaceuticals in the Environment* 1, 1 (R.E. Hester & R.M. Harrison eds., 2015).
3. [3]. See, e.g., Sarah Knapton, *First Migraine Drug in 20 Years Can Half Number of Attacks, Study Shows*, *Telegraph* (Nov. 30, 2017, 12:01 AM), <http://www.telegraph.co.uk/science/2017/11/30/first-migraine-drug-20-years-can-half-number-attacks-study-shows>.
4. [4]. Laura Lorenzetti, *Here's Why Turing Pharmaceuticals Says 5,000% Price Bump Is Necessary*, *Fortune* (Sept. 22, 2015), <http://fortune.com/2015/09/21/turing-pharmaceuticals-martin-shkreli-response>.
5. [5]. Alana Semuels, *Are Pharmaceutical Companies to Blame for the Opioid Epidemic?*, *Atlantic* (June 2, 2017), <https://www.theatlantic.com/business/archive/2017/06/lawsuit-pharmaceutical-companies-opioids/529020>.
6. [6]. See Herbert Hovenkamp et al., *IP and Antitrust: An Analysis of Antitrust Principles Applied to Intellectual Property Law* §§ 12.05, 15.03B[1] (3d ed. 2017); see also *New York ex rel. Schneiderman v. Actavis PLC*, 787 F.3d 638, 643 n.2 (2d Cir. 2015) (tracing the origin of the term “product hopping”); Michael A. Carrier & Steve D. Shadowen, *Product Hopping: A New Framework*, 92 *Notre Dame L. Rev.* 167, 168–69 (2016) (contending that product hopping is driven by the phenomenon of a “price disconnect”).

7. [7]. Although FDA-approved drug products can also be supported by non-patent exclusivities, product hopping is most often tied to patent expiration followed by new patenting. *See infra* notes 60–62 and accompanying text.
8. [8]. For a leading example from the case law, see *Actavis*, 787 F.3d at 646–47. Extended-release versions of drugs differ from their immediate-release counterparts in that—as the respective terms suggest—the former are, generally speaking, engineered so as to discharge the active pharmaceutical ingredient (i.e., the working part of the drug) into the bloodstream more slowly than the latter. *See Ali Nokhodchi et al., The Role of Oral Controlled Release Matrix Tablets in Drug Delivery Systems*, 2 *BioImpacts* 175, 175–78 (2012).
9. [9]. *See, e.g., In re Asacol Antitrust Litig.*, No. 15-cv-12730-DJC, 2016 WL 4083333, at *2–5 (D. Mass. July 20, 2016) (describing a product hopping scheme involving both so-called “soft” and “hard” switches), *further proceedings*, 233 F. Supp. 3d 247 (D. Mass. 2017); *Walgreen Co. v. AstraZeneca Pharm. L.P.*, 534 F. Supp. 2d 146, 150–52 (D.D.C. 2008) (describing a product hopping scheme involving a soft switch).
10. [10]. *See, e.g., Actavis*, 787 F.3d at 647–49; *In re Loestrin 24 Fe Antitrust Litig.*, 261 F. Supp. 3d 307, 349–54 (D.R.I. 2017); *In re Suboxone (Buprenorphine Hydrochloride and Naloxone) Antitrust Litig.*, MDL No. 2445, 2017 WL 3967911, at *9 (E.D. Pa. Sept. 8, 2017), *further proceedings*, 2017 WL 4910673, at *11 (E.D. Pa. Oct. 30, 2017); *Abbott Labs. v. Teva Pharm. USA, Inc.*, 432 F. Supp. 2d 408, 420, 423–24 (D. Del. 2006); *see also Asacol*, 2016 WL 4083333, at *3–4 (describing a product hopping scheme involving both soft and hard switches).
11. [11]. *See* 21 U.S.C. § 355(j) (2018). *See generally* Federal Food, Drug, and Cosmetic Act, 21 U.S.C. §§ 301–399h.
12. [12]. *See infra* text accompanying notes 115–21 (describing the variety of generic substitution laws); *see also* Aaron S. Kesselheim & Jonathan J. Darrow, *Hatch-Waxman Turns 30: Do We Need a Re-Designed Approach for the Modern Era?*, 15 *Yale J. Health Pol’y L. & Ethics* 293, 309–14 (2015) (tracing the evolution of generic substitution laws).
13. [13]. The generic, however, does not lose the approval to market the “copy” when the brand pulls the product from the shelves—unless that had to be done for safety or effectiveness reasons. 21 C.F.R. §314.122(a) (2018).
14. [14]. *See, e.g.,* Peter Mansfield et al., *Single-Enantiomer Drugs: Elegant Science, Disappointing Effects*, 43 *Clinical Pharmacokinetics* 287, 287 (2004) (“Patent protection and a perception of superiority based on promotion rather than evidence will maintain price premiums for single enantiomer drugs that are not justified on the basis of clinical performance.”); *see also* Ismayil Ahmet et al., *Fenoterol Enantiomers Do Not Possess Beneficial Therapeutic Properties of Their Racemic Mixture in the Rat Model of Post Myocardial Infarction Dilated Cardiomyopathy*, 26 *Cardiovascular Drugs & Therapy* 101, 106 (2012) (“While the ineffectiveness of SS-enantiomer in our study was fully anticipated, and in fact it was intended as a negative control, the lack of effectiveness on the part of RR-enantiomer contradicts the hypothesis promoted in the reports based on recording of its effect on contraction of single cardiomyocytes.”); William James Deardorff & George T. Grossberg, *A Fixed-Dose Combination of Memantine Extended-Release and Donepezil in the Treatment of Moderate-to-Severe Alzheimer’s Disease*, 10 *Drug Design, Dev. & Therapy* 3267, 3276 (2016) (“[T]here does not appear to be compelling, high-quality evidence that an FDC would substantially improve clinical outcomes over lower cost

regimens, such as generic donepezil and memantine IR. Whether or not the added cost of the FDC is justified will likely be made on a case-by-case basis.”). *But see, e.g.,* Pascal Auquier et al., *Comparison of Escitalopram and Citalopram Efficacy: A Meta-Analysis*, 7 Int’l J. Psychiatry Clinical Prac. 259, 265–66 (2003) (providing a counterexample).

15. [15]. *See, e.g.,* Aaron S. Kesselheim et al., *The High Cost of Prescription Drugs in the United States: Origins and Prospects for Reform*, 316 JAMA 858, 864–65 (2016).
16. [16]. 15 U.S.C. § 2 (2018); New York *ex rel.* Schneiderman v. Actavis PLC, 787 F.3d 638, 658–60 (2d Cir. 2015).
17. [17]. *Actavis*, 787 F.3d at 658–60. The court concluded that the plaintiff was likely to succeed on both monopolization and attempted monopolization claims. *Id.* at 651, 660.
18. [18]. *Id.* at 654–55, 658.
19. [19]. *Id.* at 656.
20. [20]. *Id.* at 655.
21. [21]. *See infra* notes 274–77 and accompanying text.
22. [22]. *See infra* notes 126–27 and accompanying text. *But cf.* Arti K. Rai & Barak D. Richman, *A Preferable Path for Thwarting Pharmaceutical Product Hopping*, Health Aff.: Health Aff. Blog (May 22, 2018), <https://www.healthaffairs.org/doi/10.1377/hblog20180522.408497/full> (proposing an approach that would allow generic substitution in such circumstances).
23. [23]. *Actavis*, 787 F.3d at 659. By “reformulated” here, the Second Circuit is of course not referring to a change in an inactive ingredient that does not affect the original drug. Instead, the reformulation has led to a change in dosing, resulting in a “new drug” under the FDCA. *See infra* notes 123–27 and accompanying text.
24. [24]. Before finding an antitrust violation, the court had to determine the relevant market, which it concluded to be memantine. *Actavis*, 787 F.3d at 646–52; *cf.* Mylan Pharm. Inc. v. Warner Chilcott PLC, 838 F.3d 421, 433–34 (3d Cir. 2016) (finding no antitrust violation because there were other drugs available in the relevant market, precluding the defendant from attaining a dominant market position).
25. [25]. *See, e.g.,* Leigh Oliver, *It Is All About the Facts: Commentary on the Current State of Antitrust Enforcement in Health Care*, 48 Loy. U. Chi. L.J. 821, 823–24 (2017); *see also* Robin Feldman & Evan Frondorf, *Drug Wars: How Big Pharma Raises Prices and Keeps Generics Off the Market* 69–78 (2017) (describing courts’ attempts to deal with product hopping strategies); Carrier & Shadowen, *supra* note 6, at 198–200 (discussing the Namenda antitrust litigation); *cf.* Michael A. Carrier, *A Real-World Analysis of Pharmaceutical Settlements: The Missing Dimension of Product Hopping*, 62 Fla. L. Rev. 1009, 1011, 1017–18 (2010).

26. [26]. See, e.g., Douglas H. Ginsburg et al., *Product Hopping and the Limits of Antitrust: The Danger of Micromanaging Innovation*, Competition Pol’y Int’l Antitrust Chron., Dec. 2015, at 1, 4–5; Joanna Shepherd, *Deterring Innovation: New York v. Actavis and the Duty to Subsidize Competitors’ Market Entry*, 17 Minn. J.L. Sci. & Tech. 663, 668, 707 (2016).
27. [27]. See, e.g., *In re Loestrin 24 Fe Antitrust Litig.*, 261 F. Supp. 3d 307, 353 (D.R.I. 2017).
28. [28]. See, e.g., *Mylan Pharm.*, 838 F.3d at 440–41.
29. [29]. See Hillary Greene, *Muzzling Antitrust: Information Products, Innovation and Free Speech*, 95 B.U. L. Rev. 35, 77–79 (2015) (noting that, as a matter of practice, antitrust courts rarely engage in balancing of pro-competitive benefits versus anti-competitive harms of innovation); cf. John M. Newman, *Anticompetitive Product Design in the New Economy*, 39 Fla. St. U. L. Rev. 681, 726–28 (2012) (arguing that certain product redesigns should and do give rise to viable antitrust claims).
30. [30]. Stacey L. Dogan & Mark A. Lemley, *Antitrust Law and Regulatory Gaming*, 87 Tex. L. Rev. 685, 709 (2009) (noting how FDA regulation of the pharmaceutical industry “presents a perfect storm” for product hopping).
31. [31]. *Verizon Commc’ns Inc. v. Law Offices of Curtis V. Trinko, LLP*, 540 U.S. 398, 411 (2004) (quoting *United States v. Citizens & S. Nat’l Bank*, 422 U.S. 86, 91 (1975)).
32. [32]. *Id.* at 413.
33. [33]. See Dennis W. Carlton et al., *Does the FTC’s Theory of Product Hopping Promote Competition?*, 12 J. Competition L. & Econ. 495, 502 (2016) (explaining that “the regulatory solution should be to fix Hatch-Waxman, rather than misuse antitrust law to impose an obligation on firms to assist rivals’ efforts to free-ride”); Alan Devlin & Michael Jacobs, *Anticompetitive Innovation and the Quality of Invention*, 27 Berkeley Tech. L.J. 1, 51 (2012) (“[P]olicymakers should not distort well-established antitrust rules in order to solve what is, at heart, a regulatory problem.”); Rebecca S. Eisenberg & Daniel A. Crane, *Patent Punting: How FDA and Antitrust Courts Undermine the Hatch-Waxman Act to Avoid Dealing with Patents*, 21 Mich. Telecomm. & Tech. L. Rev. 197, 244–45 (2015) (arguing for greater involvement of the FDA in evaluating patent-related issues); Joseph Fielding, Note, *From Pay-for-Delay to Product Hopping: The Limited Utility of Antitrust Law in the Pharmaceutical Industry*, 38 Cardozo L. Rev. 1915, 1945 (2017) (advocating for Congress to empower the FDA to play a greater role in patent-related matters); see also Matthew Sipe, *Patent Privateers and Antitrust Fears*, 22 Mich. Telecomm. & Tech. L. Rev. 191, 195–96 (2016) (contending that antitrust law should be a measure of last resort when regulatory alternatives are available); cf. C. Scott Hemphill, *Paying for Delay: Pharmaceutical Patent Settlement as a Regulatory Design Problem*, 81 N.Y.U. L. Rev. 1553 (2006) (explaining how another lacuna in FDA drug regulation allows for anti-competitive settlements); Jacob S. Sherkow, *Administering Patent Litigation*, 90 Wash. L. Rev. 205, 214–15, 250–53 (2015) (calling for a greater role for the FDA to police certain conduct by owners of pharmaceutical patents).
34. [34]. See Cynthia M. Ho, *Should All Drugs Be Patentable?: A Comparative Perspective*, 17 Vand. J. Ent. & Tech. L. 295, 320 (2015) (explaining that “[a]lthough ... actions [like those by Actavis] properly prompt antitrust disputes, the need for such actions may still result in a delay in generic competition”); Rai & Richman, *supra* note 22.
35. [35]. *New York ex rel. Schneiderman v. Actavis PLC*, 787 F.3d 638, 658 (2d Cir. 2015).

36. [36]. *In re Asacol Antitrust Litig.*, No. 15-cv-12730-DJC, 2016 WL 4083333, at *4–5 (D. Mass. July 20, 2016), *further proceedings*, 233 F. Supp. 3d 247 (D. Mass. 2017).
37. [37]. *Id.*
38. [38]. *See* Mansfield et al., *supra* note 14, at 288–89; *see also* Feldman & Frondorf, *supra* note 25, at 71–74 (providing examples of drug product changes unaccompanied by proven benefits for any patients).
39. [39]. *See* Stephen Breyer, Regulation and Its Reform 26–28, 159–64 (1982); *see also* Howard A. Shelanski, *Justice Breyer, Professor Kahn, and Antitrust Enforcement in Regulated Industries*, 100 Calif. L. Rev. 487, 494 (2012) (“Breyer ... identified several regulatory tasks for which antitrust would be inadequate, notably the correction of moral hazard and information asymmetry problems ...”).
40. [40]. *See, e.g., In re Sichert*, 566 F.2d 1154, 1159–61 (C.C.P.A. 1977) (illustrating the minimal requirements of effectiveness and safety needed to establish patentable utility).
41. [41]. *See* 35 U.S.C. § 101 (2018); *Lowell v. Lewis*, 15 F. Cas. 1018, 1019 (C.C.D. Mass. 1817) (No. 8568) (Story, Circuit Justice); *see also* Robert Patrick Merges & John Fitzgerald Duffy, *Patent Law and Policy: Cases and Materials* 201 (7th ed. 2017) (noting the limited role of the utility requirement); *Carrier & Shadowen, supra* note 6, at 181 (“The granting of a patent by the U.S. Patent and Trademark Office ... certainly does not guarantee, or even suggest, that the reformulated product is superior in any way to existing products.”). *See generally* W. Nicholson Price II, *The Cost of Novelty* (2018) (unpublished manuscript) (on file with author) (explaining that the law generally does not require a better product for patentability).
42. [42]. *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 17–18 (1966); *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 960 n.12 (Fed. Cir. 1986); *see* Gregory N. Mandel, *A Nonobvious Comparison: Nonobviousness Decisions at the PTAB and in the Federal Courts*, 24 Tex. Intell. Prop. L.J. 403, 404–07 (2016). *See generally* Michael Abramowicz & John F. Duffy, *The Inducement Standard of Patentability*, 120 Yale L.J. 1590 (2011) (arguing for the use of the economic inducement standard to judge non-obviousness of patent claims).
43. [43]. *See infra* Section III.B.
44. [44]. *See, e.g., In re Merchant*, 575 F.2d 865, 868–69 (C.C.P.A. 1978); *see also* Tamsen Valoir, *Six Methods of Preserving Market Exclusivity*, 18 Intell. Prop. & Tech. L.J. 12, 14 (2006) (“[R]esearchers may plan ahead to collect comparative data, showing that the improved product has unexpected advantages over the product disclosed in the original application. Thus, a particular species of drug with a particular activity level might be patentable, even though the genus of drugs was disclosed earlier. Any showing of unexpected advantages can be used to counter an obviousness rejection, and incorporating follow-on applications into a patent strategy early will allow scientists to design their research path accordingly.”).
45. [45]. *Graham*, 383 U.S. at 17–18 (discussing secondary considerations); *see also* *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1358–59 (Fed. Cir. 2017) (holding that secondary considerations cannot be ignored in the non-obviousness analysis).

46. [46]. See Shashank Upadhye, *To Use or Not to Use: Reforming Patent Infringement, the Public Use Bar, and the Experimental Use Doctrine as Applied to Clinical Testing of Pharmaceutical and Medical Device Inventions*, 4 Minn. Intell. Prop. Rev. 1, 4 (2002) (explaining how the public use bar encourages early filings). See generally Ted Sichelman, *Commercializing Patents*, 62 Stan. L. Rev. 341 (2010) (arguing for a new type of patent right as a driver for increasing commercialization and reducing the prevalence of patented inventions that are not commercially exploited).
47. [47]. See Jonathan J. Darrow, *Pharmaceutical Gatekeepers*, 47 Ind. L. Rev. 363, 403 (2014) (“[T]he evidence needed to ascertain a drug’s true efficacy in humans is not usually available at the time of patenting, which occurs relatively early in the research and development process.”).
48. [48]. See Rebecca S. Eisenberg, *Pharma’s Nonobvious Problem*, 12 Lewis & Clark L. Rev. 375, 396–400 (2008); see also Greg Reilly, *Decoupling Patent Law*, 97 B.U. L. Rev. 551, 577 (2017) (“In practice, secondary considerations are rarely relied on during patent acquisition both because of the difficulty for examiners in identifying and developing evidence of real world activities (as opposed to printed materials) and because secondary considerations tend to be ex post factors that only arise after the patent is granted and the invention publicized and marketed.”).
49. [49]. See *infra* notes 173–76, 217–23 and accompanying text (discussing the Seroquel example).
50. [50]. Cf. Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 Nw. U. L. Rev. 1495, 1500–08 (2001).
51. [51]. See C. Scott Hemphill & Bhaven N. Sampat, *Evergreening, Patent Challenges, and Effective Market Life in Pharmaceuticals*, 31J. Health Econ. 327, 332–36 (2012); see also Shine Tu, *Invalidated Patents and Associated Patent Examiners*, 18 Vand. J. Ent. & Tech. L. 135, 153 (2015) (finding that the Biotechnology and Organic Chemistry technology center of the PTO is responsible for the highest percentage of invalidated patents of all the technology centers). Although selection effects certainly influence the rate of invalidation, the fact remains that there is a significant rate of erroneous patent grants in the pharmaceutical space.
52. [52]. Challenges to patentability at the Patent Trial and Appeal Board (“PTAB”), however, can lead to relatively quick invalidations—assuming the challenger can get past the hurdle of the PTO’s discretionary institution of a post-issuance review. See Joanna Shepherd, *Disrupting the Balance: The Conflict Between Hatch-Waxman and Inter Partes Review*, 6 N.Y.U. J. Intell. Prop. & Ent. L. 14, 37 (2016).
53. [53]. See, e.g., *Bayer Healthcare Pharm., Inc. v. Watson Pharm., Inc.*, 713 F.3d 1369, 1377 (Fed. Cir. 2013) (reversing two lower court decisions and holding invalid a patent originally granted in 1998 and reissued in 2002, and which began to be litigated in 2007), *rev’g* *Bayer Schering Pharma AG v. Watson Pharm., Inc.*, Nos. 2:07-CV-01472-KJD-GWF, 2:08-CV-00995-KJD-GWF, 2012 WL 1079551 (D. Nev. Mar. 30, 2012), and *Bayer Schering Pharma AG v. Lupin Ltd.*, No. 2:10-CV-01166-KJD-RJJ, 2012 WL 1080296 (D. Nev. Mar. 30, 2012). As part of the reversal, the Federal Circuit concluded that the district court erred in crediting the patentee’s unexpected results evidence. Compare *id.* at 1374–77, with *Bayer*, 2012 WL 1079551, at *22 (“[T]he undisputed evidence demonstrates three unexpected results of Bayer’s invention ...”). The Federal Circuit, to be sure, granted an emergency stay of the injunction against one of the defendants’ ANDA approvals in a related appeal a month prior to issuing the decision reversing the judgment that the patents are not invalid. See Order at 2, *Bayer Healthcare Pharm., Inc. v. Sandoz, Inc.*, No. 13-1207 (Fed. Cir. Mar. 13, 2013), ECF No. 57.

54. [54]. See *infra* Section III.B; see also Janice M. Mueller & Donald S. Chisum, *Enabling Patent Law's Inherent Anticipation Doctrine*, 45 Hous. L. Rev. 1101, 1154–57, 1163–64 (2008) (explaining why another patent law doctrine, inherent anticipation, is ill-suited to address strategic behavior by brand pharmaceutical companies).
55. [55]. See Carrier & Shadowen, *supra* note 6, at 179, 221; Amy Kapczynski & Talha Syed, *The Continuum of Excludability and the Limits of Patents*, 122 Yale L.J. 1900, 1956 & n.180 (2013); Russell Korobkin, *Comparative Effectiveness Research as Choice Architecture: The Behavioral Law and Economics Solution to the Health Care Cost Crisis*, 112 Mich. L. Rev. 523, 550–51 (2014). For suggestions to incorporate comparative effectiveness analysis in the FDA approval process, see G. Caleb Alexander & Randall S. Stafford, *Does Comparative Effectiveness Have a Comparative Edge?*, 301 JAMA 2488, 2488–89 (2009); Alec B. O'Connor, *Building Comparative Efficacy and Tolerability into the FDA Approval Process*, 303 JAMA 979, 979–80 (2010). For a proposal to make comparative efficacy a general requirement of drug approvals in Europe, see generally Corinna Sorenson et al., *Evidence of Comparative Efficacy Should Have a Formal Role in European Drug Approvals*, 343 Brit. Med. J. 514 (2011).
56. [56]. The FDA treats modifications involving changes in dosage and the like formally as new drugs. See *infra* Part II.
57. [57]. See 21 U.S.C. § 355(b) (2018). As part of this requirement, the sponsor must provide “evidence consisting of adequate and well-controlled investigations, including clinical investigations, by experts qualified by scientific training and experience to evaluate the effectiveness of the drug involved, on the basis of which it could fairly and responsibly be concluded by such experts that the drug will have the effect it purports or is represented to have under the conditions of use prescribed, recommended, or suggested in the labeling or proposed labeling thereof.” *Id.* §355(d). To support this claim, the sponsor must submit “full reports of investigations which have been made to show whether or not such drug is safe for use and whether such drug is effective in use.” *Id.* §355(b)(1)(A). Although those terms are often used interchangeably, the literature distinguishes efficacy, which refers to “the effect of the treatment under optimal conditions,” i.e., in the course of clinical trials, from effectiveness, which refers to “the effect of the treatment in routine clinical practice.” Gretchen A. Jacobson, Cong. Research Serv., RL34208, *Comparative Clinical Effectiveness and Cost-Effectiveness Research: Background, History, and Overview* 4 (2007). Nonetheless, pre-approval studies can, subject to various qualifications due to their limitations, provide the kinds of results that allow such studies to serve as proxies for effectiveness in actual clinical practice. See generally Barbara J. Evans, *Seven Pillars of a New Evidentiary Paradigm: The Food, Drug, and Cosmetic Act Enters the Genomic Era*, 85 Notre Dame L. Rev. 419 (2010) (discussing evidentiary challenges for proving drug efficacy and safety).
58. [58]. See 21 C.F.R. § 314.126(b) (2018) (setting forth placebo and no-treatment controls as sufficient for meeting the statutory requirements for approval). There are some exceptions. See, e.g., Ctr. for Drug Evaluation & Research (CDER) & Ctr. for Biologics Evaluation & Research (CBER), Food & Drug Admin., U.S. Dep’t of Health & Human Servs., *Non-Inferiority Clinical Trials to Establish Effectiveness: Guidance for Industry* (2016), <https://www.fda.gov/downloads/Drugs/Guidances/UCM202140.pdf> (providing guidelines for non-inferiority trials of antibiotic drugs) [hereinafter *Non-Inferiority Clinical Trials to Establish Effectiveness*].
59. [59]. See Nicholas S. Downing et al., *Clinical Trial Evidence Supporting FDA Approval of Novel Therapeutic Agents, 2005–2012*, 311 JAMA 368, 373–74 (2014) (“Comparative effectiveness information, which is not required as part of FDA approval and involves comparison of an intervention with an active control, was available for less than half of indications, consistent with prior research, but

leaving uncertainty about the benefits and safety of these medications when compared with other available therapeutic agents.”). Sometimes, a sponsor does make certain comparisons, but they end up not being relevant to any kind of demonstrable distinctiveness between the two products. *See infra* notes 274–75 and accompanying text (discussing comparative experiments performed for Namenda IR and XR); *cf.* Jitendra Ganju & Dror Rom, *Non-Inferiority Versus Superiority Drug Claims: The (Not So) Subtle Distinction*, 18 *Trials* 278, 279–81 (2017) (contrasting statistical and clinical superiority).

60. [60]. *See, e.g.*, 21 U.S.C. § 355(c)(3)(E)(iii)–(iv) (providing for a three-year market exclusivity for drug modifications for which the sponsor conducted certain new clinical investigations essential to approval). This exclusivity, however, does not require comparative analysis.
61. [61]. *See infra* Part II (cataloguing benefits that *Orange Book* listings provide).
62. [62]. This analysis assumes that so-called “secondary” patents have terms extending significantly beyond expiration of the terms of so-called “primary” patents, a scenario that often holds in practice. For a discussion of primary and secondary patents, *see infra* Part III.
63. [63]. New York *ex rel.* Schneiderman v. Actavis PLC, 787 F.3d 638, 658–60 (2d Cir. 2015) (providing an example of such a pretextual change).
64. [64]. *See* Mueller & Chisum, *supra* note 54, at 1106 n.12 (“Drawing the line between improper attempts at evergreening and legitimate incremental innovation is a broad and difficult problem in patent law . . .”). As Professor John Thomas has noted, “[p]atent evergreening’ is a potentially pejorative term” that refers to practices that include strategic product hopping. *See* John R. Thomas, Cong. Research Serv., R40917, Patent “Evergreening”: Issues in Innovation and Competition 1 (2009); *supra* note 51 and accompanying text; *infra* note 491 and accompanying text.
65. [65]. Joshua Cohen & Kenneth Kaitin, *Follow-On Drugs and Indications: The Importance of Incremental Innovation to Medical Practice*, 15 *Am. J. Therapeutics* 89, 89 (2008); Linda J. Wastila et al., *The World Health Organization’s Essential Drug List: The Significance of Me-Too and Follow-On Research*, 3 *J. Clinical Res. & Drug Dev.* 105, 106 (1989); Albert I. Wertheimer & Thomas M. Santella, *Pharmaceutical Evolution: The Advantages of Incremental Innovation in Drug Development*, Competitive Enterprise Institute, Apr. 2009, at 1, <http://cei.org/sites/default/files/Wertheimer%20and%20Santella%20-%20Pharmaceutical%20Evolution.pdf>; *see also infra* note 342 and accompanying text (providing specific examples).
66. [66]. *See, e.g.*, S. Scott Sutton et al., *Impact of Pill Burden on Adherence, Risk of Hospitalization, and Viral Suppression in Patients with HIV Infection and AIDS Receiving Antiretroviral Therapy*, 36 *Pharmacotherapy* 385, 392–95 (2016). *See generally* Nokhodchi et al., *supra* note 8, at 175–76 (discussing various potential advantages of extended-release formulations).
67. [67]. Nokhodchi et al., *supra* note 8, at 175; *see* Gilbert Block et al., *Comparison of Immediate-Release and Controlled Release Carbidopa/Levodopa in Parkinson’s Disease*, 37 *Eur. Neurology* 23, 26 (1997); Marilou Powers Cramer & Samuel R. Saks, *Translating Safety, Efficacy and Compliance into Economic Value for Controlled Release Dosage Forms*, 5 *PharmacoEconomics* 482, 484 (1994).

68. [68]. *See, e.g.*, Nokhodchi et al., *supra* note 8, at 176. *See generally* David A. Kessler, Comm’r of Food & Drugs, Remarks at a Controlled Release Society Meeting (July 27, 1993), in 4 Food & Drug Rep. (Food & Drug Law Inst.) 437 (1993) (summarizing potential problems that can be introduced when drugs are changed from IR to XR formulations).
69. [69]. *See supra* notes 55–59 and accompanying text.
70. [70]. *See infra* Part IV.
71. [71]. *But cf.* Breyer, *supra* note 39, at 159–64 (expressing doubts about antitrust law’s role as a tool for bridging information gaps and favoring regulation for fixing such problems).
72. [72]. *See supra* notes 19–28 and accompanying text.
73. [73]. *See supra* notes 29–34 and accompanying text.
74. [74]. *Cf. infra* Section V.D (exploring some possible sources of such authority in the current statute).
75. [75]. Kessler, *supra* note 68, at 438.
76. [76]. *See* Comment Letter from James C. Stansel, Executive Vice President & Gen. Counsel, & David E. Korn, Vice President of Intellectual Prop. & Law, Pharm. Research & Mfrs. of Am., to Dockets Mgmt. Staff (HFA-305), Food & Drug Admin. 18 n.87 (Nov. 17, 2017), <https://www.regulations.gov/document?D=FDA-2017-N-3615-0108> (“When you were talking about post-approval changes, you said about the ability to improve tolerability, adherence—I believe you had four specific examples that you used. So my question is should there be a requirement to demonstrate any or all four of those when the agency approves any postmarketing type changes to the innovator?” (quoting a question from Dr. Kathleen Uhl, Director for the Office of Generic Drugs at the FDA’s Center for Drug Evaluation and Research)). The other two examples of improvements that the industry representative gave were convenience and efficacy. *Id.* at 18.
77. [77]. 21 U.S.C. § 372(d) (2018); *see* Darrow, *supra* note 47, at 402 (“The stated purpose of §372(d), as described in the accompanying 1962 Senate Report, was unambiguously to reduce the number of patents issued on therapeutically questionable drugs ...”).
78. [78]. *See supra* notes 44–45 and accompanying text; *see also* Darrow, *supra* note 47, at 401–03 (commenting on the lack of utilization of § 372(d) by the PTO).
79. [79]. 21 U.S.C. § 372(d).
80. [80]. Darrow, *supra* note 47, at 401.
81. [81]. *See, e.g.*, *In re Carabateas*, 345 F.2d 1013, 1017 (C.C.P.A. 1965) (explaining that, “[w]hen considering that minor advances in activity are eagerly sought in pharmaceutical chemistry, a showing of nine and six times more activity than the most active compound of the art is indeed most significant, representing a different order of magnitude, and is proof of unobviousness and unexpected beneficial

properties in a new compound”). In theory, courts deciding antitrust cases might also engage in comparative product analysis, though they rarely do so in practice. *See supra* text accompanying note 29.

82. [82]. *See* Yaniv Heled, *Patents vs. Statutory Exclusivities in Biological Pharmaceuticals—Do We Really Need Both?*, 18 Mich. Telecomm. & Tech. L. Rev. 419, 443–70 (2012) (proposing a reduced emphasis on patents in setting exclusivity-based incentives for so-called “biologics,” or large-molecule drugs); *see also* Daniel Gervais, *The Patent Option*, 20 N.C. J.L. & Tech. (forthcoming 2019) (manuscript at 3–4), <https://ssrn.com/abstract=3266580> (challenging reliance on patents as the primary regulatory driver in the pharmaceutical industry); *cf.* Gregory Dolin, *Exclusivity Without Patents: The New Frontier of FDA Regulation for Genetic Materials*, 98 Iowa L. Rev. 1399, 1454–64 (2013) (proposing FDA-regulatory instead of patent-based mechanisms for incentivizing certain inventions). *See generally* John R. Thomas, *The End of “Patent Medicines”? Thoughts on the Rise of Regulatory Exclusivities*, 70 Food & Drug L.J. 39 (2015) (contending that FDA-administered exclusivities have come to play a bigger role than patent protection in incentivizing pharmaceutical innovation).
83. [83]. *See* Ian Ayres & Amy Kapczynski, *Innovation Sticks: The Limited Case for Penalizing Failures to Innovate*, 82 U. Chi. L. Rev. 1781, 1789–811 (2015).
84. [84]. *See infra* Section V.B.
85. [85]. *See* 21 C.F.R. § 201.57 (2018); *Labeling Information for Drug Products*, U.S. Food & Drug Admin., <https://www.fda.gov/Drugs/DevelopmentApprovalProcess/DevelopmentResources/Labeling/default.htm> (last updated Nov. 18, 2016) (providing informational resources on drug labeling).
86. [86]. *See infra* Part IV.
87. [87]. *See Orange Book: Approved Drug Products with Therapeutic Equivalence Evaluations*, U.S. Food & Drug Admin., <https://www.accessdata.fda.gov/scripts/cder/ob/default.cfm> (last updated Oct. 2018) [hereinafter *Orange Book*].
88. [88]. *See* Dogan & Lemley, *supra* note 30, at 710–11.
89. [89]. *See infra* Section V.B.
90. [90]. Drug Price Competition and Patent Term Restoration Act of 1984, Pub. L. No. 98-417, §101, 98 Stat. 1585, 1585–92 (1984).
91. [91]. *See* H.R. Rep. No. 98-857, pt. 1, at 14–15 (1984), *as reprinted in* 1984 U.S.C.C.A.N. 2647.
92. [92]. *Id.* at 19–20.
93. [93]. *Id.* at 15–17.
94. [94]. 21 U.S.C. § 355(d) (2018). *See generally* Daniel Carpenter, *Reputation and Power: Organizational Image and Pharmaceutical Regulation at the FDA* 465–543 (2010) (detailing the organizational politics around reviews of new drugs).

95. [95]. See *New Drug Application (NDA)*, U.S. Food & Drug Admin., <https://www.fda.gov/Drugs/DevelopmentApprovalProcess/HowDrugsareDevelopedandApproved/ApprovalApplications/NewDrugApplicationNDA/default.htm> (last updated Mar. 29, 2016) (providing an overview of the approval process for new drugs); see also Henry G. Grabowski & John M. Vernon, *Effective Patent Life in Pharmaceuticals*, 19 Int'l J. Tech. Mgmt. 98, 103–04 (2000) (describing the FDA regulatory process).
96. [96]. Chie Hoon Song & Jeung-Whan Han, *Patent Cliff and Strategic Switch: Exploring Strategic Design Possibilities in the Pharmaceutical Industry*, 5 SpringerPlus 692, 699–700 (2016); see also Nina Kathleen Stinson, Note, *Trademarks and “Look-Alike” Drugs*, 15 Ind. L. Rev. 733, 743–44 n.58 (1982) (“Because of the nature of research within the drug industry, the innovator manufacturer is often the only source of information regarding the uses and precautions, as well as the physical and pharmacological properties of a new drug. Therefore, physicians and pharmacists rely heavily upon the manufacturers, especially for initial information and clinical studies pertaining to the new drug.” (citing Drug Development and Marketing 124, 182–86 (R. Helms ed., 1975))). On the role of trademark law in the drug marketing effort, see Gideon Parchomovsky & Peter Siegelman, *Towards an Integrated Theory of Intellectual Property*, 88 Va. L. Rev. 1455, 1481–493 (2002). For further discussion of drug marketing and advertising, see *infra* Sections IV.B–C and accompanying text.
97. [97]. 21 U.S.C. § 355(j); see also 21 C.F.R. § 314.127 (2018) (setting forth the prerequisites for ANDA approval); *FDA Ensures Equivalence of Generic Drugs*, U.S. Food & Drug Admin., <https://www.fda.gov/drugs/emergencypreparedness/bioterrorismanddrugpreparedness/ucm134444.htm> (last updated Aug. 21, 2015) (explaining that brand-name and generic versions of a drug product must be bioequivalent and therapeutically equivalent). Brand and generic products, to be sure, need not be exactly chemically equivalent—there is some tolerability in the difference in the generic’s composition relative to the brand that would still allow bioequivalence. See 21 C.F.R. § 210.3(b)(2), (10); see also Janet Freilich, *The Paradox of Legal Equivalents and Scientific Equivalence: Reconciling Patent Law’s Doctrine of Equivalents with the FDA’s Bioequivalence Requirement*, 66 SMU L. Rev. 59, 78–87 (2013) (describing cases in which differences between brand and generic products, such as variations in inactive ingredients, did not bar a finding of bioequivalence). Besides being a requirement for ANDA approval, bioequivalence is critical because, along with pharmaceutical equivalence (e.g., same dosing), it is an essential prerequisite to therapeutic equivalence—and therefore to generic substitution. See *infra* notes 123–24 and accompanying text.
98. [98]. Compare 21 U.S.C. § 355(a)–(b), with *id.* § 355(j).
99. [99]. *Id.* § 355(j)(5)(F)(ii).
100. [100]. On the significance of these exclusivities, see Rebecca S. Eisenberg, *The Role of the FDA in Innovation Policy*, 13 Mich. Telecomm. & Tech. L. Rev. 345, 355–56 (2007); Yaniv Heled, *Regulatory Competitive Shelters*, 76 Ohio St. L.J. 299, 317–18 (2015). See also Robin Feldman, *Regulatory Property: The New IP*, 40 Colum. J.L. & Arts 53, 55 (2016) (describing the value of regulatory approvals to brand companies); Anna B. Laakmann, *A Property Theory of Medical Innovation*, 56 Jurimetrics J. 117, 119–21 (2016) (explaining how regulatory property, such as data generated in the process of drug approvals, interacts with information dissemination).
101. [101]. When the underlying patents, if any, are challenged by ANDA applicants, that period is shortened to four years. See 21 U.S.C. § 355(j)(5)(F)(ii).

102. [102]. As noted above, *see supra* notes 77–79 and accompanying text, there is a statutory provision that authorizes the PTO to request information with respect to drugs from the FDA, *see* 21 U.S.C. §372(d), but it has not been used very often, *see* Darrow, *supra* note 47, at 402–03. For a proposal to increase interagency cooperation in the healthcare arena beyond the PTO, *see* Rachel E. Sachs, *Administering Health Innovation*, 39 Cardozo L. Rev. 1991 (2018).
103. [103]. *See infra* Part III.
104. [104]. 35 U.S.C. § 156(g)(6)(A), (c)(3) (2018); *see also infra* note 425 and accompanying text (discussing the statutory extension provisions in more detail). The standard patent term is twenty years from the effective date of the filing of a patent application. *Id.* § 154(a)(2). On the issue of variation in patent term based on various statutory and non-statutory provisions, *see* Stephanie Plamondon Bair, *Adjustments, Extensions, Disclaimers, and Continuations: When Do Patent Term Adjustments Make Sense?*, 41 Cap. U. L. Rev. 445, 451–68 (2013).
105. [105]. 21 U.S.C. § 355(b)(1); *see Orange Book, supra* note 87.
106. [106]. On the concept of “linkage” between patents and regulatory drug approvals, *see* generally Ron A. Bouchard et al., *Empirical Analysis of Drug Approval-Drug Patenting Linkage for High Value Pharmaceuticals*, 8 Nw. J. Tech. & Intell. Prop. 174 (2010).
107. [107]. 21 U.S.C. § 355(j)(2)(A)(vii)(I)–(IV).
108. [108]. 35 U.S.C. § 271(e)(2)(A).
109. [109]. 21 U.S.C. § 355(j)(5)(B)(iii). To be entitled to the 30-month stay, the brand must file the infringement lawsuit within 45 days of the generic’s Paragraph IV notice. *Id.* § 355(b)(3)(C). After 30 months, the FDA will approve the generic, though it might still be kept off the market if the patent litigation is ongoing. In addition, generic firms have the option to challenge patentability of the brand’s patents at the PTAB, which generally makes decisions more quickly than the courts. *See generally* Shepherd, *supra* note 52 (arguing that the post-grant review process at the PTAB conflicts with the Hatch-Waxman scheme). At the PTAB, the preponderance of the evidence standard (after a grant of a petition for so-called Inter Partes Review or Post Grant Review) is used to determine whether the challenged claims are unpatentable. 35 U.S.C. §§316(e), 325(e). In contrast, issued patents are accorded the presumption of validity in district court litigation, and invalidity therefore must be proven by clear and convincing evidence. *Id.* § 282(a); *see* Microsoft Corp. v. i4i Ltd. P’ship, 564 U.S. 91, 95 (2011). The PTAB, however, has the discretion to deny institution of review of an issued patent for any reason, and that decision is non-appealable. *See* 35 U.S.C. §314(d); *Oil States Energy Servs., LLC v. Greene’s Energy Grp., LLC*, 138 S. Ct. 1365, 1371 (2018).
110. [110]. The stay is lifted if the litigation concludes before the 30-month period ends. 21 U.S.C. §355(j)(5)(B)(iii)(I)(aa).
111. [111]. Grabowski & Vernon, *supra* note 95.
112. [112]. *See* Song & Han, *supra* note 96.
113. [113]. *See id.*

114. [114]. See Nathan Jessop, *Responding to the Patent Cliff*, PharmTech.com (July 1, 2013), <http://www.pharmtech.com/responding-patent-cliff>. This term can also refer to the phenomenon of a number of blockbuster drug patents expiring at nearly the same time. See Samantha DiGrande, *Second Patent Cliff Lies Ahead for Pharma With \$251 Billion in Sales at Risk by 2024*, Ctr. for Biosimilars (June 7, 2018), <https://www.centerforbiosimilars.com/news/second-patent-cliff-lies-ahead-for-pharma-with-251-billion-in-sales-at-risk-by-2024>.
115. [115]. See *supra* note 12 and accompanying text.
116. [116]. Ernst R. Berndt & Murray L. Aitken, *Brand Loyalty, Generic Entry and Price Competition in Pharmaceuticals in the Quarter Century after the 1984 Waxman-Hatch Legislation*, 18 Int'l J. Econ. Bus. 177, 178 (2011); Henry G. Grabowski & John M. Vernon, *Brand Loyalty, Entry, and Price Competition in Pharmaceuticals After the 1984 Drug Act*, 35 J. L. & Econ. 331, 332–34 (1992).
117. [117]. Given the requirement of therapeutic equivalence for generic substitution, the belief is typically not justified. See *supra* note 97 and accompanying text. See generally Livio Garattini & Katelijne van de Vooren, *Safety and Quality of Generic Drugs: A Never Ending Debate Fostered by Economic Interests?*, 13 Applied Health Econ. Health Pol'y S3 (2015) (explaining that the Hatch-Waxman Act has made it easier for pharmaceutical manufacturers to make generic drugs without reducing quality).
118. [118]. See *infra* note 320 and accompanying text (providing examples of studies of patient and other pressures on prescribers).
119. [119]. See, e.g., Conn. Gen. Stat. § 20-619 (2018) (permitting generic substitution unless the prescriber or purchaser states otherwise).
120. [120]. See, e.g., Fla. Stat. § 465.025 (2018) (mandating generic substitution unless the prescriber states otherwise).
121. [121]. See Jianfei J. Guo & Christina M.L. Kelton, *Competition Between Brand-Name and Generic Drugs*, in *Pharmaceutical Public Policy* 181, 186 (Thomas R. Fulda et al. eds., 2016). See generally Emily Michiko Morris, *The Myth of Generic Pharmaceutical Competition Under the Hatch-Waxman Act*, 22 Fordham Intell. Prop. Media & Ent. L.J. 245 (2012) (arguing that the notion of brand-generic competition under Hatch-Waxman is misconceived).
122. [122]. Although many states had passed generic substitution laws before the FDCA was amended to usher in the current federal brand-generic regime, the role of state law as a complement to modern federal drug regulation has been recognized after the amendments. See generally Alison Masson & Robert L. Steiner, Fed. Trade Comm'n, *Generic Substitution and Prescription Drug Prices: Economic Effects of State Drug Product Selection Laws* (1985), <https://www.ftc.gov/sites/default/files/documents/reports/generic-substitution-prescription-drug-prices-economic-effects-state-drug-product-selection-laws/massonsteiner.pdf> (discussing the role of generic substitution laws in realizing cost savings from generics).
123. [123]. See *supra* note 97 and accompanying text.
124. [124]. See *Orange Book Preface*, U.S. Food & Drug Admin., <https://www.fda.gov/Drugs/DevelopmentApprovalProcess/ucm079068.htm> (last updated May 2, 2018).

125. [125]. *But cf.* Rai & Richman, *supra* note 22 (proposing a way around this rule using so-called “suitability petitions” at the FDA). Even if the two versions are substitutable under state law pursuant to the proposal made by Professors Rai and Richman, however, the problem would remain that prescribers, patients, and payers lack information about the difference between the two drug products. In addition, physicians might balk at a rule that allows (or, in some states, even mandates) their prescriptions to be filled with a drug that, though not proven distinct from the earlier version, has a different dosing profile. Although generic substitutions can always be explicitly overridden by a physician’s orders, there may be unknown and unpredictable dangers from substitutions that would disfavor making them “automatic” unless specifically contraindicated.
126. [126]. New York *ex rel.* Schneiderman v. Actavis PLC, 787 F.3d 638, 656 & n.32 (2d Cir. 2015).
127. [127]. *See supra* notes 123–26 and accompanying text (explaining the prerequisites for generic substitution).
128. [128]. *See* Iain M. Cockburn et al., *Patents and the Global Diffusion of New Drugs*, 106 Am. Econ. Rev. 136, 137–39 (2016); Mark Schankerman, *How Valuable Is Patent Protection? Estimates by Technology Field*, 29 RAND J. Econ. 77, 77–79 (1998); *see also* Dan L. Burk & Mark A. Lemley, *The Patent Crisis and How the Courts Can Solve It* 49–50 (2009).
129. [129]. Grabowski & Vernon, *supra* note 95, at 98–99.
130. [130]. Joseph A. DiMasi et al., *Innovation in the Pharmaceutical Industry: New Estimates of R&D Costs*, 47 J. Health Econ. 20, 21–22 (2016).
131. [131]. *See* Heled, *supra* note 100, at 339.
132. [132]. *See, e.g.*, Eric Budish et al., *Do Firms Underinvest in Long-Term Research? Evidence from Cancer Clinical Trials*, 105 Am. Econ. Rev. 2044, 2045–46 (2015); Grabowski & Vernon, *supra* note 95, at 102; Erika Lietzan, *The Drug Innovation Paradox*, 83 Mo. L. Rev. 39, 40–46 (2018).
133. [133]. *See, e.g.*, Henry Grabowski, *Patents, Innovation and Access to New Pharmaceuticals*, 5 J. Int’l Econ. L. 849, 851–52 (2002); Erika Lietzan, *The Myths of Data Exclusivity*, 20 Lewis & Clark L. Rev. 91, 96–101 (2016); Laura M. McNamee et al., *Timelines of Translational Science: From Technology Initiation to FDA Approval*, 12 PLoS ONE e0177371, May 8, 2017, at 1–3.
134. [134]. *See, e.g.*, Aidan Hollis, *Me-Too Drugs: Is There a Problem?* 1–2 (Dec. 13, 2004) (unpublished manuscript), http://www.who.int/intellectualproperty/topics/ip/Me-tooDrugs_Hollis1.pdf.
135. [135]. *See, e.g.*, C. Scott Hemphill & Bhaven Sampat, *Drug Patents at the Supreme Court*, 339 Sci. 1386, 1386 (2013).
136. [136]. For example, the chemical compound that functions as the active pharmaceutical ingredient is sometimes known, which relegates the brand owner to less powerful patents, such as those directed to methods of use. For a well-known example, *see generally* Burroughs Wellcome Co. v. Barr Labs., Inc., 40 F.3d 1223 (Fed. Cir. 1994) (upholding the validity of method patents directed to treating HIV-AIDS with a drug called AZT). Indeed, Professor Benjamin Roin argued that difficulties in obtaining patent protection for drugs that are similar to those already known have led to diminished incentives in the areas in which innovations useful for human health are likely to be discovered. Benjamin N. Roin, *Unpatentable Drugs and the Standards of Patentability*, 87 Tex. L. Rev. 503, 504–05 (2009).
137. [137]. *See* Hemphill & Sampat, *supra* note 51, at 337.

138. [138]. Shamnad Basheer, *The Invention of an Investment Incentive for Pharmaceutical Innovation*, 15 J. World Intell. Prop. 305, 309 (2012); Lietzan, *supra* note 133, at 110; Song & Han, *supra* note 96, at 694.
139. [139]. Song & Han, *supra* note 96, at 692–93.
140. [140]. See Budish et al., *supra* note 132, at 2060–61.
141. [141]. See Basheer, *supra* note 138, at 315–16; Budish et al., *supra* note 132, at 2045–46; Lietzan, *supra* note 133, at 110–12; Benjamin N. Roin, *The Case for Tailoring Patent Awards Based on Time-to-Market*, 61 UCLA L. Rev. 672, 729–30 (2014); Mark D. Shtilerman, *Pharmaceutical Inventions: A Proposal for Risk-Sensitive Rewards*, 46 IDEA 337, 364–67 (2006); see also Son Le & Neel U. Sukhatme, Risk, Return, and Suboptimal Innovation in Pharmaceuticals 3 (Aug. 10, 2017) (unpublished manuscript), <https://cardozo.yu.edu/sites/default/files/Le%20and%20Sukhatme%20Risk%20Return%20and%20Suboptimal%20Innovation%20in%20Pharmaceuticals%208-10-17.pdf> (“[S]cholars and policymakers believe R&D generates positive externalities and knowledge spillovers for other firms and society at large, there is concern that R&D might not be produced in sufficient quantities.”).
142. [142]. Gregg Bloche et al., *Health Policy’s Gordian Knot: Rethinking Cost Control*, Health Aff.: Health Aff. Blog (Apr. 26, 2017), <https://www.healthaffairs.org/doi/10.1377/hblog20170426.059805/full>.
143. [143]. See, e.g., *Hughes Aircraft Co. v. United States*, 717 F.2d 1351, 1362 (Fed. Cir. 1983) (contrasting patents on “pioneer inventions” with “improvement patents”); see also *In re Braat*, 937 F.2d 589, 593 (Fed. Cir. 1991) (discussing “improvement patents” in the context of the obviousness-type double patenting doctrine). On the concept of pioneer patents generally, see Brian J. Love, *Interring the Pioneer Invention Doctrine*, 90 N.C. L. Rev. 379, 389–94 (2012).
144. [144]. See Hemphill & Sampat, *supra* note 51, at 334, 336–37. But see Christopher M. Holman, *In Defense of Secondary Pharmaceutical Patents: A Response to the UN’s Guidelines for Pharmaceutical Patent Examination*, 50 Ind. L. Rev. 759, 761 (2017) (contending that many secondary patents embody valuable pharmaceutical inventions).
145. [145]. See Himanshu Gupta et al., *Patent Protection Strategies*, 2 J. Pharm. Bioallied Sci. 2, 3–4 (2010); see also John F. Duffy, *A Timing Approach to Patentability*, 12 Lewis & Clark L. Rev. 343, 366 (2008) (contending “that the grant of improvement patents to a pioneer patentee may present issues different from the canonical situation in which many similarly situated inventors are seeking patents conferring immediate market exclusivity”).
146. [146]. See Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 Colum. L. Rev. 839, 868–84 (1990) (questioning whether this established feature of patent law always serves the purposes of innovation policy); see also Thomas, *supra* note 64, at 8 (explaining that “statutory standards [of patentability] are applied neutrally to each kind of invention, whether it may be characterized as an ‘original’ (such as a medication that has never been previously approved by the FDA) or an ‘improvement’ (such as a new formulation of a known medication)”).

147. [147]. 35 U.S.C. § 154(a)(2) (2018). Such patents, to be sure, do not qualify for regulatory delay extensions under 35 U.S.C. § 156. *See also infra* note 435 and accompanying text (using this feature of the statute as an example of statutory “discrimination” between different patent types).
148. [148]. Although certain types of patents that might be described as secondary, such as those covering metabolites, cannot be listed in the *Orange Book*, there is no general prohibition against the listing of secondary patents. *See infra* notes 451–52 and accompanying text.
149. [149]. *See supra* notes 108–09 and accompanying text. However, if the patent issues and is asserted after the ANDA has already been approved, then a 30-month stay may not be granted. *See* 35 U.S.C. §271(e)(2)(A) (covering only ANDAs submitted “for a drug claimed in a patent or the use of which is claimed in a patent”); *cf.* *Endo Pharm. Inc. v. Amneal Pharm., LLC*, 12 Civ. 8115 (TPG), 2016 WL 1732751, at *3–4 (S.D.N.Y. Apr. 29, 2016) (additional docket numbers omitted) (explaining the significance of the effective date of the ANDA relative to the patent issuance date for purposes of relief under 35 U.S.C. §271(e)(4) in Hatch-Waxman cases), *aff’d on other grounds sub nom.* *Endo Pharm. Inc. v. Teva Pharm. USA, Inc.*, 731 F. App’x 962, 967 n.4 (Fed. Cir.) (nonprecedential), *vacated in part on other grounds*, 729 F. App’x 936, 937 (Fed. Cir. 2018) (nonprecedential).
150. [150]. *See generally* Christopher M. Holman et al., *Patentability Standards for Follow-On Pharmaceutical Innovation*, 37 Biotechnology L. Rep. 131 (2018) (arguing that patent law should not treat follow-on pharmaceutical innovations in an unfavorable manner). *But cf.* Dmitry Karshtedt, *The Completeness Requirement in Patent Law*, 56 B.C. L. Rev. 949, 1021–24 (2015) (proposing a limited patent right for certain inventions that may not be patentable at all under current law).
151. [151]. *See* Hemphill & Sampat, *supra* note 135, at 1386. The FDA, too, implicitly recognizes the difference between primary and secondary products via NDA classification codes. *See infra* notes 443–44 and accompanying text.
152. [152]. *See generally* Lisa Larrimore Ouellette, Note, *How Many Patents Does It Take to Make a Drug? Follow-On Pharmaceutical Patents and University Licensing*, 17 Mich. Telecomm. & Tech. L. Rev. 299 (2010) (discussing the role that patents play in the development of pharmaceutical drugs and the trend of an increasing number of patents per drug).
153. [153]. Hovenkamp et al., *supra* note 6, § 15.03; *see* Alan Devlin, *Exclusionary Strategies in the Hatch-Waxman Context*, 2007 Mich. St. L. Rev. 631, 658.
154. [154]. Kessler, *supra* note 68, at 437 (“What seems to be driving many corporate decisions to develop [extended-release forms of drugs], however, is not convenience or compliance but economics.”).
155. [155]. *See infra* notes 173–76, 217–23 and accompanying text (explaining the advantages of Seroquel XR over IR).
156. [156]. U.S. Patent No. 5,948,437 col. 14 ll. 56–60 (filed May 28, 1997).
157. [157]. *See* *AstraZeneca Pharm. LP v. Anchen Pharm., Inc.*, No. 10-cv-1835 (JAP)(TJB), 2012 WL 1065458, at *1 (D.N.J. Mar. 29, 2012) (additional docket numbers omitted), *aff’d per curiam*, 498 F. App’x 999 (Fed. Cir. 2013).
158. [158]. *Id.* at *4–8.
159. [159]. *See id.* at *55.

160. [160]. See, e.g., Dmitry Karshedt, *Limits on Hard-to-Reproduce Inventions: Process Elements and Biotechnology's Compliance with the Enablement Requirement*, 3Hastings Sci. & Tech. L.J. 109, 127–33 (2011) (describing genus-species dynamics in pharmaceutical patent claims).

161. [161]. See Merges & Nelson, *supra* note 146, at 860–68 (discussing the concept of so-called “blocking” patents). See generally Douglas L. Rogers, *Double Patenting: Follow-On Pharmaceutical Patents that Suppress Competition*, 14 Nw. J. Tech. & Intell. Prop. 317 (2017) (questioning the policy of allowing such patents).

162. [162]. To be sure, a generic is sometimes able to “design around” the secondary patent and make a product that is bioequivalent to the brand (and ultimately substitutable), but not infringing. See generally Freilich, *supra* note 97 (discussing the prospects for designing around the brand’s patent claims while still maintaining equivalence); see also Holman et al., *supra* note 150, at 137–38 (explaining that narrow claims may allow for non-infringing alternative formulations). Nonetheless, given the stringent requirements for therapeutic equivalence, such a strategy is often unsuccessful unless the brand’s secondary patent claims are badly drafted—and even then, the patentee might still succeed proving infringement under the doctrine of equivalents. See, e.g., *Intendis GmbH v. Glenmark Pharm. Inc.*, USA, 822 F.3d 1355, 1358–63 (Fed. Cir. 2016). Still another possible way out for a follow-on researcher is the filing of a special NDA under a §505(b)(2) application, which is something of a hybrid between an ANDA and an NDA. Such an application can, for example, allow the applicant to seek approval of a drug with a strength different from that of the original drug with less clinical trial data than a full NDA. See 21 U.S.C.

§ 355(b)(2) (2018). Still, a well-drafted patent claim combined with a product hopping strategy can limit the marketing of drugs approved under § 505(b)(2) in the same way that such a claim can limit the marketing of drugs under ANDAs. See Chelsea E. Ott, Comment, *The Evolution of Pharmaceutical Regulatory Gaming Practices*, 47 Seton Hall L. Rev. 849, 851–54 (2017); see also *supra* note 97 and accompanying text (introducing the concept of bioequivalence as it relates to patent infringement).

163. [163]. 35 U.S.C. § 271(e)(1).

164. [164]. *Merck KGaA v. Integra Lifesciences I, Ltd.*, 545 U.S. 193, 202 (2005); *Classen Immunotherapies, Inc. v. Biogen IDEC*, 659 F.3d 1057, 1072 (Fed. Cir. 2011) (explaining that the “[statutory] purpose of § 271(e)(1) [is] to facilitate market entry upon patent expiration”).

165. [165]. See *Momenta Pharm., Inc. v. Teva Pharm. USA Inc.*, 809 F.3d 610, 621 (Fed. Cir. 2015).

166. [166]. See *Classen Immunotherapies, Inc. v. Elan Pharm., Inc.*, 786 F.3d 892, 898 (Fed. Cir. 2015) (“Filing a patent application is generally not an infringement of a patent. It is not the making, using, offering to sell, selling, or importing of an invention.”).

167. [167]. *But cf.* *Acorda Therapeutics, Inc. v. Roxane Labs., Inc.*, 903 F.3d 1310, 1338 (Fed. Cir. 2018) (“[S]uch a potential innovator might or might not be willing to research in the blocked space without a license to a blocking patent—even if the research itself is within the safe harbor provided by 35 U.S.C. § 271(e)(1)—and wait until it has already developed and patented its aimed-at improvement to negotiate for a cross-license with the blocking patent’s owner to share the profits from the improvement.”); see also *id.* at 1340–41 (explaining that blocking patents can deter competitor research).

168. [168]. See, e.g., Simone Ghislandi, *Product Hopping and Pre-emptive Cannibalization in Pharmaceuticals* 1 (Università Commerciale Luigi Bocconi Econpubblica Centre for Research on the Public Sector, Working Paper No. 169), http://www.econpubblica.unibocconi.it/files/WP_169_2012.pdf (concluding that follow-on product changes take place “mainly between products of the same firm”); cf. *Acorda*, 903 F.3d at 1341 & n.18 (accepting this intuition). Professor Jonathan Darrow has written about a notable exception. Jonathan J. Darrow, *The Patentability of Enantiomers: Implications for the Pharmaceutical Industry*, 2007 Stan. Tech. L. Rev. 2, at *13 (providing the example of Sepracor, a company specializing in the development of so-called “enantiomer” forms of drugs made by others); see also *infra* notes 445–49 and accompanying text (discussing enantiomers).
169. [169]. See W. Nicholson Price II, *Expired Patents, Trade Secrets, and Stymied Competition*, 92 Notre Dame L. Rev. 1611, 1620–32 (2017) (noting this dynamic and explaining why it can be particularly salient in the pharmaceutical industry); see also W. Nicholson Price II, *Regulating Secrecy*, 91 Wash. L. Rev. 1769, 1799–802 (2016) (arguing that secrecy in the brand’s manufacturing methods may unduly slow down generic entry); cf. W. Nicholson Price II & Arti K. Rai, *Manufacturing Barriers to Biologics Competition and Innovation*, 101 Iowa L. Rev. 1023 (2016) (discussing similar issues with the manufacturing of so-called “biologic” drugs).
170. [170]. See *infra* Section V.B (explaining the impact of this feature of the market on advertising).
171. [171]. For another recent counterexample of sorts, see *Otsuka Pharm. Co., Ltd. v. Price*, 869 F.3d 987, 994–95 (D.C. Cir. 2017) (addressing a scenario in which another firm developed an alternative version of a drug in spite of a regulatory-exclusivity protection in place for the brand).
172. [172]. As to the question of the standard for determining when a firm is sufficiently related to the sponsor of the prior product for the “same firm” regime to apply, the FDA has faced a similar issue in the interpretation of the “same sponsor” provision in the Biologics Price Competition and Innovation Act. See 42 U.S.C. § 262(k) (2018); see also Comment Letter from Jeffrey S. Peters, Deputy Gen. Counsel, Health Biotech. Indus. Org., to Div. of Dockets Mgmt. (HFA-305), Food & Drug Admin. 13 (Oct. 6, 2014), <https://www.bio.org/sites/default/files/BIO%20Comment%20Letter%20Biological%20Product%20Reference%20Product%20Exclusivity%2010%2006%202014.pdf> (analyzing FDA proposals for changes in licensure exclusivity determinations); *infra* notes 488–89 and accompanying text. This issue should be resolvable under general corporate law principles. For example, one of the firms involved in the marketing of the new form of Namenda, Actavis, now owns the firm that marketed the prior version, Forest, as a wholly owned subsidiary. *New York ex rel. Schneiderman v. Actavis PLC*, 787 F.3d 638, 642 (2d Cir. 2015). Such a relationship should be sufficiently close for the owner of the drug’s new version to qualify as the “same sponsor.”
173. [173]. See Michael E. Thase, *Quetiapine Monotherapy for Bipolar Depression*, 4 *Neuropsychiatric Disease & Treatment* 21, 22–23 (2008).
174. [174]. See generally Approval Letter from Thomas Laughren, Dir., Div. of Psychiatry Prods., Food & Drug Admin., to Gerald Limp, Dir., Regulatory Affairs, AstraZeneca Pharm. LP (May 17, 2007), https://www.accessdata.fda.gov/drugsatfda_docs/nda/2007/022047Orig1s000Approv.pdf (granting FDA approval for AstraZeneca’s drug Seroquel XR). See U.S. Patent No. 5,948,437 col. 14 l. 56 (filed May 28, 1997).

175. [175]. See *AstraZeneca Pharm. LP v. Anchen Pharm., Inc.*, Nos. 10-cv-1835 (JAP)(TJB), 2012 WL 1065458, at *4, *55 (D.N.J. Mar. 29, 2012) (additional docket numbers omitted), *aff'd per curiam*, 498 F. App'x 999 (Fed. Cir. 2013).
176. [176]. See generally *id.* (noting physician testimony that XR improved patients' course of treatment in comparison to IR). For a comparative study in the academic literature, see generally Lars Eriksson et al., *Use of Quetiapine XR and Quetiapine IR in Clinical Practice for Hospitalized Patients with Schizophrenia: A Retrospective Study*, 2 *Therapeutic Advances in Psychopharmacology* 217 (2012).
177. [177]. Chris P. Miller & Mark J. Evans, *The Chemist's Companion Guide to Patent Law* 21 (2010).
178. [178]. 35 U.S.C. § 112(b) (2018).
179. [179]. Miller & Evans, *supra* note 177, at 37–46.
180. [180]. See *id.*
181. [181]. See *id.*
182. [182]. See *supra* notes 108–14 and accompanying text.
183. [183]. 35 U.S.C. § 102.
184. [184]. *Id.* § 103.
185. [185]. *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 150 (1989). The policy of the non-obviousness requirement has sometimes been cast in terms of economic inducement embodied in the grant of a patent. See Abramowicz & Duffy, *supra* note 42; Edmund W. Kitch, *Graham v. John Deere Co.: New Standards for Patents*, 1966Sup. Ct. Rev. 293, 301 (“[A] patent should not be granted for an innovation unless the innovation would have been unlikely to have been developed absent the prospect of a patent.”). Nonetheless, some authorities have maintained that the inducement standard “in most individual cases would not be administrable.” Fed. Trade Comm’n, *To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy* 11 (2003).
186. [186]. 35 U.S.C. § 103.
187. [187]. *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 17 (1966).
188. [188]. See *id.* at 14.
189. [189]. See *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1359–61 (Fed. Cir. 2017); see also *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (“Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.”).
190. [190]. See *In re Stepan Co.*, 868 F.3d 1342, 1345–46 (Fed. Cir. 2017) (quoting *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016)).

191. [191]. *Graham*, 383 U.S. at 17. *See generally* Jonathan J. Darrow, *Secondary Considerations: A Structured Framework for Patent Analysis*, 74 Alb. L. Rev. 47 (2010–11) (arguing that the secondary considerations doctrine is underdeveloped and providing a more robust framework for deploying this *Graham* factor).
192. [192]. *See* Natalie A. Thomas, Note, *Secondary Considerations in Nonobviousness Analysis: The Use of Objective Indicia Following KSR v. Teleflex*, 86 N.Y.U. L. Rev. 2070, 2076–77 n.31 (2011).
193. [193]. *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1076 n.3 (Fed. Cir. 2012) (quoting *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1311 (Fed. Cir. 2006)); *see* *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538–40 (Fed. Cir. 1983).
194. [194]. *See* Reilly, *supra* note 48, at 577.
195. [195]. *AstraZeneca Pharm. LP v. Anchen Pharm., Inc.*, Nos. 10-cv-1835 (JAP)(TJB), 2012 WL 1065458, at *48–55 (D.N.J. Mar. 29, 2012) (additional docket numbers omitted), *aff'd per curiam*, 498 F. App'x 999 (Fed. Cir. 2013).
196. [196]. The one secondary consideration that can help the defendant is near-simultaneous invention of the claim's subject matter by multiple inventors. *See, e.g., Geo M. Martin Co. v. Alliance Mach. Sys. Int'l LLC*, 618 F.3d 1294, 1305 (Fed. Cir. 2010).
197. [197]. *See* *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1220–22 (Fed. Cir. 2016).
198. [198]. *See, e.g., In re Mageli*, 470 F.2d 1380, 1384 (C.C.P.A. 1973); *see also* *Geo M. Martin*, 618 F.3d at 1305 (“Industry praise must also be linked to the patented invention.” (citing *Power-One, Inc. v. Artesyn Techs., Inc.*, 599 F.3d 1343, 1352 (Fed. Cir. 2010))); *Ormco Corp.*, 463 F.3d at 1311–13 (“[I]f the feature that creates the commercial success was known in the prior art, the success is not pertinent.”); Robert P. Merges, *Commercial Success and Patent Standards: Economic Perspectives on Innovation*, 76 Calif. L. Rev. 803, 860–61 (1988).
199. [199]. *See generally* Price, *supra* note 41 (explaining that the law generally does not require a better product for patentability); *see also* Carrier & Shadowen, *supra* note 6, at 181 (“The granting of a patent by the U.S. Patent and Trademark Office ... certainly does not guarantee, or even suggest, that the reformulated product is superior in any way to existing products.”).
200. [200]. *See* *Lowell v. Lewis*, 15 F. Cas. 1018, 1019 (C.C.D. Mass. 1817) (No. 8568) (Story, Circuit Justice); *see also* Merges & Duffy, *supra* note 41, at 201 (outlining the limited role of the utility requirement). For a proposal for a re-invigorated “commercial utility” requirement, *see* Michael Risch, *Reinventing Usefulness*, 2010 BYU L. Rev. 1195, 1240–41. *But cf.* Sean B. Seymore, *Making Patents Useful*, 98 Minn. L. Rev. 1046, 1048–50 (2014) (contending that the utility requirement, as currently enforced, has been applied in a highly subjective manner and should be eliminated).
201. [201]. *See, e.g., Cubist Pharm., Inc. v. Hospira, Inc.*, 805 F.3d 1112, 1126 (Fed. Cir. 2015) (“The court weighed the secondary consideration evidence against the other evidence of obviousness and concluded that the secondary consideration evidence was not sufficiently strong to overcome the showing of obviousness arising from an analysis of the prior art.”); *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1372 (Fed. Cir. 2007) (“Although secondary considerations must be taken into account, they do not necessarily control the

obviousness conclusion.”); *see also* *Am. Innotek, Inc. v. United States*, 706 F. App’x 686, 686–87 (Fed. Cir. 2017) (nonprecedential) (citing *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1048 (Fed. Cir. 2016)(en banc)) (holding that secondary considerations must be considered in every case where relevant but can be overcome by other *Graham* factors).

202. [202]. *See, e.g.*, *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1357 (Fed. Cir. 2013) (“Because evidence pertaining to objective considerations raises genuine issues of material fact, the district court’s decision [to grant summary judgment that the asserted claims would have been obvious] is reversed as to all the asserted claims in this case.”).
203. [203]. *See Apple*, 839 F.3d at 1048–49, 1052–57; *see also* *Sanofi-Aventis Deutschland GmbH v. Glenmark Pharm. Inc.*, 748 F.3d 1354, 1361 (Fed. Cir. 2014) (“The jury could reasonably have relied on the testimony of the Plaintiffs’ expert, that persons skilled in the art in 1986 would not have predicted the longer-lasting hypertension control demonstrated by the double-ring structures of quinapril and trandolapril in combination with calcium antagonists, because of the widespread belief that double-ring inhibitors would not fit the pocket structure of the [biological target].”).
204. [204]. *See, e.g.*, *Prometheus Labs., Inc. v. Roxane Labs., Inc.*, 805 F.3d 1092, 1098 (Fed. Cir. 2015) (“The genus-species distinction may have particular relevance in the field of personalized medicine, where, for example, a particular treatment may be effective with respect to one subset of patients and ineffective (and even harmful) to another subset of patients. Singling out a particular subset of patients for treatment (for example, patients with a particular gene) may reflect a new and useful invention that is patent eligible despite the existence of prior art or a prior art patent disclosing the treatment method to patients generally. An obviousness rejection likely would not be appropriate where the new patient subset displayed unexpected results.” (citation omitted)); *see also* *Sanofi v. Watson Labs., Inc.*, 875 F.3d 636, 647–50 (Fed. Cir. 2017) (upholding non-obviousness of patent claims based on the lack of a reasonable expectation of success of the drug in the claimed populations).
205. [205]. *See Sanofi-Aventis*, 748 F.3d at 1360–61 (appearing to treat unexpected results as part of the motivation inquiry); *see also* *Hoffman-La Roche Inc. v. Apotex Inc.*, 748 F.3d 1326, 1334 (Fed. Cir. 2014) (discussing unexpected results without mentioning “secondary considerations” or “objective indicia”); *Aventis Pharma Deutschland GmbH v. Lupin, Ltd.*, 499 F.3d 1293, 1301–03 (Fed. Cir. 2007) (similar); *cf. In re Papesch*, 315 F.2d 381, 391 (C.C.P.A. 1963) (“[A] compound and all of its properties are inseparable ...”). *But see* *Bristol-Myers Squibb Co. v. Teva Pharm. USA, Inc.*, 752 F.3d 967, 976–77 (Fed. Cir.) (calling unexpected results “a secondary consideration”), *reh’g en banc denied*, 769 F.3d 1339 (Fed. Cir. 2014) (mem.); *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1351–53 (Fed. Cir. 2012) (similar); *Pfizer*, 480 F.3d at 1372 (similar); *see also* *Millennium Pharm., Inc. v. Sandoz Inc.*, 862 F.3d 1356, 1367–68 (Fed. Cir. 2017) (referring to “evidence of objective indicia” of unexpected results). The literature has noted this tension. Compare Frederick G. Vogt, Comment, *Unexpected Results: The Current Status of Obviousness Determinations for Pharmaceutical and Biotechnology Patents*, 29 Temp. J. Sci. Tech. & Envtl. L. 305, 318 (2010) (“Judge Rader noted that unexpected results serve as ‘independent evidence of nonobviousness[.]’ going beyond just a secondary or confirmatory consideration.” (quoting *Ortho-McNeil Pharm., Inc. v. Mylan Labs., Inc.*, 520 F.3d 1358, 1365 (Fed. Cir. 2008))), *with id.* at 308 (noting that unexpected results have been classified as “secondary factors”), and Thomas, *supra* note 192, at 2095–96 (noting that “[t]he classification of unexpected-results evidence as a secondary consideration existed prior to *KSR* and has continued since then” and explaining that this approach has been criticized). It is notable that a Federal Circuit judge sitting by designation as a trial judge in a high-profile case focused on §103 issues declined to address whether unexpected results are generally a part of the inquiry under the first three *Graham* factors or the fourth, suggesting that the issue is unsettled. *See Allergan, Inc. v. Teva Pharm. USA, Inc.*, No. 2:15-cv-1455-

WCB, 2017 WL 4803941, at *47 n.37 (E.D. Tex. Oct. 16, 2017) (Bryson, J.) (“Allergan characterizes ‘unexpected results’ as a secondary consideration. In the Court’s view, however, in a case such as this one that factor is more appropriately viewed not as a secondary consideration, but as part of the initial stage of the obviousness analysis. For that reason, the Court has analyzed the unexpected results argument in part I.A., rather than as one of the objective considerations discussed in part I.B. . . . [R]egardless of how the unexpected results issue is characterized, the Court has considered the evidence on that issue, as well as the evidence of the (other) objective indicia of nonobviousness, together with all of the other evidence pertaining to the obviousness inquiry, as the Federal Circuit has instructed.” (citation omitted)), *aff’d per curiam*, 742 F. App’x 511 (Fed. Cir. 2018); *see also Bristol-Myers Squibb*, 769 F.3d at 1352–59 (Taranto, J., dissenting from denial of rehearing en banc) (pointing out tensions in the Federal Circuit’s approaches to the doctrine of unexpected results and other aspects of the non-obviousness inquiry and calling for en banc action to resolve them).

206. [206]. *In re Soni*, 54 F.3d 746, 750 (Fed. Cir. 1995). *But cf.* *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 960 n.12 (Fed. Cir. 1986) (“Finding that an invention is an ‘improvement’ is not a prerequisite to patentability. It is possible for an invention to be less effective than existing devices but nevertheless meet the statutory criteria for patentability.”).

207. [207]. *But cf.* Laura G. Pedraza-Fariña, *Patent Law and the Sociology of Innovation*, 2013 Wis. L. Rev. 813, 851–54, 870–72 (questioning the evidentiary value of unexpected results discovered after filing with respect to the question of motivation in the non-obviousness inquiry); *id.* at 854 (“[T]he fact that one of these enantiomers was unexpectedly found to have none of the toxic effects with all the therapeutic effects—while unexpected—would likely have been noticed by any independent scientist pursuing this research program. In addition, the low likelihood of finding one enantiomer with all the therapeutic benefits and none of the toxic effects did not ex ante discourage the line of research that would attempt separation of the enantiomers. In other words, the label ‘unexpected results’ in this case does not serve as a proxy for identifying a risky line of research that requires patent inducement.”). *See generally* Mark A. Lemley, *Expecting the Unexpected*, 92 Notre Dame L. Rev. 1369 (2017) (maintaining that, when unexpected results discovered after filing conflict with the conclusion that the claimed invention would have been obvious to try, the former should give way, and the claims should be held obvious); Douglas L. Rogers, *Obvious Confusion Over Properties Discovered After a Patent Application*, 43 AIPLA Q.J. 489 (2015) (exploring this problem in depth). The Federal Circuit currently accepts ex-post unexpected results to show non-obviousness. *See, e.g., Sanofi-Aventis*, 748 F.3d at 1360–61; *see also Bristol-Myers Squibb*, 769 F.3d at 1340–41 (Dyk, J., concurring in denial of rehearing en banc) (arguing for a contrary rule). One treatise has usefully explained the dual evidentiary function of unexpected results. Donald S. Chisum et al., *Understanding Intellectual Property Law* 77 (3d ed. 2015) (“The relevance of evidence of comparative utility is in part direct and in part inferential. It is direct that the new function is part of the inventive concept, the ‘subject matter as a whole,’ which must be obvious under Section 103. It is inferential in the sense that the prior art’s failure to reveal the claimed invention despite its advantageous qualities tends to confirm that it was unexpected and unobvious. It would be contrary to normal economic incentives for obvious, advantageous subject matter to remain dormant.”).

208. [208]. *See, e.g., Allergan, Inc. v. Sandoz, Inc.*, 796 F.3d 1293, 1306–07 (Fed. Cir. 2015).

209. [209]. Harris A. Pitlick, *Some Thoughts About Unexpected Results Jurisprudence*, 86 J. Pat. & Trademark Off. Soc’y 169, 169 (2004). Thus, while the Patent Act does not require superiority of the claimed invention to prior products for patentability, *Ryco, Inc., v. Ag-Bag Corp.*, 857 F.2d 1418, 1424 (Fed. Cir. 1988), in practice the evidence of an unexpectedly improved product can be critical in overcoming the § 103 hurdle. This evidence is likely to be especially salient in secondary-patent

cases, when there may be a strong case for motivation to make the claimed formulation that could be potentially overcome with unexpected results. *See, e.g., Prometheus Labs.*, 805 F.3d at 1098 (explaining that unexpected results in new patient populations can bolster the case for non-obviousness); *Senju Pharm. Co., v. Lupin Ltd.*, 780 F.3d 1337, 1351–53 (Fed. Cir. 2015) (analyzing an argument that a new formulation provides an unexpected result); *Hoffman-La Roche*, 748 F.3d at 1334 (analyzing an argument that a new dosage provides an unexpected result); *see also* Vogt, *supra* note 205, at 314–22 (providing several other examples).

210. [210]. Decisions of the Court of Customs and Patent Appeals are binding precedent on the Federal Circuit. *See South Corp. v. United States*, 690 F.2d 1368, 1369 (Fed. Cir. 1982) (en banc).

211. [211]. *In re Carabateas*, 345 F.2d 1013, 1017 (C.C.P.A. 1965). Interestingly, the court also noted:

212. [212]. *In re Merchant*, 575 F.2d 865, 868–69 (C.C.P.A. 1978).

213. [213]. *See generally* Rogers, *supra* note 161 (questioning the legal bases for granting certain kinds of secondary patents).

214. [214]. *Cf. Daralyn J. Durie & Mark A. Lemley, A Realistic Approach to the Obviousness of Inventions*, 50 Wm. & Mary L. Rev. 989, 1010 (2008) (“Under the time and evidentiary constraints the PTO faces, examiners may have no choice but to accept ... affidavits uncritically. This is unfortunate. Because these affidavits will not be subject to cross-examination or to rebuttal by an expert proffered by an opponent, they will frequently prove to be unreliable evidence, and if they are un rebuttable they will make it fairly easy for applicants to establish nonobviousness.” (footnotes omitted)).

215. [215]. *See* Vandana Prajapati & Harish Dureja, *Product Lifecycle Management in Pharmaceuticals*, 12 J. Med. Marketing 150, 150 (2012) (“Franchise can be sustained if brand equity (and prescriptions) can be transferred to a follow-on or derivative product, even a reformulation or new delivery system. This is generally done through secondary patents or second generation patent.”). *See generally* Michael Enzo Furrow, *Pharmaceutical Patent Life-Cycle Management After KSR v. Teleflex*, 63 Food & Drug L.J. 275 (2008) (discussing approaches to overcoming § 103-based patentability challenges to pharmaceutical product modification claims); Song & Han, *supra* note 96 (describing various techniques pharmaceutical companies employ to maximize period of market exclusivity); Valoir, *supra* note 44 (setting forth strategies for owners of primary patents to build a case for unexpected results made possible by inventions covered by secondary patents).

216. [216]. *Cf. Amy Motomura, The Overlooked Significance of Own Prior Art* (2018) (unpublished manuscript) (on file with author) (explaining that anticipation of the need to overcome one’s own prior art can induce strategic behaviors by inventors); *see also* Roger Allan Ford, *Patent Invalidity Versus Noninfringement*, 99 Cornell L. Rev. 71, 104–09 (2013) (discussing patentees’ informational advantages over defendants with respect to prior art).

217. [217]. *AstraZeneca Pharm. LP v. Anchen Pharm., Inc.*, Nos. 10-cv-1835 (JAP)(TJB), 2012 WL 1065458, at *24–26 (D.N.J. Mar. 29, 2012) (additional docket numbers omitted), *aff’d per curiam*, 498 F. App’x 999 (Fed. Cir. 2013).

218. [218]. *Id.* at *26–32.

219. [219]. *Id.* at *49.

220. [220]. *Id.* at *50.

221. [221]. 21 C.F.R. § 312.85 (2018) (setting forth the FDA’s authority to require so-called Phase IV, or post-marketing, studies as a condition of approval in certain circumstances); *see also*
- 21 U.S.C. §355(o)(3)(B) (2012) (giving the FDA the authority to require post-marketing studies in cases of “serious risk” presented by an approved drug). *But cf.* Jacobson, *supra* note 57, at 4 (“Although conducted after FDA approval, post-marketing (also known as phase IV) studies are not necessarily effectiveness studies, and only rarely could be classified as comparative effectiveness studies.” (footnotes omitted)). *See generally* Charles Steenburg, *The Food and Drug Administration’s Use of Postmarketing (Phase IV) Study Requirements: Exception to the Rule?*, 61 Food & Drug L.J. 295 (2006) (explaining the history and shortcomings of Phase IV study requirements).
222. [222]. *AstraZeneca*, 2012 WL 1065458, at *50.
223. [223]. *Id.*
224. [224]. *Id.* at *1.
225. [225]. *See* New York v. Actavis, PLC, No. 14 Civ. 7473, 2014 WL 7015198, at *4, *12 (S.D.N.Y. Dec. 11, 2014), *aff’d*, 787 F.3d 638 (2d Cir. 2015).
226. [226]. *Id.* at *10.
227. [227]. *See supra* notes 123–26 and accompanying text.
228. [228]. Approval Letter from William P. Rickman for Carol A. Holquist, Acting Deputy Dir., Office of Regulatory Operations, Office of Generic Drugs, Ctr. for Drug Evaluation & Research, to Alpesh Patel, Vice President, Global Regulatory Affairs, Amneal Pharm. (Apr. 10, 2015), https://www.accessdata.fda.gov/drugsatfda_docs/appletter/2015/090041Orig1s000Ltr.pdf.
229. [229]. *See* U.S. Patent No. 5,061,703 col. 13 l. 52 – col. 14 l. 24 (filed Apr. 11, 1990). This example has the feature that both the pioneering and secondary patents are method patents rather than composition of matter patents, but that does not materially affect the analysis here.
230. [230]. *See id.*
231. [231]. *See, e.g.*, Stipulation and Order at 4–5, *Forest Labs., Inc. v. Cobalt Labs., Inc.*, No. 08-021 (LPS) (D. Del. Sept. 27, 2010), ECF No. 502; Stipulation and Order at 5–6, *Forest Labs., Inc. v. Lupin Pharm., Inc.*, No. 08-021 (GMS) (LPS) (D. Del. Sept. 1, 2010), ECF No. 500.
232. [232]. *See* Ben James, *Forest, Merz Wrap Up Namenda Patent Litigation*, Law360 (July 22, 2010, 6:20 PM), <https://www.law360.com/articles/182680/forest-merz-wrap-up-namenda-patent-litigation>; *see also* Gregory Dolin, Response, *Do Patent Challenges Reduce Consumer Welfare?*, 83 U. Chi. L. Rev. Online 256, 267–68 (2017) (analyzing such settlements).
233. [233]. U.S. Patent No. 8,039,009 B2 col. 22 ll. 9–21 (filed June 16, 2005). A different set of patents protecting Namenda XR has been invalidated for violating the definiteness requirement of patentability, 35 U.S.C. § 112(b) (2018). *See* *Forest Labs., Inc. v. Teva Pharm. USA, Inc.*, C.A. No. 14-121-LPS, 2016 WL 54910, at *8–9 (D. Del. Jan. 5, 2016) (additional docket numbers omitted), *aff’d*,

716 F. App'x 987 (Fed. Cir. 2017) (nonprecedential). Forest had licensed this second group of patents from another company, Adamas Pharmaceuticals. Kelly Knaub, *Fed. Cir. Upholds Ruling Axing Forest's Namenda Patents*, Law360 (Dec. 11, 2017, 9:35 PM), <https://www.law360.com/articles/993384/fed-circ-upholds-ruling-axing-forest-s-namenda-patents>.

234. [234]. See generally Cramer & Saks, *supra* note 67 (noting that controlled release dosage forms can improve the value of a drug); Nokhodchi et al., *supra* note 8 (discussing improvements of drug safety and efficacy through new formulations as a focus of pharmaceutical research).
235. [235]. U.S. Patent No. 5,061,703, at [73] (filed Apr. 11, 1990).
236. [236]. Non-Final Rejection at 3, U.S. Pat. App. Serial No. 11/155,330 (filed Nov. 1, 2010).
237. [237]. Susanne Hartmann & Hans Jörg Möbius, *Tolerability of Memantine in Combination with Cholinesterase Inhibitors in Dementia Therapy*, 18 Int'l Clinical Psychopharmacology 81, 85 (2003).
238. [238]. See Ctr. for Drug Evaluation & Research, Food & Drug Admin., Application number: 22-525, Clinical Pharmacology and Biopharmaceutics Review(s) 4–5 (2010), https://www.accessdata.fda.gov/drugsatfda_docs/nda/2010/022525Orig1s000ClinPharmR.pdf [hereinafter Clinical Pharmacology and Biopharmaceutics Review(s)].
239. [239]. Non-Final Rejection at 3, U.S. Pat. App. Serial No. 11/155,330 (filed Nov. 1, 2010).
240. [240]. Response to Office Action at 8, U.S. Pat. App. Serial No. 11/155,330 (filed Dec. 16, 2010).
241. [241]. Final Rejection at 2–3, U.S. Pat. App. Serial No. 11/155,330 (filed Mar. 10, 2011).
242. [242]. Response to Final Office Action at 2, U.S. Pat. App. Serial No. 11/155,330 (filed Mar. 15, 2011) (emphasis added).
243. [243]. *Id.* at 7 (first emphasis added).
244. [244]. *Id.*
245. [245]. Notice of Allowance and Fees Due, U.S. Pat. App. Serial No. 11/155,330 (filed July 19, 2011).
246. [246]. See Approval Labeling Text: NDA 21-487, at 4 (2003), https://www.accessdata.fda.gov/drugsatfda_docs/label/2003/021487lbl.pdf; Approval Letter from Robert Temple, Dir., Ctr. for Drug Evaluation & Research, to Doreen V. Morgan, Doctor of Pharm. Forest Labs., Inc. (Oct. 16, 2003), https://www.accessdata.fda.gov/drugsatfda_docs/nda/2003/21-487_Namenda_Approv.pdf.
247. [247]. See Clinical Pharmacology and Biopharmaceutics Review(s), *supra* note 238, at 3. The “once daily” limitation does not give generics a meaningful “design-around” opening because they cannot deviate from the dosing approved for the brand under the statutory and regulatory requirements for ANDA approvals. For example, the generics could not lawfully market XR memantine accompanied by instructions telling patients to take two 28-mg tablets at once every two days, as opposed to a single 28-mg tablet every day. See 21 C.F.R. §314.127(a)(4)(i) (2018).

248. [248]. New York *ex rel.* Schneiderman v. Actavis PLC, 787 F.3d 638, 648 (2d Cir. 2015).
249. [249]. *See, e.g.*, Stipulation and Order at 4, Forest Labs., LLC v. Amneal Pharm. LLC, C.A. No. 15-756 (LPS) (D. Del. Aug. 31, 2016), ECF No. 102. Under the settlement, if the FDA approves Amneal's ANDA, Amneal may launch its generic product on January 1, 2025. *See id.*; *see also* Carly Helfand, *Allergan Sews Up a Namenda XR Cushion with Amneal Patent Settlement*, FiercePharma (Sept. 10, 2015, 8:58 AM), <https://www.fiercepharma.com/sales-and-marketing/allergan-sews-up-a-namenda-xr-cushion-amneal-patent-settlement> (describing a settlement with another defendant in this case). Such settlements have sometimes been challenged on antitrust grounds. *See* FTC v. Actavis, Inc., 570 U.S. 136, 140–41 (2013).
250. [250]. *See, e.g.*, Stipulation to Order of Dismissal Without Prejudice Pursuant to Fed. R. Civ. P. 41(A)(2) at 3, Allergan Sales, LLC v. Macleods Pharm., Ltd, C.A. No. 17-672 (LPS) (D. Del. Apr. 3, 2018), ECF No. 38.
251. [251]. “Obviously” might have been a better adverb choice, but that word was not used for understandable reasons.
252. [252]. *See, e.g.*, Cadence Pharm. Inc. v. Exela PharmSci Inc., 780 F.3d 1364, 1374–76 (Fed. Cir. 2015) (upholding validity under § 103 based in part on an indirect comparison of results reported in the prior art patent with the testimony regarding results achieved by the subject matter of the patent-in-suit); *see also* Millennium Pharm., Inc. v. Sandoz Inc., 862 F.3d 1356, 1368 (Fed. Cir. 2017) (“Unexpected results are shown in comparison to what was known, not what was unknown... [Plaintiff] was not required to create the glycerol ester, when the product had not been created in the prior art.” (citations omitted)); *In re* Baxter Travenol Labs., 952 F.2d 388, 391–92 (Fed. Cir. 1991) (concluding that the applicant “has not effectively argued that these particular [desired] claims differ from what is disclosed in” the prior art reference and thus failed to establish unexpected results).
253. [253]. *Cf. In re* Hoch, 428 F.2d 1341, 1343–44 (C.C.P.A. 1970) (focusing on real-world utilities of claimed compounds as compared to those in the prior art).
254. [254]. *See supra* notes 237–39 and accompanying text.
255. [255]. *See* Hartmann & Möbius, *supra* note 237.
256. [256]. This, to be sure, is a strange result when the prior art reference discloses a product that has been approved for use under a particular indication.
257. [257]. Janssen Pharm., Inc., v. Watson Labs., Inc., No. 08-5103 (SRC), 2012 WL 3990221, at *18–19 (D.N.J. Sept. 11, 2012), *appeal dismissed*, No. 12-1693 (Fed. Cir. Mar. 28, 2013). *But see* Allergan, Inc. v. Teva Pharm. USA, Inc., No. 2:15-cv-1455-WCB, 2017 WL 4803941, at *27–39 (E.D. Tex. Oct. 16, 2017) (Bryson, J.) (adopting a contrary approach), *aff'd per curiam*, 742 F. App'x 511 (Fed. Cir. 2018); *see also* Duramed Pharm., Inc. v. Watson Labs., Inc., No. 3:08-cv-0116 (LRH-RAM), 2011 WL 2446578, at *6 (D. Nev. June 16, 2011) (“[T]here is insufficient evidence before the court that [the claimed drug] was better than other drugs on the market, including its own product ... , at preventing breakthrough bleeding. This is evidenced by the fact that the FDA did not allow Duramed to market this proclaimed benefit.”), *aff'd per curiam*, 438 F. App'x 898 (Fed. Cir. 2011).
258. [258]. *Janssen Pharm.*, 2012 WL 3990221, at *20 (citation omitted).

259. [259]. *Id.*; see *supra* note 109 and accompanying text (explaining that issued claims must be proved invalid by clear and convincing evidence in district court).
260. [260]. Consistent with general usage in this field, the terms “pre-approval” and “pre-market” (or “pre-marketing”) are used interchangeably in this Article. In theory, however, a sponsor could develop data after approval, but before marketing. The goal of this Article’s proposal is to have the FDA examine comparative data, so “pre-approval” is the technically correct term.
261. [261]. *AstraZeneca Pharm. LP v. Anchen Pharm., Inc.*, Nos. 10-cv-1835 (JAP)(TJB), 2012 WL 1065458, at *38–44 (D.N.J. Mar. 29, 2012) (additional docket numbers omitted), *aff’d per curiam*, 498 F. App’x 999 (Fed. Cir. 2013).
262. [262]. See, e.g., *In re Efthymiopoulos*, 839 F.3d 1375, 1378–79 (Fed. Cir. 2016) (focusing on the lack of real-world significance of the proffered unexpected results data in concluding that this evidence should be discounted); *Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 739 (Fed. Cir. 2013) (focusing on differences in tolerability of claimed and prior art drug products as marketed); *In re De Blauwe*, 736 F.2d 699, 705 (Fed. Cir. 1984) (requiring an applicant wishing to establish unexpected results to generate experimental data relating to products disclosed by the prior art when used for their intended purpose); cf. *Allergan*, 2017 WL 4803941, at *28 (“[A] clinician might be concerned about bare results, even when they have not been subjected to statistical analysis, and may take action based on those bare results in the absence of the availability of more concrete confirmation that those results are meaningful. But subjective impressions created by bare results are not the appropriate measure by which to compare the efficacy of two different doses of an active ingredient in a testing environment.”).
263. [263]. *In re Payne*, 606 F.2d 303, 315–16 (C.C.P.A. 1979) (citations omitted). The phrase “prima facie” refers here to the framework of the non-obviousness inquiry during patent prosecution. The applicant can rebut the PTO’s prima facie showing of “structural obviousness” of the claimed compound with evidence of unexpected results. See *id.* at 314–16.
264. [264]. *Id.* at 316; cf. *McNeil-PPC, Inc. v. L. Perrigo Co.*, 337 F.3d 1362, 1370 (Fed. Cir. 2003) (“[T]he [district] court found that the results of clinical studies adduced by McNeil were inconsistent, not shown to be reproducible, and did not include comparative data vis-à-vis placebos or other antidiarrheal/antiflatulent combinations necessary to demonstrate unexpected or synergistic effects.”); *In re Merck & Co.*, 800 F.2d 1091, 1099 (Fed. Cir. 1986) (“In the absence of evidence to show that the properties of the compounds differed in such an appreciable degree that the difference was really unexpected, we do not think that the Board erred in its determination that appellant’s evidence was insufficient to rebut the prima facie case. The fact that amitriptyline and imipramine, respectively, helped some patients and not others does not appear significant.”).
265. [265]. Permissive, that is, with respect to the types of comparisons that the applicant can make to support an argument for non-obviousness.
266. [266]. See *infra* note 326 and accompanying text (discussing unjustified perceptions of superiority of drugs based on the existence of underlying patents).
267. [267]. See *supra* notes 76–79 and accompanying text; see also Darrow, *supra* note 47, at 401–03 (noting the fact that this subsection is never utilized). I thank Professor Jonathan Darrow for helpful discussions of this provision.

268. [268]. See Darrow, *supra* note 47, at 403 (“[E]ven if the USPTO was to consistently supplement its own expertise by exercising its right under § 372(d), the evidence needed to ascertain a drug’s true efficacy in humans is not usually available at the time of patenting, which occurs relatively early in the research and development process. The assistance that the FDA would be able to provide would therefore be limited.”); Eisenberg, *supra* note 48, at 395–96.
269. [269]. Cf. *supra* note 109 and accompanying text (discussing the option to challenge brand patents in the PTAB).
270. [270]. Interestingly, India appears to have adopted the approach that makes comparative efficacy a requirement of *patentability*, with its courts holding that a modification of a known chemical compound for which an improvement in efficacy is not shown is obvious as a matter of that country’s patent law. *Novartis AG v. Union of India*, (2013) 6 SCC 1 (India). See generally Jodie Liu, Note, *Compulsory Licensing and Anti-Evergreening: Interpreting the TRIPS Flexibilities in Sections 84 and 3(d) of the Indian Patents Act*, 56 Harv. Int’l L.J. 207 (2015) (exploring the compatibility between international treaties and the law of pharmaceutical non-obviousness in India); see also Janice M. Mueller, *The Tiger Awakens: The Tumultuous Transformation of India’s Patent System and the Rise of Indian Pharmaceutical Innovation*, 68 U. Pitt. L. Rev. 491, 549–60 (2007) (analyzing the patent regime instituted in India beginning in 2005). Putting to one side the issue of practical and institutional constraints (e.g., availability of data and the limits of the PTO and courts) that make this approach difficult to execute in practice, I emphasize here that this Article’s proposal for comparative analysis at the FDA differs from India’s in another crucial respect: It requires a comparison with a product that was actually approved and marketed by the same sponsor, as opposed to a prior art disclosure that does not refer to an approved drug. For critiques of India’s approach, see Holman et al., *supra* note 150, at 140–41; Kevin Tarsa, Comment, *Novartis AG v. Union of India: Why the Court’s Narrow Interpretation of Enhanced Efficacy Threatens Domestic and Foreign Drug Development*, 39 B.C. Int’l & Comp. L. Rev. E. Supp. 40, 48–52 (2016).
271. [271]. See Darrow, *supra* note 47, at 403 (“[T]he PTO cannot act as an effective gatekeeper because the utility and non-obviousness doctrines are not up to the task, because the agency lacks appropriate health-related expertise, and because the USPTO ‘gate’ is too far upstream in the drug development process.”).
272. [272]. To be sure, the general problem of patented innovation that may be used strategically to impede competition has been identified in other contexts. See, e.g., Carlos Acuña-Quiroga, *Predatory Innovation: A Step Beyond? (Understanding Competition in High-Technology Markets)*, 15 Int’l Rev. L. Comput. & Tech. 7 (2001) (discussing the practice of anti-competitive innovation in the high-technology industry). See generally Bernard Chao, *Horizontal Innovation and Interface Patents*, 2016 Wis. L. Rev. 287 (arguing that anticompetitive product changes accompanied by patenting occur in industries other than pharmaceuticals); Price, *supra* note 41 (more generally exploring the problem of potentially harmful novelty). Nonetheless, other industries are missing the regulatory features, such as generic substitution, that make the product hopping problem particularly salient in the pharmaceutical sector, and they are also less susceptible to the market deficiencies addressed in Part IV.
273. [273]. But see generally Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology-Specific?*, 17 Berkeley Tech. L.J. 1155 (2002) (contending that patent law already has industry-specific rules, particularly in areas such as non-obviousness of chemical composition claims).
274. [274]. See Ctr. for Drug Evaluation & Research, Food & Drug Admin., Application Number: 22-525, Summary Review 3–4 (2010), https://www.accessdata.fda.gov/drugsatfda_docs/nda/2010/022525Orig1s000SumR.pdf.

275. [275]. *See id.* at 4–5. In addition, the sponsor presented some “food effect” data, but only with respect to the lack of impact of food on bioavailability of memantine, as opposed to the relative efficacy of XR versus IR. Ctr. for Drug Evaluation & Research, Food & Drug Admin., Application Number: 22-525, Medical Review(s) at 8, 56, 89 (2010), https://www.accessdata.fda.gov/drugsatfda_docs/nda/2010/022525Orig1s000MedR.pdf. Certain comparative pharmacokinetics data mirroring that submitted to the FDA was also described in the patents covering Namenda XR. *See* U.S. Patent No. 8,039,009 col. 14 l. 60 – col. 20 l. 7 (filed June 16, 2005).
276. [276]. *Dosing for Patients Currently Taking Namenda*, Namenda XR, <http://www.namendaxrhcp.com/patients-currently-taking-namenda.aspx> (last visited Nov. 20, 2018).
277. [277]. Deardorff & Grossberg, *supra* note 14, at 3276.
278. [278]. *Id.* at 3267. Professors Deardorff and Grossberg also make clear that “[o]ne economic analysis that has not been performed is the comparison of memantine ER and memantine IR in combination with [other drugs] since no studies have been performed comparing the two drugs.” *Id.* at 3276.
279. [279]. Comment Letter from Kris Haltmeyer, Vice President, Legislative and Regulatory Policy, Office of Policy & Representation, BlueCross BlueShield Ass’n, to Scott Gottlieb, Comm’r, Food & Drug Admin. 3 (Oct. 13, 2017), <https://www.regulations.gov/document?D=FDA-2017-N-3615-0087>; *see also* Matthew E. Falagas et al., *Compliance with Once-Daily Versus Twice or Thrice-Daily Administration of Antibiotic Regimens: A Meta-Analysis of Randomized Controlled Trials*, 10 PLoS One e0116207, Jan. 5, 2015, at 11 (concluding that, “considering the limitations surrounding this meta-analysis[,] once-daily antibiotic treatment might be associated with higher compliance than treatment administered multiple times daily in specific populations, for specific sites of infections and specific classes of antibiotics”). A point of note on the Falagas study is that the FDA does require proof of non-inferiority for approval of antibiotics. *See generally* Non-Inferiority Clinical Trials to Establish Effectiveness, *supra* note 58, at 1 (proffering guidelines for “the appropriate use of non-inferiority ... study designs to provide evidence of the effectiveness of a drug or biologic”).
280. [280]. Kessler, *supra* note 68, at 437.
281. [281]. *See supra* notes 276–79 and accompanying text.
282. [282]. *See, e.g.*, Micah L. Berman, *Manipulative Marketing and the First Amendment*, 103 Geo. L.J. 497, 536–38 (2015); Carrier & Shadowen, *supra* note 6, at 181–89; Darrow, *supra* note 47, at 364–85; *see also* John R. Thomas, *Pharmaceutical Patent Law* 763 (3d ed. 2015) (“The pharmaceutical industry is innovative, and its products technologically sophisticated—two features that add complexities to the economic and legal analyses demanded by the antitrust law.”).
283. [283]. *See supra* notes 160–70 and accompanying text.
284. [284]. *Cf.* M. Gregg Bloche, *The Emergent Logic of Health Law*, 82 S. Cal. L. Rev. 389, 445 (2009) (arguing that “[r]esearch into the comparative efficacy of tests and treatments is a classic public good”); Kapczynski & Syed, *supra* note 55, at 1952 (explaining why comparative effectiveness research is “highly nonexcludable” and therefore under-incentivized by tools like patents).

285. [285]. Carrier & Shadowen, *supra* note 6, at 179–80; see David H. Kreling, *Market for Pharmaceuticals*, in *Pharmaceutical Public Policy*, *supra* note 121, at 281, 302 (“The demand for pharmaceuticals is not determined by the consumer, but directed by prescribers, and the demand is inelastic with respect to price.”); see also *id.* at 299 (“A lack of available comparative value information and a low awareness of drug cost levels by physicians also contribute to reduce the role that price plays in physician prescribing decisions.”).
286. [286]. Carrier, *supra* note 25, at 1017.
287. [287]. See Arti K. Rai, *The Information Revolution Reaches Pharmaceuticals: Balancing Innovation Incentives, Cost, and Access in the Post-Genomics Era*, 2001 U. Ill. L. Rev. 173, 207 (“[P]hysicians, and plans, that deliver care in a parsimonious fashion may be deemed to deviate from the custom-based standard of care and may, on that basis, be held liable in tort.”); see also Bloche, *supra* note 284, at 464 (“If there are multiple therapeutic options and the one chosen turns out badly, the plaintiff can find a physician-expert witness who would have opted for one of the other options.” (footnotes omitted)); Korobkin, *supra* note 55, at 541–42 (discussing “defensive medicine”); Richard S. Saver, *Health Care Reform’s Wild Card: The Uncertain Effectiveness of Comparative Effectiveness Research*, 159 U. Pa. L. Rev. 2147, 2196–98 (2011) (explaining that the law of medical malpractice can interfere with the practice of evidence-based medicine); cf. *Sheeley v. Mem’l Hosp.*, 710 A.2d 161, 166–67 (R.I. 1998) (holding that the standard of care in medical malpractice cases should be determined by national custom).
288. [288]. See Carrier & Shadowen, *supra* note 6, at 169–70, 179–80; Jessie Cheng, Note, *An Antitrust Analysis of Product Hopping in the Pharmaceutical Industry*, 108 Colum. L. Rev. 1471, 1509–10 (2008). See generally Douglas Lundin, *Moral Hazard in Physician Prescription Behavior*, 19 J. Health Econ. 639 (2000) (analyzing how the lack of financial pressure can influence physicians’ prescribing decisions). Nonetheless, these effects might be alleviated with “consumer-driven health care” models. See Wendy Netter Epstein, *Nudging Patient Decision-Making*, 92 Wash. L. Rev. 1255, 1274–92 (2017).
289. [289]. *In re Suboxone (Buprenorphine Hydrochloride and Naloxone) Antitrust Litig.*, 64 F. Supp. 3d 665, 683–84 (E.D. Pa. 2014).
290. [290]. Carrier & Shadowen, *supra* note 6, at 204 (“The price disconnect is the economic premise around which all states and the federal government have for the past forty years built a robust generic-substitution regulatory regime.”).
291. [291]. See, e.g., David Orentlicher, *Controlling Health Care Spending: More Patient “Skin in the Game?”*, 13 Ind. Health L. Rev. 348, 352–57 (2016); see also Epstein, *supra* note 288, at 1292–98 (providing an overview of how default choices may influence patients’ decisions); Rachel E. Sachs, *Delinking Reimbursement*, 102 Minn. L. Rev. 2307, 2348–51 (2018) (discussing an approach that could empower the FDA to drive the production and disclosure of information useful in promoting evidence-based care and coverage decisions).
292. [292]. See David Orentlicher, *Cost Containment and the Patient Protection and Affordable Care Act*, 6 FIU L. Rev. 67, 72–77 (2010) (addressing some of these provisions).
293. [293]. Korobkin, *supra* note 55, at 551; see also Darrow, *supra* note 47, at 375–77 (discussing patients’ failure to function as gatekeepers against ineffective drugs).

294. [294]. See generally Sachs, *supra* note 291 (explaining that the current health care regulatory regime generates unnecessarily high costs). Notably, however, Massachusetts is considering adopting a “closed formulary” approach to Medicaid reimbursements that would take cost-effectiveness of drugs into account. Nicholas Bagley & Rachel Sachs, *Massachusetts Wants to Drive Down Medicaid Drug Costs: Why Is the Administration so Nervous?*, Health Aff.: Health Aff. Blog (Apr. 5, 2018), <https://www.healthaffairs.org/doi/10.1377/hblog20180404.93363/full> (evaluating whether “beneficiaries ... could be denied access to expensive therapies” if the state were “to exclude certain brand-name drugs from Medicaid”); see also Rachel Sachs et al., *Value-Based Pricing for Pharmaceuticals in the Trump Administration*, Health Aff.: Health Aff. Blog (Apr. 27, 2017), <https://www.healthaffairs.org/doi/10.1377/hblog20170427.059813/full> (discussing value-based pricing, which makes sales revenue dependent on prescription drug effectiveness rather than volume sold).
295. [295]. See Korobkin, *supra* note 55, at 546–50.
296. [296]. *Id.* at 547.
297. [297]. Wendy Netter Epstein, *The Health Insurer Nudge*, 91 S. Cal. L. Rev. 593, 596 (2018); see also Korobkin, *supra* note 55, at 541–43 (noting provider incentives that contribute to unnecessary health care delivery); Saver, *supra* note 287 at 2170–75 (contending that medicine involves a much greater degree of uncertainty than most laypeople realize, and this contributes to unnecessary health care expenditures).
298. [298]. Stephen Fink & Mark J. Lewis, *The Myth of ‘Price Disconnects’ in US Pharma Markets*, Law360 (May 17, 2016, 11:39 AM), <https://www.law360.com/articles/796876/the-myth-of-price-disconnects-in-us-pharma-markets>; see also Acad. of Managed Care Pharmacy, *The AMCP Format for Formulary Submissions: Version 4.0* (2016), <http://www.amcp.org/FormatV4> (providing guidance for formulary placement and coverage support decisions); Dave Nellesen, *AMCP Format Expands Evidence Requirements for US Payers*, Analysis Group, <http://www.analysisgroup.com/amcp-format-expands-evidence-requirements-us-payers> (last visited Dec. 15, 2018) (describing evidence requirements for supporting formulary placements).
299. [299]. Fink & Lewis, *supra* note 298.
300. [300]. See Michael Hiltzik, *How ‘Price-Cutting’ Middlemen Are Making Crucial Drugs Vastly More Expensive*, L.A. Times (June 9, 2017, 12:00 PM), <http://www.latimes.com/business/hiltzik/la-fi-hiltzik-pbm-drugs-20170611-story.html>; Charles Ornstein & Katie Thomas, *Take the Generic, Patients Are Told. Until They Are Not.*, N.Y. Times (Aug. 6, 2017), <https://www.nytimes.com/2017/08/06/health/prescription-drugs-brand-name-generic.html>.
301. [301]. Jonathan J. Darrow & Aaron S. Kesselheim, *Promoting Competition to Address Pharmaceutical Prices*, Health Aff. (Mar. 15, 2018), <https://www.healthaffairs.org/doi/10.1377/hpb20180116.967310/full>; see also Joseph S. Ross & Aaron S. Kesselheim, *Prescription-Drug Coupons—No Such Thing as a Free Lunch*, 369 New Eng. J. Med. 1188, 1188 (2013) (explaining “drug coupons’ effect on health care costs”).
302. [302]. See generally Corinna Sorenson et al., *Advancing Value Assessment in the United States: A Multistakeholder Perspective*, 20 Value in Health 299, 300 (2017) (noting that, in spite of cost pressures, data on the “comparative net health benefit[s]” of various drugs is largely “insufficient”); see also *id.* at 305 (concluding that “consideration of observational data in value assessments of asthma therapies

could capture the preferences and outcomes of important patient subgroups, such as smokers and patients with serious comorbidities and/or adherence problems, that are not often studied in premarket clinical trials”); Robin Feldman, *Perverse Incentives: Why Everyone Prefers High Drug Prices—Except for Those Who Pay the Bills*, Harv. J. on Legis. (forthcoming 2019) (manuscript at 54), <https://ssrn.com/abstract=3162432> (“[A]lthough we might hope that the insurer would push back on behavior that entrenches higher-priced drugs, the incentives that are misaligned and the information that might drive them in that direction is incomplete.”).

303. [303]. See Fink & Lewis, *supra* note 298; Shepherd, *supra* note 26, at 691–92.

304. [304]. See Sachs, *supra* note 291, at 2309 (“[F]ederal law requires Medicare and Medicaid to cover most, and in many cases all, FDA-approved drugs.”); see also Henry Waxman et al., *Getting to the Root of High Prescription Drug Prices: Drivers and Potential Solutions*, Commonwealth Fund (July 10, 2017), <https://www.commonwealthfund.org/publications/fund-reports/2017/jul/getting-root-high-prescription-drug-prices-drivers-and-potential> (arguing, among other things, for reforms in reimbursement approaches by public payers).

305. [305]. Daniel R. Cahoy, *Medical Product Information Incentives and the Transparency Paradox*, 82 Ind. L.J. 623, 635–36 (2007) (“Companies may disclose clinical information directly through a variety of means including: websites, annual reports, or letters to physicians... . Of course, the extent to which this may result in the selective disclosure of favorable information is an issue of concern for both the regulatory and financial communities. Further, the results of voluntarily disclosed studies are usually briefly summarized at best and one cannot realistically conduct an independent evaluation of the information.” (citations omitted)).

306. [306]. See Nikolas H. Goldberg et al., *Availability of Comparative Efficacy Data at the Time of Drug Approval in the United States*, 305 JAMA 1786, 1788–89 (2011) (finding, in a study of newly approved drugs containing new molecular entities, that comparative effectiveness information at the time of approval was absent for a significant number of new drug products, and even when present, the information was not always accessible). The authors conclude that “[s]trategies are needed to enhance the accessibility of, and ultimately the use of, this information, particularly in the early marketing experience, when comparative effectiveness data from other sources are scarce or nonexistent.” *Id.* at 1789. There is no suggestion that the situation with respect to comparative data availability is better for “hopped” drug products as opposed to new active-ingredient products that the authors examined. *Cf.* Downing et al., *supra* note 59, at 373–75. The number determined in the Goldberg et al. study, moreover, includes new drugs for whose approval the FDA requires an active comparator. Goldberg et al., *supra*, at 1787–88; see also Sebastian Schneeweiss et al., *Assessing the Comparative Effectiveness of Newly Marketed Medications: Methodological Challenges and Implications for Drug Development*, 90 Clinical Pharmacology & Therapeutics 777, 777 (2011); *infra* note 481 and accompanying text (describing non-inferiority trials required for approval of anti-infectives).

307. [307]. See Ryan Abbott & Ian Ayres, *Evidence and Extrapolation: Mechanisms for Regulating Off-Label Uses of Drugs and Devices*, 64 Duke L.J. 377, 396 (2014) (recounting the expansion of post-marketing commitments legally required of pharmaceutical companies). *But cf.* Joshua Cohen et al., *Compared to US Practice, Evidence-Based Reviews in Europe Appear to Lead to Lower Prices for Some Drugs*, 32 Health Aff. 762, 765–68 (2013) (noting that Europe is ahead of the U.S. in terms of post-marketing comparative drug evidence development); see also PhRMA Found. & Acad. Managed Care Pharmacy, *Comparative Effectiveness and Patient-Centered*

Outcomes Research: Enhancing Uptake and Use by Patients, Clinicians and Payers: Conference Summary 2 (2017), <http://www.phrmafoundation.org/wp-content/uploads/2017/01/CER-Conference-Summary.pdf> (discussing gaps in comparative drug information).

308. [308]. See *infra* notes 395–407 and accompanying text; see also Kazuo Iijima et al., *Time Series Analysis of the Effectiveness and Safety of Capsule Endoscopy Between the Premarketing and Postmarketing Settings: A Meta-Analysis*, 11 PLoS One e0153662, June 1, 2016, at 1, 2 (cataloguing some advantages of post- over pre-marketing comparative studies but ultimately describing them as “complement[ary]”).
309. [309]. See Alexander & Stafford, *supra* note 55, at 2488; see also Schneeweiss et al., *supra* note 306, at 784 (“Although the goal of [comparative effectiveness research]—to understand the relative effectiveness of medical products in routine care—implies evaluation before market entry, parts of the process can be initiated prior to approval.”); cf. Rebecca S. Eisenberg & W. Nicholson Price, II, *Promoting Health Care Innovation on the Demand Side*, 4 J.L. & Biosciences 3, 16–18 (2017) (positing why such information is often underproduced).
310. [310]. Although pre-approval data is generally of more limited value than the real-world information developed after clinical practice starts, there can be an important feedback mechanism between the two. For example, pre-marketing comparative efficacy studies on ADHD drugs in Europe have yielded critical data points that could be supplemented in the course of clinical practice. Florence T. Bourgeois et al., *Premarket Safety and Efficacy Studies for ADHD Medications in Children*, 9 PLoS ONE e102249, July 9, 2014, at 1, 2–8; see also *supra* note 57 and accompanying text (noting that the FDA’s drug approval standard does not require an active comparator).
311. [311]. See *supra* text accompanying notes 160–70.
312. [312]. Cf. *supra* notes 168, 171 and accompanying text (discussing some exceptions).
313. [313]. See *supra* notes 121–22 and accompanying text.
314. [314]. The First Amendment significantly limits the ability of the FDA (or other government agencies) to control such advertising. See, e.g., *United States v. Caronia*, 703 F.3d 149, 168–69 (2d Cir. 2012); see also *Sorrell v. IMS Health Inc.*, 564 U.S. 552, 557 (2011) (“Speech in aid of pharmaceutical marketing ... is a form of expression protected by the Free Speech Clause of the First Amendment.”); Alan Bennett et al., *Back to First Principles: A New Model for the Regulation of Drug Promotion*, 2 J.L. & Biosciences 168, 171 (2015) (noting that courts have “indicated that content- and speaker-based restrictions on drug manufacturer speech are subject to ‘heightened scrutiny’ under the First Amendment”); Coleen Klasmeier & Martin H. Redish, *Off-Label Prescription Advertising, the FDA and the First Amendment: A Study in the Values of Commercial Speech Protection*, 37 Am. J.L. & Med. 315 (2011) (analyzing the protections that prescription drug advertising is entitled to under the First Amendment). For a discussion of implications of this case law for FDA approval practices, see Patricia J. Zettler, *The Indirect Consequences of Expanded Off-Label Promotion*, 78 Ohio St. L.J. 1053, 1067–76 (2017). For criticism of this line of cases and suggestions for reform, see Christopher Robertson, *When Truth Cannot Be Presumed: The Regulation of Drug Promotion Under an Expanding First Amendment*, 94 B.U. L. Rev. 545, 553–58 (2014); Joshua M. Sharfstein & Alta Charo, *The Promotion of Medical Products in the 21st Century: Off-Label Marketing and First Amendment Concerns*, 314 JAMA 1795,

1795–96 (2015); Randall S. Stafford, *Regulating Off-Label Drug Use—Rethinking the Role of the FDA*, 358 New Eng. J. Med. 1427, 1427 (2008) (“Although off-label prescribing—the prescription of a medication in a manner different from that approved by the FDA—is legal and common, it is often done in the absence of adequate supporting data.”).

315. [315]. New York *ex rel.* Schneiderman v. Actavis PLC, 787 F.3d 638, 658–60 (2d Cir. 2015); *In re Suboxone* (Buprenorphine Hydrochloride and Naloxone) Antitrust Litig., 64 F. Supp. 3d 665, 679–84 (E.D. Pa. 2014).
316. [316]. *See generally* Alan Lyles, *Pharmaceutical Promotion in the United States*, in *Pharmaceutical Public Policy*, *supra* note 121, at 231 (describing current pharmaceutical promotion practices).
317. [317]. 21 U.S.C. § 352(a)(1) (2018); *see also id.* § 331(a) (defining “[t]he introduction or delivery for introduction into interstate commerce of any food, drug, device, tobacco product, or cosmetic that is adulterated or misbranded” as one of the prohibited acts under this subsection); *United States v. Harkonen*, No. C 08-00164 MHP, 2009 WL 1578712, at *9, *13 (N.D. Cal. June 4, 2009) (finding a press release to constitute a form of drug labeling, and thus evidence of “misbranding”). *See generally* Nathan Cortez, *The Statutory Case Against Off-Label Promotion*, 83 U. Chi. L. Rev. Online 124 (2016) (surveying the statutory framework governing misbranding claims). False Claims Act liability is possible in these scenarios as well. *See* 31 U.S.C. § 3729; *Universal Health Servs., Inc. v. United States ex rel. Escobar*, 136 S. Ct. 1989, 2003–04 (2016).
318. [318]. 21 C.F.R. § 202.1(e)(6)(ii) (2018); *see also id.* § 201.57(c)(2)(iii) (“Any statements [on product labeling] comparing the safety or effectiveness of the drug with other agents for the same indication must, except for biological products, be supported by substantial evidence derived from adequate and well-controlled studies as defined in § 314.126(b) of this chapter unless this requirement is waived under § 201.58 or § 314.126(c) of this chapter.”).
319. [319]. *See* David A. Kessler et al., *Therapeutic-Class Wars—Drug Promotion in a Competitive Marketplace*, 331 New Eng. J. Med. 1350, 1351–52 (1994); *see also* Darrow, *supra* note 47, at 368–69 (“[T]he void of non-biased information is often filled by drug company ‘detailers,’ who personally visit physicians for the primary purpose of influencing prescribing decisions.” (footnote omitted)); *id.* at 369 (“Many people (*including [many] physicians*) think that newer drugs are better. While that’s a natural assumption to make, it’s not true. Studies consistently find that many older medicines are as good as—and in some cases better than—newer medicines.” (quoting *Evaluating Statin Drugs to Treat: High Cholesterol and Heart Disease*, Consumer Reps. Health Best Buy Drugs 1, 21 (2012), <http://www.consumerreports.org/health/resources/pdf/best-buy-drugs/StatinUpdate-FINAL.pdf>)); *cf.* James J. Dettore et al., *Branding Lessons from Consumer Marketing*, Pharmaceutical Executive, May 2001, at 48–49 (discussing the important role of direct-to-consumer marketing and branding in the pharmaceutical industry).
320. [320]. Namenda XR, *Namenda XR TV Commercial, “Be a Guardian,”* iSpot.tv (2015), <https://www.ispot.tv/ad/7F3x/namenda-xr-be-a-guardian>. Empirical work has shown that patient demand can drive prescribing decisions. *See* Rebecca K. Schwartz et al., *Physician Motivations for Nonscientific Drug Prescribing*, 28 Soc. Sci. & Med. 577, 579 (1989) (“Patient demand was the most commonly cited motivation for prescribing the target drugs”); Steenburg, *supra* note 221, at 299 (“[D]irect-to-consumer ... advertising and other increasingly sophisticated marketing strategies often result in swift transitions from small, controlled trials to widespread use” (footnote omitted)); *see also* Andrea Coscelli, *The Importance of Doctors’ and Patients’ Preferences in the Prescription Decision*, 48 J.

Indus. Econ. 349, 367–68 (2000) (finding that “persistence” in doctor and patient prescription preferences can have an effect on the aggregate market for prescription drugs); Dettore et al., *supra* note 319, at 49–50; Ramkumar Janakiraman et al., *Physicians’ Persistence and Its Implications for Their Response to Promotion of Prescription Drugs*, 54 Mgmt. Sci. 1080, 1081 (2008) (“Our model results indicate significant levels of persistence in drug choice... . 60% of the physicians are classified as persistent, with the remaining 34% classified as nonpersistent.”).

321. [321]. See Drug Topics, Aug. 2013, at 2–4, <http://images2.advanstar.com/pixelmags/drug-topics/pdf/2013-08.pdf>. The ad does include a disclaimer, in relatively small print, indicating that no comparative study was performed between IR and XR. *Id.* at 2; see also Shepherd, *supra* note 26, at 697 & n.222.
322. [322]. Emily Wasserman, *Forest Laboratories Announces Intention to Continue Marketing Both NAMENDA® Tablets and Once-Daily NAMENDA XR® Into the Fall of 2014*, FiercePharma, (June 11, 2014, 7:20 AM), <http://www.fiercepharma.com/marketing/forest-laboratories-announces-intention-to-continue-marketing-both-namenda%C2%AE-tablets-and>.
323. [323]. Indeed, even the soft switch was estimated to have led to a transition of a significant number of prescribers and patients to XR. See New York *ex rel.* Schneiderman v. Actavis PLC, 787 F.3d 638, 647–48 (2d Cir. 2015). Partly for the reason that such ads induce unjustified switches to more costly drugs, the American Medical Association has called for a ban of direct-to-consumer drug ads. See *AMA Calls for Ban on DTC Ads of Prescription Drugs and Medical Devices*, Am. Med. Ass’n (Nov. 17, 2015), <https://www.ama-assn.org/content/ama-calls-ban-direct-consumer-advertising-prescription-drugs-and-medical-devices>; see also *supra* note 287 and accompanying text (explaining how physician risk-averseness, particularly in the face of potential malpractice suits, can drive prescribing decisions).
324. [324]. See 21st Century Cures Act, Pub. L. No. 114-255, § 3037, 130 Stat. 1033, 1105 (2016); see also 21 U.S.C. § 352(a)(2)(A) (2018) (“[T]he term ‘health care economic information’ means any analysis (including the clinical data, inputs, clinical or other assumptions, methods, results, and other components underlying or comprising the analysis) that identifies, measures, or describes the economic consequences, which may be based on the separate or aggregated clinical consequences of the represented health outcomes, of the use of a drug. Such analysis may be comparative to the use of another drug, to another health care intervention, or to no intervention.”). See generally Sam F. Halabi, *Off-Label Marketing’s Audiences: The 21st Century Cures Act and the Relaxation of Standards for Evidence-Based Therapeutic and Cost-Comparative Claims*, 44 Am. J.L. & Med. 181 (2018) (discussing an expansion in the scope of permissible manufacturer-payer communications allowed by 21st Century Cures Act); Peter J. Neumann et al., *The FDA’s Regulation of Health Economic Information*, 19 Health Aff. 129 (2000) (addressing the statutory regime relating to communication of health care economic information prior to the passage of the 21st Century Cures Act, which amended the FDCA).
325. [325]. See *supra* notes 312–15 and accompanying text.
326. [326]. See Darrow, *supra* note 47, at 385–87 (describing the “patent halo”); cf. Evans, *supra* note 57, at 491 (“Today’s drug labeling tells only what is known about a drug’s risks and benefits but does not give a sense of all that is still unknown. This has contributed to a culture of mass drug marketing and consumption in which people are eager to get the latest drug, often believing that it must be better

and safer than older drugs when in fact, such comparative data rarely exist.” (citing Cong. Budget Office, Research on the Comparative Effectiveness of Medical Treatments 4 (2007), <http://www.cbo.gov/ftpdocs/88xx/doc8891/12-18-ComparativeEffectiveness.pdf>). *See generally* Mansfield et al., *supra* note 14 (discussing unjustified perceptions of superiority of certain types of new drug versions).

327. [327]. *See* Deardorff & Grossberg, *supra* note 14, at 3269–76.

328. [328]. *See, e.g.*, Cynthia M. Ho, *First Amendment Overprotection of “Alternative Facts”: The Case of Cognitive Biases with Pharmaceutical Marketing*, 94 Ind. L.J. (forthcoming 2019) (manuscript at 25), <https://ssrn.com/abstract=3152645> (“[A]lthough doctors are trained in science, as busy individuals, they often don’t read more than abstracts, which have been found to be inaccurate.”).

329. [329]. *See supra* note 287 and accompanying text (explaining that, based on malpractice concerns and other factors, the real or perceived customary approach for treating certain conditions can drive prescribing decisions). *See generally* David A. Hyman & Charles Silver, *It Was on Fire When I Lay Down on It: Why Medical Malpractice Reform Can’t Fix Healthcare*, in *The Oxford Handbook of U.S. Health Law* 556 (I. Glenn Cohen et al. eds., 2017) (discussing the influence of malpractice law on medical care and the challenge of reform).

330. [330]. *See supra* note 321; *see also* Kevin R. Betts et al., *Physician Response to Contextualized Price-Comparison Claims in Prescription Drug Advertising*, 10 J. Comm. Healthcare 195, 203–04 (2017).

331. [331]. Betts, *supra* 330, at 200.

332. [332]. *Id.* at 196, 202.

333. [333]. *Id.* at 195.

334. [334]. *Id.*

335. [335]. Pierre Azoulay, *Do Pharmaceutical Sales Respond to Scientific Evidence?*, 11 J. Econ. & Mgmt. Strategy 551, 586 (2002) (“I find that marketing had a more pronounced direct effect on demand than science, but the latter was still statistically and economically significant.”).

336. [336]. *See* Ho, *supra* note 328. *See generally* Cynthia M. Ho, *Drugged Out: How Cognitive Bias Hurts Drug Innovation*, 51 San Diego L. Rev. 419 (2014) (uncovering schemas in another context in the pharmaceutical arena).

337. [337]. Daniel Carpenter, *Confidence Games: How Does Regulation Constitute Markets?*, in *Government and Markets: Toward a New Theory of Regulation* 164, 173–81 (Edward J. Balleisen & David A. Moss eds., 2010); *see also id.* at 165 (“Evidence from the most rigorous and historically contextual studies suggests that institutions of entry and approval regulation have arisen in markets characterized by learning constraints, including credence good markets and markets with appreciable information asymmetries. In the absence of regulation, as well as in the presence of weak regulation, these markets are characterized by equilibrium fraud and “lemons problems.” (citing George A. Akerlof, *The Market for “Lemons”: Quality Uncertainty and the Market Mechanism*, 84 Q.J. Econ. 488, 488–500 (1970))); Ariel Katz, *Pharmaceutical Lemons: Innovation and Regulation in the Drug Industry*, 14 Mich. Telecomm. & Tech. L. Rev. 1, 11–13 (2007).

338. [338]. Katz, *supra* note 337, at 27–28.

339. [339]. See generally Carpenter, *supra* note 94 (discussing pharmaceutical regulation by the FDA). Indeed, addressing this market failure in information production is a standard economic justification for FDA regulation. See, e.g., Kapczynski & Syed, *supra* note 55, at 1956–57; see also Cahoy, *supra* note 305, at 627 (“An individual’s decision regarding the safety profile of a particular product can be manipulated, though, by controlling the information the individual receives.”). See generally Eisenberg, *supra* note 100 (discussing the role of the FDA in driving pharmaceutical innovation).
340. [340]. See *supra* notes 217–23 and accompanying text.
341. [341]. See AstraZeneca Pharm. LP v. Anchen Pharm., Inc., Nos. 10-cv-1835 (JAP)(TJB), 2012 WL 1065458, at *55 (D.N.J. Mar. 29, 2012) (additional docket numbers omitted), *aff’d per curiam*, 498 F. App’x 999 (Fed. Cir. 2013).
342. [342]. See, e.g., Bourgeois et al., *supra* note 310, at 5–7; Johan C.F. van Luijn et al., *Superior Efficacy of New Medicines?*, 66 Eur. J. Clinical Pharmacology 445, 445–46 (2010).
343. [343]. New York *ex rel.* Schneiderman v. Actavis PLC, 787 F.3d 638, 658–60 (2d Cir. 2015).
344. [344]. See Rebecca S. Eisenberg, Lecture, *Patents, Product Exclusivity, and Information Dissemination: How Law Directs Biopharmaceutical Research and Development*, 72 Fordham L. Rev. 477, 488–90 (2003); Amy Kapczynski, *Dangerous Times: The FDA’s Role in Information Production, Past and Future*, 102Minn. L. Rev. 2357, 2357–59 (2018); see also Laakmann, *supra* note 100, at 147–48, 158–62 (discussing the institutional role of the FDA as an information intermediary); Anna B. Laakmann, *The New Genomic Semicommons*, 5 U.C. Irvine L. Rev. 1001, 1038 (2015) (“The FDA further acts as an information intermediary by using its labeling authority to certify the credibility of drug and device manufacturers’ marketing claims. In addition to specifying the type and amount of data that manufacturers must generate before they can communicate with patients and physicians about intended uses of their products, the FDA filters how interpretations of that data are conveyed in product labels.” (citing Eisenberg, *supra* note 100, at 370–72)). But see Richard A. Epstein, *Against Permittitis: Why Voluntary Organizations Should Regulate the Use of Cancer Drugs*, 94 Minn. L. Rev. 1, 31–34 (2009) (questioning the FDA’s information-forcing role and suggesting reliance on private institutions to generate health care information).
345. [345]. See *infra* text accompanying notes 494–501.
346. [346]. See John Vernon et al., *Fewer Drugs, Shorter Lives, Less Prosperity: The Impact of Comparative Effectiveness Research on Health and Wealth*, 45 Drug Info. J. 699, 701 (2011). See generally Scott Gottlieb, *The FDA Should Not Mandate Comparative-Effectiveness Trials*, AEI Health Pol’y Outlook (June 2011), <http://www.aei.org/wp-content/uploads/2011/10/HPO-2011-05-g.pdf> (arguing against implementing CER by demanding proof of comparative effectiveness to obtain FDA approval). But cf. *supra* note 55 and accompanying text (exploring the possibility of using comparative effectiveness as a condition of drug approval).
347. [347]. This point assumes that a patent on the modification can still be acquired, but the stick proposed in Part IV would serve as enough of a counter-incentive to discourage investment into the modification. Cf. Shepherd, *supra* note 26, at 702–06 (discussing potentially negative effects on innovation brought on by the antitrust product hopping case law).

348. [348]. See Richard A. Epstein, *Overdose: How Excessive Government Regulation Stifles Pharmaceutical Innovation* 57 (2006); see also Richard A. Epstein, *Why America Does Not Have a Second Drug Problem*, in *Innovation and the Pharmaceutical Industry: Critical Reflections on the Virtues of Profit* 100, 117 (H. Tristram Engelhardt, Jr. & Jeremy R. Garrett eds., 2008) (“In cases of ‘ordinary’ markets, we welcome new entry as a way to expand consumer choice. There is no reason not to do the same here. The FDA should not be turned into an arbiter of marketability.”); Ross D. Petty, *Limiting Product Choice: Innovation, Market Evolution, and Antitrust*, 21 J. Pub. Pol’y & Marketing 269, 273 (2002) (“[D]ynamic innovation is crucial for maximizing consumer choice among products and services over time.”).
349. [349]. See *supra* notes 314–23 and accompanying text (describing allowable forms of drug advertising).
350. [350]. Korobkin, *supra* note 55, at 570 (discussing “[t]he problem of individual variation”).
351. [351]. Or, if the sponsor did develop such data, these market participants would proceed with knowledge of what the data shows.
352. [352]. One specific mechanism for ameliorating market defects is for payers to cover the cheaper form unless an incremental improvement is shown for the more expensive one. See Scott D. Halpern et al., *Harnessing the Power of Default Options to Improve Health Care*, 357 New Eng. J. Med. 1340, 1340 (2007).
353. [353]. And, further downstream, these dynamics could lead to evidence-driven medical innovation. See *infra* text accompanying notes 366–71, 408–20.
354. [354]. See 21 C.F.R. § 201.57 (2018) (describing the content of the labeling that must accompany prescription drug products).
355. [355]. See 21 U.S.C. § 352(f) (2018); *Labeling Development Team*, U.S. Food & Drug Admin., <https://www.fda.gov/AboutFDA/CentersOffices/OfficeofMedicalProductsandTobacco/CDER/ucm443026.htm> (last updated Sept. 27, 2018).
356. [356]. See 21 C.F.R. § 201.57.
357. [357]. Ctr. for Drug Evaluation & Research (CDER) & Ctr. for Biologics Evaluation & Research (CBER), Food & Drug Admin., U.S. Dep’t of Health & Human Servs., *Guidance for Industry: Labeling for Human Prescription Drug and Biological Products—Implementing the PLR Content and Format Requirements 1–2* (2013), <https://www.fda.gov/downloads/Drugs/GuidanceComplianceRegulatoryInformation/Guidances/UCM075082.pdf>.
358. [358]. Scott Gottlieb & Leah Christl, *FDA Taking New Steps to Better Inform Physicians About Biosimilars through Education About These Potentially Cost-Saving Options*, U.S. Food & Drug Admin. (Oct. 23, 2017), <https://www.fda.gov/NewsEvents/Newsroom/FDAVoices/ucm612008.htm>.
359. [359]. See Evans, *supra* note 57, at 508 (“Communicating risk-benefit information will not improve public health, unless the information actually is applied at the point when physicians prescribe drugs. Labeling changes repeatedly have been shown, in empirical studies, to have little impact on physicians’ prescribing behavior.” (first citing Walter Smalley et al., *Contraindicated Use of Cisapride: Impact of Food and Drug Administration Regulatory Action*, 284 JAMA 3036, 3038 (2000); then citing Raymond L. Woosley & Glenn Rice, *A New System for Moving Drugs to Market*, 21 Issues Sci. & Tech. 63 (2005))). Nonetheless, the cited studies precede the

introduction of the Physician Labeling Rule. *See* Karen B. Feibus, *FDA's Proposed Rule for Pregnancy and Lactation Labeling: Improving Maternal Child Health Through Well-Informed Medicine Use*, 4 J. Med. Toxicology 284, 284 (2008) (“With development and implementation of the Physician Labeling Rule (PLR), FDA transformed the prescription drug label into a better communication tool in which information is better organized, clearly presented, and more easily located.”).

360. [360]. 21 U.S.C. § 355(d).

361. [361]. *See, e.g.*, Cahoy, *supra* note 305, at 627–28.

362. [362]. Bloche, *supra* note 284, at 446 (“Selection of outcome measures for such [comparative] studies is fraught with normative questions that lack agreed-on answers.”).

363. [363]. *See, e.g.*, Roger Chou et al., *Comparative Efficacy and Safety of Long-Acting Oral Opioids for Chronic Non-Cancer Pain: A Systematic Review*, 26 J. Pain & Symptom Mgmt. 1026, 1028, 1042 (2003).

364. [364]. *See supra* note 57 and accompanying text (noting terminological differences between “efficacy” and “effectiveness”).

365. [365]. *See* Saver, *supra* note 287, at 2170–75.

366. [366]. *See* Cramer & Saks, *supra* note 67, at 483–84 (discussing potential axes of improvement for extended-release versus immediate-release drug products having the same active pharmaceutical ingredient).

367. [367]. *See supra* notes 222–23 and accompanying text.

368. [368]. Kessler, *supra* note 68, at 440.

369. [369]. *Id.*

370. [370]. *See* 21 U.S.C. § 360cc(c), (e) (2018) (requiring a showing of clinical superiority at the approval stage before recognizing regulatory exclusivity for a so-called “orphan drug”); *see also id.* §360cc(c)(2) (defining a “clinically superior” drug as one that “provides a significant therapeutic advantage over and above an already approved or licensed drug in terms of greater efficacy, greater safety, or by providing a major contribution to patient care”).

371. [371]. *See, e.g.*, *In re* Kao, 639 F.3d 1057, 1062, 1068–69 (Fed. Cir. 2011) (describing a formulation that causes multiple peaks of blood concentration of the active pharmaceutical ingredient, an unexpected result that beneficially prevents patients from building tolerance to the drug); *see also supra* notes 204–23 and accompanying text (analyzing the unexpected results doctrine).

372. [372]. More rigorous standards are possible. *See, e.g.*, *supra* note 370 and accompanying text; *infra* notes 482–83 and accompanying text (providing an example of a setting in which the FDA must use the “clinically superior” standard). Nonetheless, given the already significant shift toward comparative analysis proposed here and the difficulty of establishing superiority, a more permissive standard is appropriate. In Part VI, I discuss the objection that the standard could be readily gamed by sponsors.

373. [373]. *See* 21 C.F.R. § 314.126(b) (2018). Sometimes, to be sure, availability of a new and clearly better drug could render the risk-benefit profile of an already-approved drug no longer acceptable, causing its withdrawal. *See, e.g.*, *infra* notes 462–64 and accompanying text (providing a recent example of this scenario).

374. [374]. *Cf.* 21 C.F.R. § 314.126(b)(2)(iv) (describing the option of using an “active control” to obtain new drug approval).
375. [375]. *See supra* notes 75–76 and accompanying text.
376. [376]. *See supra* note 306 and accompanying text.
377. [377]. *See* Non-Inferiority Clinical Trials to Establish Effectiveness, *supra* note 58, at 7.
378. [378]. *See* Kevin Fain et al., Research Letter, *The Food and Drug Administration Amendments Act and Postmarketing Commitments*, 310 JAMA 202 (2013) (finding reduced rates of compliance with FDA-required post-marketing studies, as opposed to pre-marketing studies); *see also* Cahoy, *supra* note 305, at 632–34, 667–71 (noting the FDA’s limited ability to control the sponsor and product after approval and marketing); Kapczynski, *supra* note 344, at 2369–74 (discussing the problem of “incomplete data” that thwarts accurate post-marketing drug comparisons). *See generally* Steenburg, *supra* note 221.
379. [379]. *See* 21 U.S.C. § 355(d) (2018); *see also* 21 C.F.R. § 201.57 (reiterating the statutory standard of “adequate and well-controlled studies” for providing the basis for information on the labeling).
380. [380]. *See* Grabowski & Vernon, *supra* note 95 (setting forth the FDA’s drug approval process). *See generally* Richard A. Merrill, *Regulation of Drugs and Devices: An Evolution*, 13 Health Aff. 47 (1994) (describing the “drug model” of FDA regulation).
381. [381]. *See* 21 C.F.R. § 10.30. Confidentiality of sponsor data, however, could be a barrier here, as demonstrated in the course of challenges to other FDA decisions. *See, e.g.,* Lisa Heinzerling, *The FDA’s Plan B Fiasco: Lessons for Administrative Law*, 102 Geo. L.J. 927, 972 (2014).
382. [382]. 5 U.S.C. § 706(2)(A).
383. [383]. *See* Steenburg, *supra* note 221, at 334 (“Recognizing their own limitations, courts are unwilling to question the agency’s judgment as to the necessary standards for assessing safety and efficacy.”); *see also, e.g.,* Cytori Therapeutics, Inc. v. Food & Drug Admin., 715 F.3d 922, 927 (D.C. Cir. 2013) (“A court is ill-equipped to second-guess that kind of agency scientific judgment under the guise of the [Administrative Procedure Act’s] arbitrary and capricious standard.”).
384. [384]. Indeed, in a manner analogous to the advertising of “off-label” uses, which is protected by the First Amendment, *see supra* note 314 and accompanying text, the sponsor could legally make comparative claims supported by truthful and non-misleading information unexamined by the FDA. *See generally* Cortez, *supra* note 317 (evaluating the statutes governing acceptable claims made in the course of drug marketing). Interestingly, though, sponsors currently wishing to make comparative claims often have difficulty meeting the “substantial evidence or substantial clinical experience” standard mandated by 21 C.F.R. § 202.1(e)(6)(ii). *Cf.* Coleen Klasmeier, *Congress Should Clarify the Circumstances Under Which Drug Makers Can Communicate Results on Comparative Effectiveness*, 31 Health Aff. 2220, 2221–23 (2012) (questioning the FDA’s enforcement of this standard). The proposed approach clears up this gray area because the FDA would have already weighed in on whether comparative claims are supported by substantial evidence. *See supra* note 378 and accompanying text.

385. [385]. *See, e.g.*, *Va. State Bd. of Pharmacy v. Va. Citizens Consumer Council, Inc.*, 425 U.S. 748, 770 (1976). For example, even if the package insert explicitly states that no relevant comparative data was provided to the FDA, sponsors may still legally share scientific articles with physicians that describe studies comparing different drug forms. *See* Klasmeier & Redish, *supra* note 314, at 322–23.
386. [386]. *But see* David A. Hyman & William E. Kovacic, *Risky Business: Should the FDA Pay Attention to Pharmaceutical Prices?*, 11 N.Y.U. J. L. & Liberty 754, 768–69 (2017) (making the case that the FDA should engage in economic cost-benefit analysis in some circumstances).
387. [387]. *See, e.g.*, C. Peter N. Watson et al., *A Qualitative Systematic Review of Head-to-Head Randomized Controlled Trials of Oral Analgesics in Neuropathic Pain*, 15 Pain Res. & Mgmt. 147, 147 (2010) (“Head-to-head randomized controlled trials ... are critical in all areas of clinical medicine ...”).
388. [388]. *See* Kessler, *supra* note 68, at 438, 440.
389. [389]. *See supra* notes 222–23 and accompanying text (discussing Seroquel XR).
390. [390]. *See infra* notes 445–49 and accompanying text (discussing enantiomers).
391. [391]. 42 U.S.C. § 262(k)(7)(C)(ii)(II) (2018); *see also infra* notes 485–91 and accompanying text (discussing biologics).
392. [392]. Schneeweiss et al., *supra* note 306, at 786 (describing indirect comparisons of data from separate placebo-controlled randomized clinical trials as a route for establishing comparative efficacy). Indeed, if the sponsor seeks to show a difference between two drug versions via an indirect comparison, the placebo-controlled approval data from the first product’s approval can be used as the active control against which the approval data for the second product (likewise placebo-controlled) would be compared.
393. [393]. *See generally* Non-Inferiority Clinical Trials to Establish Effectiveness, *supra* note 58 (discussing the agency’s standards for requiring non-inferiority trials). Note that, though only used for antibiotics, this Guidance proffers a general rationale for using active controls: “Caregivers, third party payers, and some regulatory authorities have increasingly placed an emphasis on the comparative effectiveness of treatments, leading to more studies that compare two treatments. Such studies can provide information about the clinical basis for comparative effectiveness claims, which may be helpful in assessing cost effectiveness of treatments. If a placebo group is included in addition to the active comparator, it becomes possible to judge whether the study could have distinguished treatments that differed substantially, e.g., active drug versus placebo.” *Id.* at 7.
394. [394]. *See supra* Part IV.
395. [395]. Omri Ben-Shahar & Carl E. Schneider, *The Failure of Mandated Disclosure*, 159 U. Pa. L. Rev. 647, 651 (2011).
396. [396]. *See* Russell G. Thornton, *The Learned Intermediary Doctrine and Its Effects on Prescribing Physicians*, 16 Baylor U. Med. Ctr. Proc. 359, 359 (2003). The role of the learned intermediary doctrine is to shield manufacturers from tort claims based on inadequate warnings. Underlying that doctrine is the assumption that the prescriber is responsible for informing the patient of the risks and benefits of a drug. *But see* State *ex rel.* Johnson & Johnson Corp. v. Karl, 647 S.E.2d 899, 909–11 (W. Va. 2007) (declining to adopt the learned intermediary doctrine in part because of the proliferation of direct-to-consumer advertising).
397. [397]. Ben-Shahar & Schneider, *supra* note 395, at 746.

398. [398]. See *supra* notes 356–58 and accompanying text.

399. [399]. For skepticism, see Evans, *supra* note 57, at 508; *supra* note 359 and accompanying text. See also Darrow, *supra* note 47, at 368 (“Although drug labels are required to contain a section describing clinical trial results, this information is buried in section fourteen of the package insert, is often written in such a way that it is difficult for doctors (let alone patients) to understand, and is not standardized even among drugs within the same category, making assessments of comparative efficacy difficult or impossible.” (footnotes omitted)). Professor Darrow’s characterization, however, refers to the current approach to labeling—which does not include comparative information and thus forces physicians who wish to engage in comparative analysis to piece together data from different drug inserts and other sources.

400. [400]. See generally Ann Jacoby et al., *A Qualitative Study to Explore Influences on General Practitioners’ Decisions to Prescribe New Drugs*, 53 Brit. J. Gen. Prac. 120 (2003) (describing the role of professional norms in driving rational prescribing decisions).

401. [401]. Cf. Liora Sukhatme, Note, *Deterring Fraud: Mandatory Disclosure and the FDA Drug Approval Process*, 82 N.Y.U. L. Rev. 1210, 1242 (2007) (explaining the importance of disclosure of drug-related information for another class of individuals with a stake in the accuracy of clinical trial data—investors); see also *supra* notes 293–99 and accompanying text (discussing the complex role of payers in drug pricing).

402. [402]. See *supra* notes 300–01 and accompanying text.

403. [403]. U.S. Food & Drug Admin., A Guide to Drug Safety Terms at FDA 2 (2012), <https://www.fda.gov/downloads/forconsumers/consumerupdates/ucm107976.pdf>. Although the patient normally does not see the package insert until after he or she acquires a drug from the pharmacy, and black box warnings are generally meant for clinicians as learned intermediaries, not patients, the clinicians are actually required to discuss black box warnings with patients before prescribing the drug. See Becky Upham, *What Is a Black Box Warning for a Drug?*, Everyday Health, <https://www.everydayhealth.com/fda/what-black-box-warning-drug> (last updated June 26, 2018). In a similar way, the proposed labeling might initiate a conversation about possible reasons for the switch from one drug form to another between the doctor and the patient.

404. [404]. See *infra* text accompanying notes 519–21 (noting that antitrust actions against product hopping can still play a role even if this Article’s proposal is adopted).

405. [405]. New York *ex rel.* Schneiderman v. Actavis PLC, 787 F.3d 638, 656 (2d Cir. 2015) (explaining that unwillingness to switch back to the generic could be driven by both patient welfare concerns and by the lack of advertising by generics).

406. [406]. Holman et al., *supra* note 150, at 138 (“A critic of follow-on patents might argue that, even in cases in which the follow-on patent covers a trivial or illusory improvement, a drug company may promote the improved version and convince doctors to prescribe it in spite of it being more expensive than the original product and providing little, if any, additional benefit. If that were the case, it would not be the fault of the patent system; it would be a deficiency in the market that should be corrected.”).

407. [407]. Alexander & Stafford, *supra* note 55, at 2488; see Sorenson et al., *supra* note 55, at 514; see also Bethany Fox, *Closing the Information Gap: Informing Better Medical Decisionmaking Through the Use of Post-Market Safety and Comparative Effectiveness Information*, 67 Food & Drug L.J. 83, 83 (2012) (“The statutory efficacy requirements for approval do not require a determination of the

relative effectiveness of the product as compared with other treatment options, which results in a ... dearth of premarket comparative information. Uncertainty regarding the risks and relative benefits of prescription drugs leaves physicians and patients in an information vacuum.”).

408. [408]. See Evans, *supra* note 57, at 470–75.

409. [409]. See *supra* notes 303–10 and accompanying text.

410. [410]. Bourgeois et al., *supra* note 310, at 5–7.

411. [411]. Brett T. Venker et al., *Safety and Efficacy of New Anticoagulants for the Prevention of Venous Thromboembolism After Hip and Knee Arthroplasty: A Meta-Analysis*, 32 J. Arthroplasty 645, 651 (2017); see Iijima et al., *supra* note 308, at 7–12; Y.K. Loke & C.S. Kwok, *Dabigatran and Rivaroxaban for Prevention of Venous Thromboembolism—Systematic Review and Adjusted Indirect Comparison*, 36 J. Clinical Pharmacy & Therapeutics 111, 122 (2011); Schneeweiss et al., *supra* note 306, at 788 (“Robust [comparative effectiveness] results, produced as quickly as possible, have enormous importance for patients and payers.”); van Luijn et al., *supra* note 342, at 446–48.

412. [412]. Alexander & Stafford, *supra* note 55, at 2488.

413. [413]. Eisenberg, *supra* note 100, at 373.

414. [414]. Legislative efforts to install CER can be traced back to the 2003 Medicare Modernization Act, which created the first federal CER mandate. See Carol M. Ashton & Nelda P. Wray, *Comparative Effectiveness Research: Evidence, Medicine, and Policy* 135 (2013).

415. [415]. American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115, 177, 187–88 (2009); see also 42 U.S.C. § 299b-8 (2018) (creating a Federal Coordinating Council for Comparative Effectiveness Research and providing appropriations).

416. [416]. See Patient Protection and Affordable Care Act, Pub L. 111-148, §§ 6301, 6302, 124 Stat. 119, 727–47 (2010).

417. [417]. Riaz Ali et al., *Comparative Effectiveness Research in the United States: A Catalyst for Innovation*, 4 Am. Health & Drug Benefits 68, 69 (2011).

418. [418]. Saver, *supra* note 287, at 2160.

419. [419]. Ali et al., *supra* note 417, at 71.

420. [420]. Alexander & Stafford, *supra* note 55, at 2488.

421. [421]. See, e.g., Scott Gottlieb, *Congress Wants to Restrict Drug Access*, Wall St. J. (Jan. 20, 2009, 12:01 AM), <https://www.wsj.com/articles/SB123241385775896265>; see also Tomas J. Philipson & Eric Sun, *Blue Pill or Red Pill: The Limits of Comparative Effectiveness Research* 6 (2011), https://www.manhattan-institute.org/pdf/fda_04.pdf (“As currently implemented, CER uses population-based measures of response to identify ‘winning’ treatments and shifts demand toward these treatments by affecting clinical decision making and reimbursement policies. That approach falls short of the goal of finding the best treatment for an individual patient and could actually reduce patient health if the ‘winning’ or optimal therapy varies significantly for each patient.”).

422. [422]. See, e.g., Jerry Avorn, *Debate About Funding Comparative-Effectiveness Research*, 360 New Eng. J. Med. 1927, 1928–29 (2009).
423. [423]. Cf. *supra* note 346 and accompanying text (discussing criticisms of proposals to make comparative efficacy a condition of approval).
424. [424]. See Ghislandi, *supra* note 168, at 29 (concluding that follow-on product changes take place primarily within a single firm because “a firm, being able to strategically influence the market, could keep its market shares by patenting and launching a new product similar to the existing ones”); see also *supra* text accompanying note 172 (noting that questions with respect applying the proposed regime to various corporate forms, such as subsidiaries and spinouts, would need to be addressed under the “same firm” inquiry).
425. [425]. See *supra* Part IV.
426. [426]. Wertheimer & Santella, *supra* note 65, at 7 (“[I]t is imperative to separate the constructive process of incremental innovation from transparent attempts to extend patent protection periods with minor modifications of little therapeutic advantage.”); Joanna Shepherd, *The Prescription for Rising Drug Prices: Competition or Price Controls?*, 27 *Health Matrix* 315, 345 (2017) (addressing “sham innovation that does not justify shifts in marketing effort or redirecting consumers”); see also Mueller & Chisum, *supra* note 54, at 1106 n.12 (“Drawing the line between improper attempts at evergreening and legitimate incremental innovation is a broad and difficult problem in patent law ...”).
427. [427]. See generally Govind Persad, *Priority Setting, Cost-Effectiveness, and the Affordable Care Act*, 41 Am. J.L. & Med. 119 (2015) (setting forth potential rationales behind decisions to restrict certain treatments under the Affordable Care Act).
428. [428]. See *supra* notes 105–10 and accompanying text.
429. [429]. 21 U.S.C. § 355(b)(1) (2018).
430. [430]. See 35 U.S.C. § 271(e)(2).
431. [431]. See 21 U.S.C. § 355(j)(2)(A)(vii)(IV). A different statutory provision applies to “use” patents. See *id.* § 355(j)(2)(A)(viii).
432. [432]. See *id.* § 355(j)(5)(B)(iii).
433. [433]. See Bouchard et al., *supra* note 106 (explaining the value of the patent-regulatory linkage for firms marketing approved branded drugs); see also Dogan & Lemley, *supra* note 30, at 709–12 (cataloguing benefits of *Orange Book* listings to brand companies).
434. [434]. Cf. Eisenberg & Crane, *supra* note 33, at 218–20 (calling on the FDA to take on a greater role in managing *Orange Book* listings); Sherkow, *supra* note 33, at 214–15, 250–53 (arguing that the FDA should do more to police the *Orange Book*). Nonetheless, unlike these proposals, this Article does not task the FDA with enforcing any aspect of substantive patent law—another area the agency has been unwilling to enter. Instead, the proposal goes to the FDA’s core competency, which is the evaluation of safety and effectiveness of drugs.

435. [435]. There are, incidentally, already some existing instances of “discrimination” between patents in the context of the patent-FDA regulatory interface, and these provisions confirm that disparate treatment of primary and secondary patents is both precedented and legally cognizable. For example, only one *Orange Book* patent covering a drug is eligible for term extension to account for FDA delays, 35 U.S.C. §156(c)(4), and patents eligible for extension are limited to those on pioneering forms of drugs, *id.* §156(a)(5). See Ouellette, *supra* note 152, at 306 (“Only one patent per drug may be extended, and extensions are granted only for ‘the first permitted commercial marketing or use of the product,’ meaning that a patent owner cannot extend a patent on a drug that is merely a new formulation of an old ‘product.’” (footnotes omitted) (quoting 35 U.S.C. §156(a)(5))). Interestingly, though, patent extensions under this subsection have been allowed for so-called “prodrugs.” See *Photocure ASA v. Kappos*, 603 F.3d 1372, 1375 (Fed. Cir. 2010); Ouellette, *supra* note 152, at 312 & n.84 (addressing the holding in *Photocure ASA v. Kappos*). For a further discussion of prodrugs, see Amy Kapczynski et al., *Polymorphs and Prodrugs and Salts (Oh My!): An Empirical Analysis of “Secondary” Pharmaceutical Patents*, 7 PLoS ONE e49470, Dec. 5, 2012, at 5–8; *infra* note 448 and accompanying text.
436. [436]. Note that an exclusion of certain patents from the *Orange Book* does not violate the “anti-discrimination” provision of the Agreement on Trade-Related Aspects of Intellectual Property Rights (“TRIPS”) Article 27.1, an international treaty that the United States has acceded to, because *Orange Book* listings are viewed as a regulatory benefit that is not a part of the regular bundle of rights that comes with a patent. Agreement on Trade-Related Aspects of Intellectual Property Rights, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C art. 27, Apr. 15, 1994, 1869 U.N.T.S. 299, 33 I.L.M. 1197. Indeed, some TRIPS jurisdictions do not have an *Orange Book* equivalent. See generally Bouchard, *supra* note 106, at 174 (characterizing the “privileged models of therapeutic product development” that exist independent of international treaties). Moreover, although it should be noted that this Article’s proposal does not limit patent rights as such, the Doha Declaration on the TRIPS Agreement and Public Health supports the notion that enforcement of patent rights should be balanced against health-care concerns. See generally Amir Attaran, *The Doha Declaration on the TRIPS Agreement and Public Health, Access to Pharmaceuticals, and Options Under WTO Law*, 12 Fordham Intell. Prop. Media & Ent. L.J. 859 (2002); *WTO Panel Finds 2001 Doha Declaration on the TRIPS Agreement and Public Health Is an Agreement Between Members*, Knowledge Ecology Int’l (Sept. 19, 2018), <https://www.keionline.org/28950>. I thank Professor Janewa Osei-Tutu for suggesting that I make this point.
437. [437]. 35 U.S.C. § 271(a)–(c); see *aaiPharma Inc. v. Thompson*, 296 F.3d 227, 241 n.7 (4th Cir. 2002) (“It is important to recognize that the ... patentee can still pursue patent infringement suits against generic manufacturers. It is simply deprived of the opportunity to litigate its infringement claims under the shelter of the thirty-month stay.”).
438. [438]. See, e.g., *AstraZeneca AB v. Apotex Corp.*, 782 F.3d 1324, 1329–32, 1343–44 (Fed. Cir. 2015).
439. [439]. See Hemphill & Sampat, *supra* note 51, at 327–28.
440. [440]. Cf. *supra* Section IV.B.2 (explaining that evidence that has not been vetted by the FDA and lacks clinical validity can influence non-obviousness determinations at the PTO or during litigation); see also Jacob S. Sherkow, *Patent Law’s Reproducibility Paradox*, 66 Duke L.J. 845, 907–11 (2017) (noting that information developed after the filing of a patent application sometimes brings to light the fact that the claims fail the enablement requirement of patentability).

441. [441]. See, e.g., *Johnson & Johnson Vision Care, Inc. v. CIBA Vision Corp.*, 712 F. Supp. 2d 1285, 1290–94 (M.D. Fla. 2010) (denying an injunction in a health care patent infringement case based in part on the public interest factor for whether to grant equitable relief). Because of the proposed de-linking from the *Orange Book*, the patentee would not have a remedy of an automatic injunction against ANDA approval under 35 U.S.C. § 271(e)(4)(B), another important benefit of listing. See *Braintree Labs., Inc. v. Novel Labs., Inc.*, 749 F.3d 1349, 1367 (Fed. Cir. 2014) (Moore, J., dissenting) (“[W]hile the injunction remedy [under 35 U.S.C. § 283] rests within the discretion of the district court, the order to delay the approval of the ANDA until patent expiration *is not* discretionary. [35 U.S.C. § 271(e)(4)(A),(B)]... [T]his is exactly what the statutory language commands. The statute requires the court to delay approval until expiration of the patent, even if there is only a single infringement. And since the generic can’t launch without FDA approval, the statute creates a de facto injunction.”).
442. [442]. Cf. *AstraZeneca*, 782 F.3d at 1344 (discussing measurement of the “value of what was taken” in the determination of reasonable royalty damages in a Hatch-Waxman case). Another, even more powerful, option for the prevailing patentee is the lost profits measure of damages. See *id.* at 1334 n.3; David Manspeizer, *The Law on Damages in Generic Drug Launches Remains Vague*, N.Y. L.J., Jan. 6, 2014, at 2, <https://www.law.com/newyorklawjournal/almID/1202633987243>.
443. [443]. U.S. Food & Drug Admin., Policy and Procedures: Office of Pharmaceutical Quality: NDA Classification Codes 2–5 (2015), <https://www.fda.gov/downloads/aboutfda/centersoffices/officeofmedicalproductsandtobacco/cder/manualofpoliciesprocedures/ucm470773.pdf>. This manual also discusses other types of new drug products that are not relevant to the purposes of this Article’s proposal. *Id.* at 5–7.
444. [444]. *Id.* Conceptually similar to these categories might be chemical entities related to the original product, such as enantiomers and prodrugs, discussed below. See *infra* note 448; see also *supra* note 435 (referencing a term extension carve-out for patents covering new formulations).
445. [445]. See Kyle Faget, Comment, *Why FDCA Section 505(U) Should Not Concern Us Greatly*, 15 Mich. Telecomm. & Tech. L. Rev. 453, 454 (2009) (discussing the “limited effect [of §505(u)] on drug development incentives”); see also Lemley, *supra* note 207, at 1377–79, 1384–87 (scrutinizing the patenting of enantiomers). See generally Darrow, *supra* note 168 (describing racemate drugs and enantiomers).
446. [446]. See 21 U.S.C. § 355(u) (2018); Faget, *supra* note 445, at 458–65; Aparna Nemlekar et al., *FDA Is Evolving on Qualifications for ‘New Chemical Entity’*, Pepper Hamilton LLP (Sept. 7, 2016), <http://www.pepperlaw.com/publications/fda-is-evolving-on-qualifications-for-new-chemical-entity-2016-09-07>.
447. [447]. See, e.g., *Aventis Pharma Deutschland GmbH v. Lupin, Ltd.*, 499 F.3d 1293, 1301–03 (Fed. Cir. 2007) (discussing unexpected clinical properties of the claimed enantiomer in the context of §103 analysis); see also *UCB, Inc. v. Accord Healthcare, Inc.*, 890 F.3d 1313, 1318 (Fed. Cir. 2018) (upholding the validity of an enantiomer patent where the specification stated “that ‘the R stereoisomer is unexpectedly more potent than the corresponding S stereoisomer and the racemic mixture.’” (citation omitted)). To be sure, sometimes weighing against non-obviousness in enantiomer cases is the difficulty of enantiomer separation—which, combined with unexpected properties, could bolster the case for patentability. See, e.g., *Sanofi-Synthelabo v. Apotex, Inc.*, 550 F.3d 1075, 1088 (Fed. Cir. 2008) (“The district court found that this separation was not a simple or routine procedure and that success in separation, as well as the allocation of properties, was unpredictable.”); *Forest Labs., Inc. v. Ivax Pharm., Inc.*, 501 F.3d 1263, 1269 (Fed. Cir. 2007); *Mansfield*, <https://ilr.law.uiowa.edu/print/volume-104-issue-3/the-more-things-change-improvement-patents-drug-modifications-and-the-fda/>

supra note 14. Conversely, the challenges of making the claimed formulation in a useful form are sometimes introduced to bolster non-obviousness of patents on extended-release formulations. *See, e.g., Acorda Therapeutics, Inc. v. Roxane Labs., Inc.*, No.

14–882–LPS, 2017 WL 1199767, at *25 (D. Del. Mar. 31, 2017) (noting an argument that the prior art compound “is highly soluble, making it difficult to slow its release”), *aff’d on other grounds*, 903 F.3d 1310 (Fed. Cir. 2018).

448. [448]. Another common modification type is the formation of a so-called “prodrug,” a chemically modified version of the active drug that metabolizes to the active form of the drug. Such derivatives could improve the therapeutic efficacy of the drug product, and also its stability. *See generally, e.g., Sherif I. Farag Badawy, Effect of Salt Form on Chemical Stability of an Ester Prodrug of a Glycoprotein IIb/IIIa Receptor Antagonist in Solid Dosage Forms*, 223 Int’l J. Pharmaceutics 81 (2001) (finding that a “salt form” modification has significant value for the pH stability of a drug). Arguments made in this Article about new formulations and enantiomers apply to prodrugs (as well as other modifications, such as new salt or crystalline forms of drugs), with the caveat that the discussion of manufacturing improvements in the paragraph that follows is also highly relevant to these products. *See, e.g., Millennium Pharm., Inc. v. Sandoz Inc.*, 862 F.3d 1356, 1362, 1368–69 (Fed. Cir. 2017) (holding claimed ester prodrug non-obvious, as established through “unexpectedly superior stability, solubility, and dissolution” where prior art compound was denied FDA approval because of instability); *In re Carabateas*, 345 F.2d 1013, 1017–18 (C.C.P.A. 1965) (holding claimed ester prodrug obvious in spite of some improved therapeutic properties); *see also supra* note 443 and accompanying text (discussing drugs products that fall under Type 2 in the FDA’s NDA classification scheme, including esters and salts, that sometimes function as prodrugs). Interestingly, the FDA already excludes metabolites—which can be thought of as a flip-side of prodrugs (as they are the active form of a drug into which the chemical ingested by patients metabolizes)—from the *Orange Book*. *See* 21 C.F.R. § 314.53(b) (2018) (“Process patents, patents claiming packaging, patents claiming metabolites, and patents claiming intermediates are not covered by this section, and information on these patents must not be submitted to FDA.”); Sherkow, *supra* note 33, at 216, 252–53 (discussing this provision and using it as an example of *Orange Book* policing that the FDA already performs); *see also* Schering Corp. v. Geneva Pharm., Inc., 339 F.3d 1373, 1381–82 (Fed. Cir. 2003) (defining metabolites and invalidating a metabolite patent); Mueller & Chisum, *supra* note 54, at 1147–54 (using *Schering v. Geneva* as an example of the Federal Circuit’s efforts to combat evergreening). *But see* Holman et al., *supra* note 150, at 141–42 (providing an example of a patented metabolite that offered a significant therapeutic advantage over the original drug).

449. [449]. *See generally* Neil Vargesson, *Thalidomide-Induced Teratogenesis: History and Mechanisms*, 105 Birth Defects Res. (Part C) 140 (2015) (detailing the cause of widespread birth defects caused by thalidomide).

450. [450]. *See generally, e.g., Auquier et al., supra* note 14 (concluding that escitalopram, an enantiomer, was more effective than its racemate counterpart).

451. [451]. *See generally* W. Nicholson Price II, *Making Do in Making Drugs: Innovation Policy and Pharmaceutical Manufacturing*, 55 B.C. L. Rev. 491 (2014) (setting forth a framework for incentivizing improvements to drug manufacturing processes). For an example of an argument for patentability based mainly on unexpected non-therapeutic properties of a new salt compound, though one discounted by the Federal Circuit, *see* *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1368 (Fed. Cir.) (“[W]e hold that the optimization of the acid addition salt formulation for an active pharmaceutical ingredient would have been obvious where as here the acid addition salt formulation has no effect on the therapeutic effectiveness of the active ingredient and the prior art heavily suggests the particular anion used to form the salt.”), *reh’g en banc denied*, 488 F.3d 1377 (Fed. Cir. 2007) (mem.). *But see* *Pfizer*, 488 F.3d at 1382 (Lourie, J., dissenting from denial of rehearing en banc) (“[T]he panel

improperly placed greater importance on the therapeutic value of a claimed compound over the value of its physical properties.”); *id.* at 1384 (Rader, J., dissenting from denial of rehearing en banc) (“The panel also mistakenly determined that the superior properties of the besylate did not overcome a *prima facie* case of obviousness because they showed no superior *therapeutic value*—the maleate salt form of amlodipine worked just as well as the besylate form in clinical trials. Therapeutic value, however, is just one property of a pharmaceutical. Other properties, such as solubility, stability, hygroscopicity, and processability, must also play a role in the analysis of advantages.”); *cf.* Glaxo Grp. Ltd. v. Apotex, Inc., 376 F.3d 1339, 1349 (Fed. Cir. 2004) (finding that both unexpected bioavailability and stability of an amorphous form of a compound were evidence of unexpected results over the prior art).

452. [452]. See 21 C.F.R. § 314.53(b)(1) (2018) (excluding “[p]rocess patents, patents claiming packaging, patents claiming metabolites, and patents claiming intermediates” from the *Orange Book*). Many drug modifications that could in fact improve a drug’s manufacturing or handling features (e.g., shelf stability of the drug), such as crystalline (or polymorphic) forms, are listable, however. See, e.g., Abbott Labs. v. Sandoz, Inc., 566 F.3d 1282, 1285–94 (Fed. Cir. 2009); *cf.* 21 C.F.R. § 314.53(b)(2) (imposing unique test data requirements for *Orange Book* listings of polymorphs).

453. [453]. See *supra* notes 16–24 and accompanying text.

454. [454]. See *supra* note 136 and accompanying text.

455. [455]. See Warner-Lambert Co. v. Apotex Corp., 316 F.3d 1348, 1363 (Fed. Cir. 2003); Rebecca S. Eisenberg, *The Problem of New Uses*, 5 Yale J. Health Pol’y L. & Ethics 717, 720, 721–22 (2005); Benjamin N. Roin, Solving the Problem of New Uses 31 (Oct. 14, 2016) (unpublished manuscript), <https://www.bu.edu/law/files/2016/10/Solving-the-Problem-of-New-Uses-Ben-n.-Roin.pdf>. But *cf.* Sam F. Halabi, *The Drug Repurposing Ecosystem: Intellectual Property Incentives, Market Exclusivity, and the Future of “New” Medicines*, 20 Yale J. L. & Tech. 1, 61–63 (2018) (contending that new pharmaceutical uses of known chemical compounds are often discovered without traditional incentives, such as patents and regulatory exclusivities).

456. [456]. See generally Dmitry Karshedt, *Causal Responsibility and Patent Infringement*, 70 Vand. L. Rev. 565 (2017) (arguing that patent law sometimes imposes unduly elevated mens rea requirements for proving infringement of method claims); Erika Lietzan, *Paper Promises for Drug Innovation*, 26 Geo. Mason L. Rev. (forthcoming 2019), <https://ssrn.com/abstract=3103293> (contending that research into new uses of existing drugs is underincentivized). But *cf.*, e.g., Sanofi v. Watson Labs. Inc., 875 F.3d 636, 644–46 (Fed. Cir. 2017) (upholding a finding of indirect infringement by a generic manufacturer in a Hatch-Waxman case).

457. [457]. See, e.g., Burroughs Wellcome Co. v. Barr Labs., Inc., 40 F.3d 1223, 1232 (Fed. Cir. 1994) (upholding the validity of a method of use patent for treating the symptoms of HIV-AIDS).

458. [458]. *Cf.*, e.g., Sorenson et al., *supra* note 55, at 300 (suggesting making comparative efficacy a condition of drug approval in Europe).

459. [459]. *Cf. supra* notes 346–49 and accompanying text (discussing these critiques).

460. [460]. See 21 U.S.C. § 355(d) (2018).

461. [461]. I thank Professor Patricia Zettler for suggesting that I make this point.

462. [462]. See, e.g., Determination that the OXYCONTIN (Oxycodone Hydrochloride) Drug Products Covered by New Drug Application 20–553 Were Withdrawn from Sale for Reasons of Safety or Effectiveness, 78 Fed. Reg. 23,273, 23,274 (Apr. 18, 2013) (“Original OxyContin has the same therapeutic benefits as reformulated OxyContin. Original OxyContin, however, poses an increased potential for abuse by certain routes of administration, when compared to reformulated OxyContin. Based on the totality of the data and information available to the Agency at this time, FDA concludes that the benefits of original OxyContin no longer outweigh its risks.”); Holman et al., *supra* note 150, at 141–42 (providing another example of withdrawal of a prior formulation); Patricia J. Zettler et al., *Implementing a Public Health Perspective in FDA Drug Regulation*, 73 Food & Drug L.J. 221, 228–39 (2018) (discussing the FDA’s withdrawal of approval for previously approved opioids due to safeguards in new formulas).
463. [463]. See generally Zettler et al., *supra* note 462 (explaining how this dynamic can aid the FDA in promoting public health).
464. [464]. See *id.* at 237.
465. [465]. Lars Noah, *Product Hopping 2.0: Getting the FDA to Yank Your Original License Beats Stacking Patents*, 19 Marq. Intell. Prop. L. Rev. 161, 167–68 (2015).
466. [466]. Cf. Darrow, *supra* note 47, at 410–17 (analyzing the limits of fraud actions implicating FDA approvals). See generally Maria Elena Flacco et al., *Head-to-Head Randomized Trials Are Mostly Industry Sponsored and Almost Always Favor the Industry Sponsor*, 68 J. Clinical Epidemiology 811 (2015) (describing the incentives of pharmaceutical companies to discount unfavorable data).
467. [467]. See, e.g., *In re Suboxone (Buprenorphine Hydrochloride and Naloxone) Antitrust Litig.*, 64 F. Supp. 3d 665, 682 (E.D. Pa. 2014) (discussing how disparagement of one’s product and perceived threat of withdrawal could convince both patients and doctors to switch to a company’s newer product and explaining how such a strategy could help support an antitrust claim). For an analysis of antitrust theories based on disparagement, see Michael A. Carrier & Carl J. Minniti III, *Biologics: The New Antitrust Frontier*, 2018 U. Ill. L. Rev. 1, 60–65.
468. [468]. See generally Michael S. Labson, *Pediatric Priorities: Legislative and Regulatory Initiatives to Expand Research on the Use of Medicines in Pediatric Patients*, 6 J. HealthCare L. & Pol’y 34 (2002) (describing the historical development of the Pediatric Rule). I thank Professor Erika Lietzan for suggesting this example.
469. [469]. See *Ass’n of Am., Physicians & Surgeons, Inc. v. U.S. Food & Drug Admin.*, 226 F. Supp. 2d 204, 219–22 (D.D.C. 2002), *appeal dismissed on stipulation*, Order at 1, Nos. 02-5407, 03-5005, 2003 WL 22972071, at *1 (D.C. Cir. Dec. 11, 2003). Prior to the dismissal, the Court of Appeals for the District of Columbia ordered the parties to “address in their briefs the question how this court can enforce a rule that the agency has not sought to defend on appeal and that the governing statute does not compel.” Order at 1, *Ass’n of Am. Physicians & Surgeons, Inc. v. Food & Drug Admin.*, Nos. 02-5407, 03-5005, 2003 WL 21384604, at *1 (D.C. Cir. May 28, 2003).
470. [470]. See *Ass’n of Am., Physicians & Surgeons*, 226 F. Supp. 2d at 211–22 (holding that the Pediatric Rule lacks support in any of the provisions of the FDCA relied upon by the FDA and is therefore beyond the agency’s jurisdiction).
471. [471]. See Pediatric Research Equity Act of 2003, Pub. L. 108-155, 117 Stat. 1936, 1937–40 (2003).

472. [472]. *Priority Review*, U.S. Food & Drug Admin., <https://www.fda.gov/ForPatients/Approvals/Fast/ucm405405.htm> (last updated Jan. 4, 2018). *See generally* Erin E. Kepplinger, *FDA's Expedited Approval Mechanisms for New Drug Products*, 34 *Biotechnology L. Rep.* 15 (2015) (discussing the development and function of expedited approval mechanisms).
473. [473]. *See* Kepplinger, *supra* note 472, at 24–25; *Eagle Pharm., Inc. v. Azar*, Civ. No. 16-790 (TJK), 2018 WL 3838265, at *2, *5–10 (D.D.C. June 8, 2018) (striking down an FDA regulation that imposed the “clinically superior” standard for orphan drug approvals without statutory support, while acknowledging that Congress later passed a statute codifying this standard), *further proceedings*, 2018 WL 3838223 (D.D.C. Aug. 1, 2018), *appeal docketed*, No. 18-5254 (D.C. Cir. Aug. 24, 2018); *Depomed, Inc. v. U.S. Dep’t of Health & Human Servs.*, 66 F. Supp. 3d 217, 226, 229 (D.D.C. 2014).
474. [474]. For a critical review of the FDA’s tendency to push the boundaries of its authority, see Lars Noah, *Administrative Arm-Twisting in the Shadow of Congressional Delegations of Authority*, 1997 *Wis. L. Rev.* 873, 931–35.
475. [475]. As noted, the FDA has imposed specialized approval requirements (e.g., a showing of efficacy relative to an active comparator rather than placebo) for some types of drugs. *See, e.g.*, *Non-Inferiority Clinical Trials to Establish Effectiveness*, *supra* note 58; *see also* *Non-Inferiority Clinical Trials to Establish Effectiveness: Guidance for Industry; Availability*, 81 *Fed. Reg.* 78,605 (Nov. 8, 2016) (announcing the finalized non-inferiority Guidance); *Draft Guidance for Industry on Non-Inferiority Clinical Trials; Availability*, 75 *Fed. Reg.* 9228 (Mar. 1, 2010) (providing a draft non-inferiority Guidance). It is not clear how specifically the FDA has reconciled this Guidance with the language of the FDCA, but it does not seem to have encountered significant opposition from the industry. *See, e.g.*, *Comment Letter from Donald R. Jaffe, Dir., Worldwide Regulatory Strategy, Worldwide Regulatory Affairs & Quality Assurance, Pfizer Inc., to Div. of Dockets Mgmt. (HFA-305), Food & Drug Admin.* (June 1, 2010), <https://www.regulations.gov/document?D=FDA-2010-D-0075-0019> (providing suggestions for improving the Guidance).
476. [476]. 21 U.S.C. § 352(f)(1) (2018); *cf. Ass’n of Am., Physicians & Surgeons, Inc. v. U.S. Food & Drug Admin.*, 226 F. Supp. 2d 204, 213–14 (D.D.C. 2002). The counterargument is that the sponsor is not seeking an indication for marketing comparative utility between two drug forms, however.
477. [477]. *Ass’n of Am., Physicians & Surgeons*, 226 F. Supp. 2d at 221.
478. [478]. *See* 21 U.S.C. § 355(b)(1) (referring to a listing requirement for “any patent which claims the drug for which the applicant submitted the application”). *But see* 21 C.F.R. § 314.53(b)(1) (2018) (excluding metabolites from *Orange Book* listings); *see also id.* § 314.53(b)(1)–(2) (requiring special test data “[f]or patents that claim only a polymorph”).
479. [479]. Indeed, even without a general requirement of comparative efficacy, such data is available as part of some approval packages—which means that the FDA sometimes analyzes data developed based on an active-comparator control. *See* Goldberg et al., *supra* note 306, at 1788 (“[A]bout half of all new drugs approved in the United States since 2000 were compared with an alternative treatment prior to market authorization, and the results of this comparison were publicly available in the FDA approval packages.”). To be sure, the data set discussed in this study is for new molecular entity drugs. *See also* Downing et al., *supra* note 59, at 373–74 (“Comparative effectiveness information, which is not required as part of FDA approval and involves comparison of an intervention with an active control, was available for less than half of indications, consistent with prior research, but leaving uncertainty about the benefits and safety

of these medications when compared with other available therapeutic agents.” (footnote omitted)); Gottlieb, *supra* note 356, at 5 (“[D]rug companies already take on the enormous investment in preapproval superiority trials to gain market access for their new drugs.... In cases where drug makers undertake comparative trials to help secure reimbursement, they are doing the studies before approval and submitting them as part of their FDA files so they have the information available at the time of approval.”). Nonetheless, it is clear that drug companies do not generate this information in a significant number of product hopping cases, perhaps in part because of the market failures outlined in Part IV. In addition, there may be concerns with the quality and independent scrutiny of the voluntarily generated information. *See supra* note 306 and accompanying text.

480. [480]. *See supra* notes 472–73 and accompanying text.

481. [481]. *See* Non-Inferiority Clinical Trials to Establish Effectiveness, *supra* note 58; *see also* Zachary Brennan, *When Can Non-Inferiority Trials Establish Efficacy? FDA Explains with Guidance*, Reg. Aff. Profs. Soc’y (Nov. 7, 2016), <http://www.raps.org/Regulatory-Focus/News/2016/11/07/26134/When-can-Non-Inferiority-Trials-Establish-Efficacy-FDA-Explains-With-Guidance>. *But cf.* Gottlieb, *supra* note 346, at 2–5 (describing potential challenges in the conduct of non-inferiority trials and some approaches to dealing with them). For another helpful discussion of non-inferiority trials, *see generally* Sandeep K. Gupta, *Non-Inferiority Clinical Trials: Practical Issues and Current Regulatory Perspective*, 43 Indian J. Pharmacology 371, 371 (2011) (evaluating practical distinctions “between non-inferiority and superiority trials”).

482. [482]. 21 U.S.C. § 360cc(c), (e) (2018).

483. [483]. Pediatric Research Equity Act of 2003, Pub. L. No. 108-155, § 2(c), 117 Stat. 1936, 1940 (2003) (“(1) [I]f approved, the drug or biological product would represent a significant improvement in the treatment, diagnosis, or prevention of a disease, compared with marketed products adequately labeled for that use in the relevant pediatric population; or (2) the drug or biological product is in a class of products or for an indication for which there is a need for additional options.”); *see also* Labson, *supra* note 468, at 54 (explaining that “[i]mprovement over existing products” under the “meaningful therapeutic benefit” standard for waiver of pediatric trials under the Pediatric Rule “would be demonstrated by 1) evidence of increased effectiveness in treatment, prevention, or diagnosis of disease, 2) elimination or substantial reduction of a treatment-limiting drug reaction, 3) documented enhancement of patient compliance, or 4) evidence of safety and effectiveness in a new subpopulation”).

484. [484]. *See* 21 C.F.R. § 314.126(b)(2)(iv) (2018); *supra* note 479 and accompanying text.

485. [485]. The parallels are, to be sure, rough—there are many significant differences between the Hatch-Waxman and the BPCIA, ranging from the length of the brand’s regulatory exclusivity period to the conduct of patent litigation between brands and biosimilar applicants. *See, e.g.,* Heled, *supra* note 82, at 436–43. *See generally* Krista Hessler Carver et al., *An Unofficial Legislative History of the Biologics Price Competition and Innovation Act of 2009*, 65 Food & Drug L.J. 671 (2010) (discussing the events leading up to the passage of the Biologics Price Competition and Innovation Act and explaining its provisions).

486. [486]. *See, e.g.,* Karshedt, *supra* note 160, at 136–37; Bryan A. Liang, *Regulating Follow-On Biologics*, 44 Harv. J. on Legis. 363, 369 (2007).

487. [487]. *See generally* Carver et al., *supra* note 485 (providing an overview of the BCPIA’s history).

488. [488]. 42 U.S.C. § 262(k)(7)(C)(ii)(II) (2018). This statute also forbids granting separate exclusivity to the same firm when “a change (not including a modification to the structure of the biological product) ... results in a new indication, route of administration, dosing schedule, dosage form, delivery system, delivery device, or strength.” *Id.* § 262(k)(7)(C)(ii)(I).
489. [489]. U.S. Food & Drug Admin., Guidance for Industry: Reference Product Exclusivity for Biological Products Filed Under Section 351(a) of the PHS Act 7 (2014), <https://www.fda.gov/downloads/Drugs/GuidanceComplianceRegulatoryInformation/Guidances/UCM407844.pdf>; *see also* James E. Valentine & James C. Shehan, *FDA’s New Biosimilars Guidance Has Sponsors Provide Information to Win Reference Product Exclusivity; Liberal Criteria Opens the Door to More Exclusivities Being Awarded*, FDA Law Blog (Aug. 9, 2014), www.fdalawblog.net/fda_law_blog_hyman_phelps/2014/08/fdas-new-biosimilars-guidance-has-sponsors-provide-information-to-win-reference-product-exclusivity-.html (discussing this Guidance).
490. [490]. *Cf.* Erika Lietzan, *The Uncharted Waters of Competition and Innovation in Biological Medicines*, 44 Fla. St. U. L. Rev. 883, 938–41 (2017) (criticizing the BPCIA’s potential, based on the provisions of § 262(k)(7)(C)(ii), to discourage post-approval innovation by firms that have a biologic product on the market).
491. [491]. *See* Janet Freilich, *Patent Infringement in the Context of Follow-On Biologics*, 16 Stan. Tech. L. Rev. 9, 23 (2012) (“[T]he BPCIA includes an ‘anti-evergreening’ provision: a list of improvements in a drug that do not qualify for an exclusivity period—an effort to reduce the strategic small improvements made by producers of small molecule drugs in an attempt to extend their market monopoly.”); *id.* at 11 n.7 (stating that “the BPCIA contains anti-evergreening provisions intended to curb some of the strategic patenting seen in generic drugs”); Kurt R. Karst, *BPCIA’s Principal Authors Seek to Clarify Congressional Intent with Respect to 12-Year Exclusivity Period; PhRMA/BIO Request “Umbrella Exclusivity,”* FDA Law Blog (Jan. 5, 2011), www.fdalawblog.net/2011/01/bpcias-principal-authors-seek-to-clarify-congressional-intent-with-respect-to-12-year-exclusivity-pe (“[Section]351(k)(7)(C) is intended to prevent evergreening by excluding most product changes from qualifying for a new 12-year exclusivity period.”); Heled, *supra* note 82, at 463–64 (“BPCIA accounts for the risk of abuse of statutory exclusivities by specifically and explicitly disallowing grants of market and data exclusivities under certain circumstances... . Patent law, on the other hand, does not seem to have the same kind of safeguards against abuse.”); *see also* Carver et al., *supra* note 485, at 764–66, 791–96 (chronicling the BPCIA evergreening debate). “Evergreening” is a term (often thought of as pejorative) that refers generally to strategies that brand companies use to maintain exclusivities for their products. *See supra* note 64 and accompanying text; *see also* Robin Feldman, *May Your Drug Price Be Ever Green* (UC Hasting Research Paper No. 256, 2018) (manuscript at 11), <https://ssrn.com/abstract=3061567> (“[M]any drugs with high prices have been available far longer than the 20-year term of a patent, and the modern drug approval system is designed to encourage generic versions of drugs after that time.”); Prajapati & Dureja, *supra* note 215 (analyzing product lifecycle management); Song & Han, *supra* note 96 (cataloguing strategic behaviors in the pharmaceutical industry); Valoir, *supra* note 44 (discussing follow-on patenting and other exclusivity “extension” strategies). For an overview of evergreening in a small-molecule context, see generally Thomas, *supra* note 64.

492. [492]. Indeed, Professor Benjamin Roin has argued that, because many incremental innovations in the pharmaceutical space are in fact unpatentable, we have seen underinvestment into research involving drug products that have high potential to improve human health. *See generally* Roin, *supra* note 136.
493. [493]. *See supra* notes 138–42 and accompanying text.
494. [494]. *See supra* notes 387–94 and accompanying text.
495. [495]. Thus, with the comparative information on the insert, drug firms could advertise the advantages of the drug to clinicians without the concern of facing a lawsuit for misbranding. *See supra* notes 317–18, 384–85 and accompanying text.
496. [496]. *Cf.* Gottlieb, *supra* note 346, at 5–6 (describing the challenges facing drug makers in convincing payers to cover new drugs).
497. [497]. *See supra* notes 342–43 and accompanying text.
498. [498]. *See supra* notes 217–23 and accompanying text.
499. [499]. *See supra* note 138 and accompanying text. Of course, although a product hop accompanied by secondary patenting can enable the manufacturer to maintain control over the market, the exclusivity is not really being extended because the primary patents have expired. *Cf.* Jonathan J. Darrow, *Debunking the “Evergreening” Patents Myth*, 131 Harv. L. Rec. 6, 6 (2010) (explaining that patenting modifications to a product covered by a pioneering patent does not “extend” the term of that patent).
500. [500]. *See* Josh Bloom, *Should Patents on Pharmaceuticals Be Extended to Encourage Innovation? Yes: Innovation Demands It*, Wall St. J. (Jan. 23, 2012), <https://www.wsj.com/articles/SB10001424052970204542404577156993191655000>. *See generally* Erika Lietzan, *The History and Political Economy of the Hatch-Waxman Amendments*, 49 Seton Hall L. Rev. 53 (2018) (maintaining that the purported compromise of the Hatch-Waxman Act was actually a bad deal for brand companies).
501. [501]. *See supra* notes 16–24 and accompanying text.
502. [502]. Commentators have expressed concern that sponsors’ control of the relevant information might enable them to succeed before the FDA by manipulating clinical trial results. *See* Flacco et al., *supra* note 466, at 815–18; *see also* Thomas O. McGarity, *Beyond Buckman: Wrongful Manipulation of the Regulatory Process in the Law of Torts*, 41 Washburn L.J. 549, 559 (2002) (“When the onus is on the regulatee to provide data establishing that its product is ‘safe and effective’ ... , the temptation is strong for a company to discount data indicating that the product may not meet the statutory test.”). Still, the advantage of this Article’s proposal over what is done currently is that comparative claims would no longer go completely unvetted. As to the problem of firms’ presentation of inaccurate information to the FDA, claims against pharmaceutical companies based on “fraud-on-the-FDA” theories have ended in mixed results. *See, e.g.,* *Desiano v. Warner-Lambert & Co.*, 467 F.3d 85, 96–98 (2d Cir. 2006) (allowing such claims under Michigan law), *aff’d by an equally divided court sub nom.* *Warner-Lambert Co. v. Kent*, 552 U.S. 440 (2008) (per curiam). *But see* *Lofton v. McNeil Consumer & Specialty Pharm.*, 672 F.3d 372, 379–80 (5th Cir. 2012) (disagreeing with the reasoning of *Desiano* and holding fraud-on-the-FDA claims under Texas law are preempted by an FDA regulation). *See generally* Darrow, *supra* note 47, at 410–17 (explaining the limits of fraud actions implicating FDA approvals).

503. [503]. Cahoy, *supra* note 305, at 625–26 (“Because greater transparency generally means greater tort exposure, companies may make the logical choice to simply diminish the source of liability. In other words, companies may reduce the amount of information they create (e.g., by conducting fewer voluntary clinical trials).”); Allan M. Joseph, *Kid Tested, FDA Approved: Examining Pediatric Drug Testing*, 72 Food & Drug L.J. 543, 548 (2017) (“Manufacturers are often reluctant to perform additional trials of any sort after approval because such trials ‘pose a risk of exposing previously unrecognized toxicities, thereby reducing rather than expanding product demand.’” (quoting Eisenberg, *supra* note 455, at 720)).
504. [504]. See, e.g., Wyeth v. Levine, 555 U.S. 555, 577–81 (2009); see also Jodie M. Gross & Judi Abbott Curry, *The Federal Preemption Debate in Pharmaceutical Labeling Product Liability Actions*, 43 Tort Trial & Ins. Prac. L.J. 35, 36–37 (2007) (analyzing deference to the FDA’s approach to preemption); cf. Catherine M. Sharkey, *Federalism Accountability: “Agency-Forcing” Measures*, 58 Duke L.J. 2125, 2128–30 (2009) (scrutinizing the FDA’s strategies for having required drug labeling preempt state law tort claims).
505. [505]. See Eisenberg & Price, *supra* note 309, at 18 (“[C]omparative effectiveness research runs the risk of showing that a new drug is worse than existing treatments. Since placebo-controlled trials are generally enough to win regulatory approval, drug companies may decide not to take the risk of demonstrating inferiority rather than superiority for the patent-protected product.”); D.N. Lathyris et al., *Industry Sponsorship and Selection of Comparators in Randomized Clinical Trials*, 40 Eur. J. Clinical Investigation 172, 172 (2010).
506. [506]. See *supra* notes 222–23 and accompanying text; see also *supra* note 479 and accompanying text (explaining that comparative data is sometimes available in approval packages).
507. [507]. See *supra* notes 433–35 and accompanying text.
508. [508]. See *supra* notes 267–70 and accompanying text.
509. [509]. See *supra* notes 372–80 and accompanying text.
510. [510]. See *supra* note 306 and accompanying text.
511. [511]. See *supra* Section III.B.2. I say “putative” because the validity of some of the Namenda XR patents has not yet been fully tested post-issuance.
512. [512]. See *supra* notes 433–35 and accompanying text.
513. [513]. See, e.g., Ron Nixon, *Funding Gap Hinders Law for Ensuring Food Safety*, N.Y. Times (Apr. 7, 2015), <https://www.nytimes.com/2015/04/08/us/food-safety-laws-funding-is-far-below-estimated-requirement.html>.
514. [514]. See, e.g., Epstein, *supra* note 344, at 12 (“The harms that are caused by particular therapeutic agents—such as thalidomide, which causes major limb deformities—attract immense political pressures to ban these dangerous products from the marketplace. Overall, the result is a strong bias to overweigh Type I error [of erroneous approval] relative to the quiet harms that arise when individuals die for want of therapeutic agents that languish unapproved within the FDA.” (footnotes omitted)).
515. [515]. See Prescription Drug User Fee Act of 1992, Pub. L. 102-571, 106 Stat. 4491–505 (1992) (codified as 21 U.S.C. §§ 379g–h (2018)).

516. [516]. See, e.g., Cahoy, *supra* note 305, at 670 (“[T]he [Institute of Medicine] Report noted that the agency’s heavy reliance on user-fees for funding exacerbates the concern regarding industry influence.” (citing Institute of Med. Nat’l Acads., *The Future of Drug Safety: Promoting and Protecting the Health of the Public* 73 (2007))); Dogan & Lemley, *supra* note 30, at 689–90, 699. See generally James T. O’Reilly, *Losing Deference in the FDA’s Second Century: Judicial Review, Politics, and a Diminished Legacy of Expertise*, 93 Cornell L. Rev. 939 (2008) (providing examples of the FDA’s political capture). But see generally Rachel E. Barkow, *Insulating Agencies: Avoiding Capture Through Institutional Design*, 89 Tex. L. Rev. 15 (2010) (proposing various mechanisms for shielding agencies from undue influence); see also *id.* at 47 & n.178 (contending that “the FDA is relatively more independent than other executive agencies, with its heads often advocating for drug regulation regardless of the position of their appointing president,” but noting concerns with capture (footnote omitted)).

517. [517]. See *supra* notes 403–04 and accompanying text.

518. [518]. See *supra* notes 410–14 and accompanying text.

519. [519]. See *supra* notes 458–61 and accompanying text.

520. [520]. See Dogan & Lemley, *supra* note 30, at 711–17 (providing a framework for antitrust analysis of this conduct); see also Comment Letter from Ameet Sarpatwari et al., to Div. of Dockets Mgmt., Food & Drug Admin. (Sept. 18, 2017), <https://www.regulations.gov/document?D=FDA-2017-N-3615-0064> (suggesting that the FDA refer problematic product hops to the Federal Trade Commission).

521. [521]. Professors Yaniv Heled, Liza Vertinsky, and Cassady Brewer have recently made a proposal for a fundamental change along these lines. They argue that “companies involved in the provision of healthcare products and services should be incentivized or even required to assume alternative business forms that would both enable and require them to consider the needs of a broader range of stakeholders and the public interest in addition to shareholder value.” Yaniv Heled et al., *Why Healthcare Companies Should Be(come) Benefit Corporations*, 60 B.C. L. Rev. 73, 74 (2019).

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