

A Fracking Mess: Just Compensation for Regulatory Takings of Oil and Gas Property Rights

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I. INTRODUCTION

The law of takings receives much attention from courts and scholars.¹ Yet much of that attention focuses on the questions of whether or not a taking has occurred, or whether the taking was for a public use.² Less attention has focused on the appropriate measure of just compensation.³ This is understandable, because in many cases the requirement to pay just compensation would be too burdensome on the government, particularly in the more recent line of regulatory takings cases, and so if a taking is found, the government simply abandons its regulation and pays no or reduced

1. The most recent pronouncement from the United States Supreme Court was *Murr v. Wisconsin*, 137 S. Ct. 1933, 1943–44 (2017) (addressing the parcel as a whole rule as applied to neighboring properties jointly owned).

2. The bulk of attention by both courts and scholars focuses on the thorny question of when a taking of private property has occurred. See, e.g., *Lucas v. S.C. Coastal Council*, 505 U.S. 1003 (1992); *Penn Cent. Transp. Co. v. City of New York*, 438 U.S. 104 (1978); *Pa. Coal Co. v. Mahon*, 260 U.S. 393 (1922); RICHARD ALLEN EPSTEIN, *TAKINGS: PRIVATE PROPERTY AND THE POWER OF EMINENT DOMAIN* (1985); Joseph L. Sax, *Takings and the Police Power*, 74 *YALE L.J.* 36 (1964); William Michael Treanor, *The Original Understanding of the Takings Clause and the Political Process*, 95 *COLUM. L. REV.* 782 (1995). On the question of public use, see for example *Kelo v. City of New London*, 545 U.S. 469 (2005); Eric R. Claeys, *Public-Use Limitations and Natural Property Rights*, 2004 *MICH. ST. L. REV.* 877; Nicole Stelle Garnett, *The Public-Use Question as a Takings Problem*, 71 *GEO. WASH. L. REV.* 934 (2003); Thomas W. Merrill, *The Economics of Public Use*, 72 *CORNELL L. REV.* 61 (1986); Christopher Supino, *The Police Power and “Public Use”: Balancing the Public Interest Against Private Rights Through Principled Constitutional Distinctions*, 110 *W. VA. L. REV.* 711 (2008).

3. Katrina Miriam Wyman, *The Measure of Just Compensation*, 41 *U.C. DAVIS L. REV.* 239, 286 (2007) (“While there is a mass of scholarship about takings, relatively little of it is about how much takers should pay when they take property.”); contra Frank I. Michelman, *Property, Utility, and Fairness: Comments on the Ethical Foundations of “Just Compensation” Law*, 80 *HARV. L. REV.* 1165, 1166 (1967) (arguing that “the compensation problem—has received a generous share of attention from courts” and scholars).

compensation.⁴ Nevertheless, courts have attempted to grapple with the just compensation question and developed a variety of approaches that might be used to determine damages for takings on a case-by-case basis.⁵ Yet the lack of clear guidance from the courts and the potential for high damages awards due to the value of oil and gas likely means that government regulators are hesitant to step in to address the concerns of neighboring communities. Oftentimes, government officials operate on the misguided and incorrect assumption that mineral rights owners have an unqualified “right” to extract oil and gas, and this inhibits the creation or enforcement of rules that would interfere with fracking.⁶

Although the oil and gas industry has historically been lightly regulated,⁷ and therefore only a handful of takings claims related to oil and gas have ever been brought,⁸ that may change going

4. Early regulatory takings cases did not even contemplate just compensation as a remedy, instead focusing on invalidation of the offending law. More recently, the United States Supreme Court has held that abandonment of the regulation does not automatically avoid the need for just compensation, and thus compensation may still be required for the time an invalidated law was in effect. However, in practice courts rarely resolve the question of what is required as just compensation for a regulatory taking claim. As an example, contrast the United States Supreme Court’s pronouncement in *First English Evangelical Lutheran Church* with the subsequent ruling from the California courts that no compensation was required because the regulation did not amount to a taking. Compare *First English Evangelical Lutheran Church v. County of Los Angeles*, 482 U.S. 304, 322 (1987), with *First English Evangelical Lutheran Church v. County of Los Angeles*, 258 Cal. Rptr. 893, 906–07 (1989); see also *Tahoe-Sierra Pres. Council, Inc. v. Tahoe Reg’l Planning Agency*, 535 U.S. 302, 329 (2002).

5. See e.g., *SDDS, Inc. v. South Dakota*, 650 N.W.2d 1, 19 (S.D. 2002); J. Margaret Tretbar, Comment, *Calculating Compensation for Temporary Regulatory Takings*, 42 U. KAN. L. REV. 201, 217–19 (1993).

6. CITY OF GREELEY, COLO., MINUTES OF SPECIAL CITY COUNCIL PROCEEDINGS 31 (2016) (showing that city council members reversed Planning Commission denial of approval for urban oil and gas development, stating that industry “has a right to development [sic] their property”); see also Aldo Svaldi, *Drilling and Development Are on Collision Course in Northeastern Colorado*, DENV. POST (Aug. 7, 2017, 9:30 AM), <https://www.denverpost.com/2017/08/06/oil-gas-drilling-permits-development-construction-northeast-colorado/> [https://perma.cc/UH E2-869E] (Weld County, Colorado statement that reads: “These [oil and gas] resources are protected property rights and mineral owners should be afforded the opportunity to extract the mineral resource.”).

7. The early regulation of oil and gas by the states is discussed in more detail below. See *infra* notes 79–83 and accompanying text. Much of the early regulation on oil and gas focused on maintaining the price of the resource or maximizing the potential production of oil and gas fields. Only recently has regulation begun to attempt to address the impacts that oil and gas development has on public health, safety, and welfare.

8. The few oil and gas takings claims that have been brought are discussed in more detail in Part III. See *infra* notes 226–235 and accompanying text.

forward. The technological developments that have enabled the latest fracking boom in oil and gas production in the United States have also dramatically increased the impacts that the industry has at the surface and on its neighbors.⁹ Thus, especially when oil and gas development occurs near residential areas, there is a growing demand for government regulation to address the worst of these impacts. These concerns are so great that some jurisdictions have gone so far as to ban fracking outright.¹⁰ As a result, the oil and gas industry and government regulators appear to be on a collision course that will only be resolved through takings litigation.

Although no plausible takings claim related to recent regulations on fracking has yet been presented to the courts, it is entirely conceivable that such a claim might be brought in the future in New York or other jurisdictions that decide to ban the use of fracking to protect public health.¹¹ For example, an owner of mineral rights in New York overlying the Marcellus or Utica Shale who has credible plans to extract oil and gas using fracking might be able to present a fracking-takings claim that could proceed to the merits. I have argued elsewhere that these restrictions on fracking should not be found to be a taking of private property. If courts reject these fracking-takings claims, then the compensation question is moot. However, if courts do find that regulation of fracking amounts to a taking, the question of how to measure just compensation presents numerous problems, as this Article will demonstrate. The main goal of this Article is to assess valuation of fracking-takings claims in light of the theory underpinning the Takings Clause, the nature of property interests in oil and gas, and the case law on regulatory takings.

Scholars have advanced a number of theoretical approaches to justify various measures of just compensation and have identified key questions raised by the methods and by particular examples of takings. The most prominent reasons for requiring payment of just compensation are fairness and efficiency.¹² However, both scholars and courts have paid limited attention to the unique problems that

9. See *infra* notes 48–51 and accompanying text.

10. See *infra* note 53.

11. See *infra* note 17 and accompanying text.

12. As discussed in more detail in Part III.A, fairness deals primarily with deciding whether private parties or the public should bear the costs associated with a particular regulation, while efficiency is aimed at enabling the free market to function well absent market failures.

arise in attempting to determine just compensation for a taking of property interests in oil and gas—which I have previously defined as a fracking-takings claim.¹³

The vast majority of the literature deals with regulatory takings of real property interests, and most of that focuses on the question of whether a taking has occurred. For that portion of the literature addressing the measure of just compensation, the debate focuses on the best ways to determine just compensation for eminent domain or regulatory restrictions on developing property for residential or commercial use. Only a small handful of articles discuss the issue of whether regulation of fracking amounts to a taking, and none of them address in detail the question of how to value just compensation in those cases.¹⁴ This Article seeks to fill that gap in the literature by evaluating the match between existing takings law and fracking-takings claims—highlighting a number of difficulties that arise when calculating just compensation for oil and gas rights. Ultimately, existing valuation methods do not serve the underlying goals of fairness or efficiency, which calls into question the all-or-nothing approach to compensation under existing law. Specifically, theories requiring high compensation, when applied to the fracking-takings context, would break down by either unduly inhibiting appropriate government regulation or by shifting the enormous risk of fracking development from private entities to the public while creating windfalls for mineral interest

13. Kevin J. Lynch, *Regulation of Fracking Is Not a Taking of Private Property*, 84 U. CIN. L. REV. 39, 42 (2016).

14. See, e.g., Robert A. Dunkelman, Note, *Consideration of Mineral Rights in Eminent Domain Proceedings*, 46 LA. L. REV. 827, 836–41 (1986) (discussing the analysis under the Louisiana constitution which requires compensation not only for taking but also for damaging property); Steven D. McGrew, Note, *Selected Issues in Federal Condemnations for Underground Natural Gas Storage Rights: Valuation Methods, Inverse Condemnation, and Trespass*, 51 CASE W. L. REV. 131 (2000); ALAN T. ACKERMAN & DARIUS W. DYNKOWSKI, CALCULATION OF DAMAGES IN TEMPORARY TAKINGS 26–28 (2009) (expert practitioners in eminent domain law examining question of damages for temporary takings of mineral rights). Other scholarly work has addressed the question of whether regulation of energy might constitute a taking, without delving into the question of valuing just compensation. See Patrick C. McGinley, *Regulatory Takings in the Shale Gas Patch*, 19 PENN. ST. ENVTL. L. REV. 193 (2011) (focusing on when constitutional takings principles might limit shale gas regulation); Michael Pappas, *Energy Versus Property*, 41 FLA. ST. U. L. REV. 435, 483–86 (2014) (discussing the “energy/property balance” as it relates to renewables regulation); Timothy Riley, Note, *Wrangling with Urban Wildcatters: Defending Texas Municipal Oil and Gas Development Ordinances Against Regulatory Takings Challenges*, 32 VT. L. REV. 349 (2007).

owners at the public's expense.¹⁵ Instead, low or context-dependent compensation theories are better suited to resolving fracking-takings claims because they can still allow for some compensation when fairness requires it, but they do not reward private property owners who have invested neither labor nor capital to increase the value of their oil and gas rights.

Case law on this point is nearly as sparse as the literature. Only two cases have grappled seriously with the question of how to value a takings claim related to property rights in oil and gas, and in one of those the court ultimately concluded that no taking had occurred.¹⁶ This should not be surprising given the lack of significant public health restrictions on oil and gas extraction until recent times. Yet the expansion of regulation in many states with potential for oil and gas development means that governments may face takings challenges to their regulations going forward.¹⁷ Even the threat of potential takings litigation and liability can influence the decisions of governments who seek to balance concerns over fracking and its impacts on communities with the interests of

15. See *infra* notes 300–308 and accompanying text, for a discussion of the concept of windfalls as used in this Article.

16. *Bass Enters. Prod. Co. v. United States*, 381 F.3d 1360 (Fed. Cir. 2004) (finding no taking but discussing multiple calculation methods); *Miller Bros. v. Department of Nat. Res.*, 513 N.W.2d 217, 222–23 (Mich. Ct. App. 1994) (awarding just compensation based on denial of permits to drill in protected area). In addition to these resolved cases, there are at least two pending in Dallas and New York State that have raised takings issues related to property interests in oil and gas. See *infra* notes 226–231 and accompanying text. Older oil and gas cases which refer to takings simply held that the law at issue was unconstitutional and therefore invalid, but did not require the payment of just compensation. See, e.g., *Texoma Nat. Gas Co. v. R.R. Comm'n*, 59 F.2d 750, 753 (W.D. Tex. 1932) (striking down law requiring pipeline owners to operate as common purchasers of natural gas in order to avoid waste).

17. Maryland recently joined New York and Vermont as states which have banned fracking. Devin Henry, *Maryland Governor Signs Fracking Ban Into Law*, THE HILL (Apr. 4, 2017, 4:27 PM), <http://thehill.com/policy/energy-environment/327266-maryland-governor-signs-fracking-ban-into-law> [<https://perma.cc/5Y7C-6CKG>]. Florida and Nevada have also recently considered legislation to ban fracking in their states. Although some states have struck down fracking bans by local governments, such as Colorado and Ohio, local efforts to regulate fracking continue to advance in other parts of the country, with Monterey County, California, becoming the first county in the country where the oil and gas industry was already well-established to ban fracking. Wenonah Hauter, *Fracking Bans Are Not a Partisan Issue*, ECOWATCH (Mar. 28, 2017, 4:57 PM), <https://www.ecowatch.com/fracking-ban-not-partisan-2333486383.html> [<https://perma.cc/U4YR-7HUT>]; Benjamin Spillman, *Nevada Considers Fracking Ban*, RENO GAZETTE J. (Feb. 21, 2017, 6:16 PM), <https://www.rgj.com/story/news/2017/02/21/nevada-considers-fracking-ban/98226716/> [<https://perma.cc/4U7M-HVWS>].

mineral rights holders and oil and gas companies in pursuing the latest fracking boom.¹⁸

A careful evaluation of the thorny question of valuing a fracking-takings claim reveals numerous problems which undercut the goals of both fairness and efficiency. These problems derive from the characteristics of oil and gas as property. The right to extract oil and gas is different from ownership of oil and gas that has been extracted from the ground. Yet oil and gas in place is highly uncertain, both in the quantity recoverable, the cost to extract it, and the highly volatile market price at the uncertain time of sale. Additionally, in most cases the owner of oil and gas rights will have invested little to no money or labor in extraction of oil and gas when such extraction is prohibited by a ban on fracking. Thus, the question of just compensation for the takings of these property rights include the potential for private windfalls at public expense, the need to account for offsetting benefits of the broad regulation of oil and gas, and the shifting of the risk associated with fracking from private parties to the public. Each of these problems raises serious fairness concerns by enriching private property owners at the public's expense. Additional problems of uncertainty, speculation, and gaming the system are present due to the high variability of the value of oil and gas reserves, which impair or perhaps utterly destroy the efficiency rationale.

These problems in valuing fracking-takings can be reduced by moving beyond the all-or-nothing approach to just compensation that is implied by the existing regulatory takings doctrine. The all-or-nothing approach is reflected in the common statement that courts seek to put the property owner subject to a regulatory taking in the same position as if the property had not been taken. This is typically accomplished through calculating the fair market value of the taken property.¹⁹ However, this Article urges courts to move beyond fair market value. Rather than seeking to make the

18. See Jon Campbell, *Expected Lawsuits Don't Follow NY Fracking Ban*, LOHUD (Apr. 20, 2017, 3:10 PM), <https://www.lohud.com/story/news/politics/politics-on-the-hudson/2017/04/20/ny-bans-fracking-but-lawsuits-dont-follow/100706352/> [<https://perma.cc/AHC3ZTA4>] (discussing lack of expected takings litigation after New York banned fracking statewide in 2014); Robert Wilonsky, *Appeals Court Breathes New Life into \$30 Million Fracking Lawsuit Against Dallas*, DALL. NEWS (Feb. 8, 2017), <https://www.dallasnews.com/opinion/commentary/2017/02/08/appeals-court-breathes-new-life-into-30-million-fracking-lawsuit-dallas> [<https://perma.cc/HSQ5-GUKM>].

19. See *infra* note 189 and accompanying text, for a definition of "fair market value."

property owner whole as a result of a taking of property, courts should use a variety of valuation mechanisms to carefully calibrate just compensation awards to provide a fair amount of compensation without unduly inhibiting necessary regulation of oil and gas. Courts should therefore resist calls for high damage awards as just compensation for fracking-takings and instead allow government to exercise its traditional police power authority to decide whether, when, and how oil and gas may be extracted in a manner that is consistent with public health and safety.

II. PROPERTY RIGHTS IN OIL AND GAS

In much of the world, mineral interests are owned by the government.²⁰ If this were the case in the United States, then the takings doctrine would not be an impediment to government restrictions on oil and gas development deemed necessary to protect public health or address the pressing challenge of climate change.²¹ However, because many mineral rights are privately held in the United States, there is at least an open question and some uncertainty about the extent to which governments may regulate the oil and gas industry (whether the regulation “goes too far”) as well as how much money governments would be required to pay to private developers or mineral rights holders (“just compensation”).²² As a result, governments in the United States

20. 1 NORTHCUTT ELY, U.S. BUREAU OF MINES, SUMMARY OF MINING AND PETROLEUM LAWS OF THE WORLD 4 (1961).

21. This is not to say that disputes between the state and developers of oil and gas would go away entirely, as doctrines such as “security of tenure” may still limit post hoc restrictions on the ability to extract oil and gas. See A.R. Thompson, *Sovereignty and Natural Resources—A Study of Canadian Petroleum Legislation*, 1 VAL. U. L. REV. 284 (1967).

22. This Article focuses on the latter question, although there is some unavoidable overlap between the arguments that support lower awards of just compensation and the arguments against finding a taking in the first place. As the author has explained previously, regulation of fracking in most cases should not amount to a taking of private property. Lynch, *supra* note 13, at 96–97. But assuming that a court already has found a taking, it is important to carefully think through how a calculation of just compensation would best support the efficiency and fairness goals of the Takings Clause. One critical distinction, discussed in more detail in Part III, is between physical and regulatory takings. Unlike eminent domain or other physical occupations of property, a regulatory taking is instead a restriction on property use that is analogized to actual transfer of property from a private party to the public. Yet this analogy breaks down for oil and gas, because the oil and gas is not extracted and transferred to the public, but rather remains in the ground for potential one-time extraction by the property owner in the future. The implications of these distinctions are discussed in Part IV.

are likely under-regulating the industry,²³ which has serious implications for local and regional public health as well as for global climate policy.²⁴ This Article attempts to reduce some of that uncertainty²⁵ and to encourage government officials to more confidently develop appropriate and reasonable restrictions on oil and gas development to protect the local, regional, and global environments.

Some basic working knowledge of the oil and gas industry and the law's treatment of property rights in oil and gas is necessary in order to assess the proper measure of just compensation for a fracking-takings claim. This Part, therefore, first provides a brief introduction to fracking, including the developments in technology that have enabled economic extraction of oil and gas from

23. Susan Rose-Ackerman, *Against Ad Hocery: A Comment on Michelman*, 88 COLUM. L. REV. 1697, 1701 (1988) (arguing that the “incoherence and unpredictability of takings law” promotes conservatism and risk aversion among government officials).

24. A full accounting of the myriad ways in which the extraction and consumption of oil and gas impact society is beyond the scope of this Article. Some of the impacts stem from the special treatment that the oil and gas industry receives from legislatures and courts, which allows oil and gas development to often ignore zoning rules by siting industrial activity in residential or commercial areas. See Pappas, *supra* note 14, at 465–74 (discussing how in the “energy/property balance,” energy usually wins). The industrial-scale nature of oil and gas extraction results in potential impacts to air, water, wildlife, noise, and even earthquakes on a local level. N.Y. STATE DEP'T OF HEALTH, A PUBLIC HEALTH REVIEW OF HIGH VOLUME HYDRAULIC FRACTURING FOR SHALE GAS DEVELOPMENT 4–11, 45 (2014). On a regional level, the pollution emitted from oil and gas extraction (or even just escaped natural gas) are considered volatile organic compounds, which is a precursor to ground-level ozone or smog. *Basic Information about Oil and Natural Gas Air Pollution Standards*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/controlling-air-pollution-oil-and-natural-gas-industry/basic-information-about-oil-and-natural-gas> [<https://perma.cc/5HME-9BNS>]. Globally, both the release of natural gas (principally composed of methane) and the burning of both oil and natural gas, which releases carbon dioxide, are among the major contributors to climate change, which has numerous adverse effects and is only expected to worsen in the future. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, FIFTH ASSESSMENT REPORT, CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS 11–12 (Thomas F. Stocker et al. eds., 2013) (providing an overview of the rise in global carbon dioxide and methane levels, primarily from the combustion of these fossil fuels); Solomon Hsiang et al., *Estimating Economic Damage from Climate Change in the United States*, 356 SCI. 1362, 1362–69 (2017) (evaluating economic impacts from a changing climate across “agriculture, crime, coastal storms, energy, human mortality, and labor”).

25. As discussed in more detail later, *infra* Part IV.B.2, there is some level of uncertainty inherent in any case-by-case calculation of just compensation. Yet the effect of that uncertainty on government regulators, which most directly impacts the efficiency rationale for takings liability, would be minimized if courts were to adopt valuation mechanisms which limit takings liability and avoid astronomical takings awards. Any attempts to further reduce or perhaps even eliminate the uncertainty in just compensation calculations through the use of bright line rules would come at a cost of reduced fairness.

different geologic formations. This Part also provides an overview of the historic and evolving treatment of oil and gas rights as property. This overview includes as clear a definition as possible of how oil and gas rights are defined as property among key oil and gas producing states where fracking is ongoing or might occur in the future. Finally, this Part explains the different interests in oil and gas rights that might form the basis of potential fracking-takings claims, from the basic fee simple estate in land to severed mineral estates on through to leases of those mineral rights by industry. These background points are important to understand the regulatory schemes for fracking in the various states, what kind of fracking-takings claims might be brought under those schemes, and how oil and gas property rights must be valued differently than traditional appraisals of the fair market value of real property. Any fracking regulation that prevents extraction of oil and gas and does not actually physically take the property from a private party and transfer it to the government. Therefore, this Article is concerned with regulatory takings of oil and gas property rights.

A. Fracking Overview

Fracking is the commonly used term which refers to a process used in the extraction of oil and gas called hydraulic fracturing.²⁶ Variants on the term include fracturing,²⁷ high-volume hydraulic fracturing,²⁸ or fracing.²⁹ This Article uses the term fracking both in its technical sense as used in the industry, but also as a catch-all term to refer to the modern extraction of oil and gas in the United States, where fracking is by far the most common technique currently in use.³⁰

Modern fracking involves the use of large volumes of water mixed with sand and a number of chemicals, many of them toxic,

26. See Lynch, *supra* note 13, at 42–46.

27. *Glossary of Oil and Gas Terms*, COLO. OIL & GAS CONSERVATION COMMISSION, https://cogcc.state.co.us/COGIS_Help/glossary.htm [https://perma.cc/ET2J-YBL9] (last visited Apr. 5, 2018) (defining “fracturing” to be “[a] method of breaking down a formation by pumping fluid at very high pressures. The objective is to increase production rates from a reservoir.”).

28. Mcginley, *supra* note 14, at 197.

29. Thomas E. Kurth et al., *American Law and Jurisprudence on Fracing*, 47 ROCKY MOUNTAIN MIN. L. FOUND. J. 277, 278–79 (2010).

30. John M. Golden & Hannah J. Wiseman, *The Fracking Revolution: Shale Gas as a Case Study in Innovation Policy*, 64 EMORY L.J. 955, 968–71 (2015) (discussing the “web of technologies” that compose fracking).

in order to break apart an underground formation of rock to facilitate the release of oil and/or gas that is stored in that formation.³¹ This method thus allows for oil and gas to be extracted economically from geologic formations that previously could not be tapped in a cost-effective manner.³² These formations include shale or tight sand formations, which compose a relatively thin but expansive layer of rock at depths typically several thousand feet beneath the surface.³³ The depth and thinness of the formation had previously made it cost-prohibitive to extract the oil or gas, but that changed with the development of directional and horizontal drilling. With these new technologies, the industry could now drill multiple wells from a single location, using directional drilling to spread out from a single well site and reach different areas of the target formation.³⁴ Once the target formation was reached, horizontal drilling meant that the well could travel for distances of a mile or more through the formation, dramatically increasing the area that could be drained by a single well.³⁵ Fracking is then used to break up the formation so that the oil or gas is released at a higher rate.³⁶

All of these techniques have combined to make oil and gas development dramatically more expensive,³⁷ and therefore more risky,³⁸ but also potentially much more profitable.³⁹ Fracking has

31. David B. Spence, *Federalism, Regulatory Lags, and the Political Economy of Energy Production*, 161 U. PA. L. REV. 431, 438 (2013); Hannah Wiseman, *Untested Waters: The Rise of Hydraulic Fracturing in Oil and Gas Production and the Need to Revisit Regulation*, 20 FORDHAM ENVTL. L. REV. 115, 118 (2009).

32. Mcginley, *supra* note 14, at 197.

33. See Wiseman, *supra* note 31, at 118.

34. Golden & Wiseman, *supra* note 30, at 971.

35. *Id.* at 971–72.

36. Spence, *supra* note 31, at 438.

37. Thomas Covert, *When Global Oil Prices Tanked, Shale Production Didn't. Here's Why*, FORBES (Aug. 31, 2016, 9:45 AM), <https://www.forbes.com/sites/ucenergy/2016/08/31/when-global-oil-prices-tanked-shale-oil-production-didnt-heres-why/#46b7bcd818ba> [<https://perma.cc/7LT9-6MG7>] (noting that break-even costs for North American shale wells are about three times higher than costs for other wells and deplete faster as well).

38. Schumpeter, *America's Shale Firms Don't Give a Frack About Financial Returns*, ECONOMIST (Mar. 25, 2017), <https://www.economist.com/news/business-and-finance/21719436-exploration-and-production-companies-are-poised-go-another-investment-spree-americas> [<https://perma.cc/3BMP-GKSP>] (discussing the “unparalleled money-losing streak” of shale firms, which lost about \$11 billion in the most recent quarter as well as numerous bankruptcies in the most recent crash of 2014–16).

39. Golden & Wiseman, *supra* note 30, at 1001 (noting the financial rewards for early movers who acquired land and mineral rights and established their profitability in the Marcellus Shale).

enabled access to vast reserves of oil and gas contained in the Marcellus Shale in Pennsylvania and New York, the Barnett Shale in the Dallas-Fort Worth metro area, and other booming oil and gas regions in North Dakota, Colorado, and other parts of the United States.⁴⁰ As a result, the United States has become one of the top producers of oil and gas and, despite the huge demand for oil and gas domestically, one of the top exporters of natural gas as well.⁴¹

Modern fracking can be contrasted with more traditional means of extracting oil and gas, which were commonly found in pools or reservoirs composed of relatively porous rock formations which were capped by a relatively impervious rock formation.⁴² Typically those reservoirs were reached through the use of vertical wells which were spaced out on the surface in order to efficiently drain the oil and gas from the reservoir.⁴³ This method of extraction relied on using the pressure of the reservoir to force the oil or gas up the well and to the surface.⁴⁴ This is reflected in the common understanding of a “gusher” which uncontrollably releases oil at the surface, such as the famous (in oil and gas circles, at least) Spindletop gusher which sparked a previous oil and gas boom in 1901.⁴⁵ However, absent government regulation, there was nothing to stop someone from putting a well right on his property line in an attempt to suck out the oil and gas beneath his neighbor’s property, as reflected in the infamous “I drink your milkshake” scene from the movie *There Will Be Blood*.⁴⁶ As a result, early

40. See U.S. ENERGY INFO. ADMIN., DRILLING PRODUCTIVITY REPORT (2017) (providing a map and description of current major oil and/or gas producing regions in the United States).

41. Nina Chestney, *U.S. on Track to be World’s No. 2 LNG Exporter by End-2022*: IEA, REUTERS (July 13, 2017, 3:09 AM), <https://www.reuters.com/article/us-gas-lng-iea/u-s-on-track-to-be-worlds-no-2-lng-exporter-by-end-2022-iea-idUSKBN19Y0L1> [<https://perma.cc/43GK-RPH7>].

42. See, e.g., *Voss v. Lundvall Bros.*, 830 P.2d 1061, 1067 (Colo. 1992) (“Oil and gas are found in subterranean pools.”); *Trees Oil Co. v. State Corp. Comm’n*, 105 P.3d 1269 (Kan. 2005) (discussing legal and technical definition of a pool); *Oilfield Glossary: Conventional Reservoir*, SHLUMBERGER, http://www.glossary.oilfield.slb.com/Terms/c/conventional_reservoir.aspx [<https://perma.cc/88CA-EZY8>] (last visited Aug. 8, 2017) (defining “conventional reservoir” to be “[a] reservoir in which buoyant forces keep hydrocarbons in place below a sealing caprock,” as opposed to shale and other unconventional resources).

43. K.K. DuVivier, *Sins of the Father*, 1 TEX. A&M J. REAL PROPERTY L. 391, 406 (2014) (discussing well spacing rules introduced by oil and gas conservation statutes).

44. *Id.* at 405.

45. Riley, *supra* note 14, at 349.

46. *THERE WILL BE BLOOD* (Ghoulardi Film Company 2007), available at https://www.youtube.com/watch?v=s_hFTR6qyEo [<https://perma.cc/M2K7-M47Y>].

regulation of the oil and gas industry focused on limiting production to avoid waste of the resource while equitably sharing the costs and profits of production from the pooled resource to protect correlative rights.⁴⁷

The process of fracking (broadly defined) typically involves the construction of an industrial wellsite even in areas where other industrial activity would be prohibited by zoning laws. The preparation of the wellsite, drilling of the wells, and fracking itself take place over a period of many months.⁴⁸ In rural or industrial areas, this may not pose a problem, or any problems created may be manageable. But in more dense urban and suburban areas, fracking has the potential to create conflicts with the surrounding community.⁴⁹ Neighbors of the wellsite must deal with increases in noise, traffic, and toxic air pollution⁵⁰ as well as the visual impacts of either an industrial site or a giant wall erected to hide the site from view.⁵¹ These impacts and other concerns have led to calls for greater regulation at the local and state levels.⁵² In some jurisdictions the government has responded to these calls with

47. The early regulation of oil and gas by the states is discussed in more detail below. *See infra* notes 79–83 and accompanying text. For a good historical overview of the early development of the oil and gas industry, see Northcutt Ely, *The Conservation of Oil*, 51 HARV. L. REV. 1209, 1210–18 (1938).

48. *Oil and Gas Drilling 101*, FRACTTRACKER: ALLIANCE, <https://www.fractracker.org/resources/oil-and-gas-101/> [<https://perma.cc/P3ZX-XUTV>] (last visited Aug. 8, 2017) (including a TED video explaining the process of fracking over many months).

49. A complete accounting of the myriad public health and safety concerns associated with fracking are beyond the scope of this Article. For a more detailed discussion, see Lynch, *supra* note 13, at 43–45.

50. N.Y. STATE DEP'T OF HEALTH, *supra* note 24, at 4–11 (noting potential impacts to air and water quality, induced seismic activity, and community impacts).

51. Bruce Finley, *Oil and Gas Industry Building Giant Walls to Try to Ease Impact*, DENVER POST (Apr. 27, 2016, 7:59 AM), <http://www.denverpost.com/2014/05/29/oil-and-gas-industry-building-giant-walls-to-try-to-ease-impact/> [<https://perma.cc/DN7L-6UYQ>].

52. Although the oil and gas has long been subjected to regulation, that regulation historically focused on resolving disputes between neighboring mineral interest owners, and regulation of environmental and nuisance-like activities only began recently. *See infra* notes 79–83 and accompanying text. This makes sense because traditional oil drilling, while still disruptive to the surrounding community, operated on a dramatically smaller scale than modern high-volume hydraulic fracturing. Additionally, our understanding of the potentially harmful impacts of pollution from fracking operations has only recently begun to come into focus. Thus, it makes sense that calls for greater regulation of the impacts of fracking and pushback from industry have not been addressed by courts or scholars previously.

restrictions going so far as to ban fracking until it can be proven safe.⁵³

Fracking-takings claims have therefore become an important issue recently for a few key reasons. First, developments in technology in the oil and gas industry have unlocked vast new reserves of oil and gas.⁵⁴ Second, some of those reserves are located in populated areas, which has led to conflict between residents and industry.⁵⁵ Third, a growing awareness of the negative impacts of fracking on the surrounding communities has only recently begun to take shape in the public health literature.⁵⁶ Finally, in response to these changes, some governments have initiated an unprecedented regulation of the oil and gas industry, going beyond earlier laws which were focused primarily on promoting efficient extraction of the oil and gas.⁵⁷ These regulations might increase the costs of fracking, potentially making it uneconomical to extract oil and gas with current technologies at current prices. Some regulations have even gone so far as to ban fracking entirely.⁵⁸ As a result, the specter of fracking-takings claims looms over the debate about the appropriate scope of regulation of the industry, and in particular the uncertain and potentially large liability to pay just compensation, which is the focus of this Article.⁵⁹

B. State Approaches to Property Rights in Oil and Gas

Property rights, for the purpose of the Takings Clause, are largely defined by state law.⁶⁰ Therefore, it is important to understand the

53. N.Y. STATE DEP'T OF ENVTL. CONSERVATION, FINAL SUPPLEMENTAL GENERIC ENVIRONMENTAL IMPACT STATEMENT ON THE OIL, GAS AND SOLUTION MINING REGULATORY PROGRAM: FINDINGS STATEMENT 34–41 (2015); *see also* Lynch, *supra* note 13, at 47–49 (discussing history of New York fracking ban).

54. Golden & Wiseman, *supra* note 30, at 964–68 (describing the boom in shale gas).

55. Lynch, *supra* note 13, at 50 (describing fracking boom in suburban areas of Colorado); Riley, *supra* note 14, at 354 (discussing conflict with industry in the Dallas-Fort Worth area).

56. *See* Lynch, *supra* note 13, at 44–45 (providing an overview of public health concerns related to fracking); Spence, *supra* note 31, at 440–46 (discussing environmental impacts of fracking).

57. *See, e.g.*, Republic Nat. Gas Co. v. Oklahoma, 334 U.S. 62, 63 (1948) (noting purposes of regulation to prevent waste and protect correlative rights in a common pool).

58. *See supra* note 17.

59. *See infra* notes 226–235 and accompanying text.

60. To be precise, the United States Supreme Court has recently stated that “property interests have their foundations in state law” yet property rights under the Takings Clause

different treatments of oil and gas property under various state laws, as this may affect the analysis under the Takings Clause as well. The takings analysis in one state might therefore turn out quite differently depending on how state law defines property interests in oil and gas. This Part therefore focuses on one of the key distinctions made under state law regarding whether the property owner also owns the minerals found before they are extracted. The subsequent Part then explores the different forms of property interests in oil and gas and the mechanisms that have been developed to facilitate transfer of those interests and the ultimate extraction of oil and gas.

Oil and gas are considered minerals under property law, grouped together with other natural resources such as metals, gravel, or sand which may be mined from the land.⁶¹ Yet oil and gas have unique characteristics, related to geology and their methods of extraction, which have led courts to treat oil and gas separately from other minerals.⁶² The primary reason for this distinction is that (at least historically) oil and gas were acknowledged to be somewhat mobile and therefore not fixed in place under one specific surface estate.⁶³ The development of the law relating to oil and gas has thus reflected this understanding. Historically, oil and gas were conceptualized as minerals *ferae naturae*, analogous to wild animals, and therefore subject to the rule of capture.⁶⁴ The rule of

are not “coextensive with those under state law.” *Murr v. Wisconsin*, 137 S. Ct. 1933, 1938, 1944 (2017).

61. See *United States ex rel Tenn. Valley Auth. v. Harris*, 115 F.2d 343, 343–44 (5th Cir. 1940) (discussing mineral interests of iron, asphalt, silica, or quartz along with sand and gravel).

62. See, e.g., *Ohio Oil Co. v. Indiana*, 177 U.S. 190, 202 (1900) (“[O]il and gas, like other minerals, are situated beneath the surface of the earth, but except for this one point of similarity, in many other respects they greatly differ.”).

63. They have no fixed situs under a particular portion of the earth’s surface within the area where they obtain. They have the power, as it were, of self-transmission. No one owner of the surface of the earth, within the area beneath which the gas and oil move, can exercise his right to extract from the common reservoir, in which the supply is held, without, to an extent, diminishing the source of supply as to which all other owners of the surface must exercise their rights.

Id. at 202–03.

64. *Westmoreland & Cambria Nat. Gas Co. v. De Witt*, 18 A. 724, 725 (Pa. 1889). The court formulated the rule of capture for oil and gas in this way:

In common with animals, and unlike other minerals, [oil and gas] have the power and the tendency to escape without the volition of the owner. . . . They belong to the owner of the land, and are part of it, so long as they are on or in it, and are subject to his control; but when they escape, and go into other land, or come under another’s control,

capture means that the first person to take control over a natural resource, or “capture” it, then becomes its owner. Other early formulations analogized oil and gas to groundwater.⁶⁵ More recently, a variety of ownership models have been developed in the states: the nonownership theory, the qualified ownership theory, and the ownership in place theory.⁶⁶ These different legal formulations of oil and gas property rights will be discussed in turn.

Under the nonownership theory, “no person owns oil and gas until it is produced.”⁶⁷ This theory thus relies on the rule of capture and analogizes to either *ferae naturae* or groundwater. The analogy to *ferae naturae* means that although private persons might reduce oil or gas to ownership by capturing it, the state has the right to prohibit or regulate capture.⁶⁸ The groundwater analogy is more likely to come up in disputes between private parties, because landowners have a right to withdraw groundwater even if it drained from beneath their neighbor’s land.⁶⁹ New York apparently follows the nonownership theory.⁷⁰

the title of the former owner is gone. Possession of the land, therefore, is not necessarily possession of the gas.

Id. Wild animals, *ferae naturae*, are typically controlled by the state. *Horne v. Dep’t of Agric.*, 135 S. Ct. 2419, 2431 (2015). The rule of capture embodied by this view of the nature of oil and gas rights was sometimes contrasted with ownership of the oil in place. *See Comment, Protraction of Petroleum Production*, 51 YALE L.J. 608, 610 n.4 (1942) (explaining that “[o]wnership of oil in a pool is not determined by the boundaries of the overlying surface properties”); *see also* Ely, *supra* note 47, at 1218–22.

65. DuVivier, *supra* note 43, at 401 (discussing the early case of *Dark v. Johnston*, 55 Pa. 164, 168 (1867)).

66. 1 PATRICK H. MARTIN & BRUCE M. KRAMER, WILLIAMS & MEYERS, OIL & GAS LAW, § 203 (2015) [hereinafter WILLIAMS & MEYERS, OIL & GAS LAW]. The treatise also discusses an “ownership of the strata theory” meaning that “the landowner owns the sedimentary layer containing the oil and gas within the limits of the vertical planes representing the boundaries of his tract.” *Id.* § 203.4.

67. *Id.* § 203.1.

68. *See Townsend v. State*, 47 N.E. 19 (Ind. 1897); *but see Gas Prods. Co. v. Rankin*, 207 P. 993, 998 (Mont. 1922) (rejecting analogies to flowing streams or wild animals).

69. Wm. E. Colby, *The Law of Oil and Gas*, 31 CAL. L. REV. 357, 360 (1943) (describing early decisions likening oil and gas deposits to running water underground).

70. WILLIAMS & MEYERS, OIL & GAS LAW, *supra* note 66, § 203. Adherence to the nonownership theory in New York would mean that the state has a strong claim to a common law right to regulate or even prohibit the extraction of oil and gas, meaning that the likelihood of a taking being found is further minimized. *Cf. Lynch, supra* note 13, at 79–84 (noting background principles of nuisance, reasonable use, and the public trust doctrine as defenses against fracking-takings claims in New York). However, for the purposes of this Article, the analysis focuses on how a takings claim should be valued assuming that a court has already found a taking.

The qualified ownership theory was explained by the United States Supreme Court in a case challenging the authority of the State of Indiana to enact an oil and gas conservation law. According to this theory:

Although in virtue of his proprietorship the owner of the surface may bore wells for the purpose of extracting natural gas and oil, until these substances are actually reduced by him to possession, he has no title whatever to them as owner. That is, he has the exclusive right on his own land to seek to acquire them, but they not become his property until the effort has resulted in dominion and control by actual possession.⁷¹

The qualified ownership theory has support in a number of states although its precise reach is debatable, and some argue that this theory is not much distinguishable from the nonownership theory.⁷² California follows either the nonownership theory or the qualified ownership theory.⁷³

The more common approach to oil and gas property rights is the ownership in place theory.⁷⁴ Under this theory, a landowner's interest in oil and gas is the same as his interest in solid minerals such as coal. Thus, a severance of surface and mineral rights is allowed under this theory, because title to the oil and gas can be transferred independently of the surface.⁷⁵ This theory provides the strongest support for property owners in arguing that a fracking-takings claim should succeed and that just compensation might be due. Texas follows the ownership in place theory.⁷⁶

71. *Ohio Oil Co. v. Indiana*, 177 U.S. 190, 208 (1900).

72. Some secondary authorities on oil and gas, such as Sullivan, recognize the qualified ownership theory but view it as “indistinguishable from the nonownership theory.” WILLIAMS & MEYERS, *OIL & GAS LAW*, *supra* note 66, § 203. Other authorities group qualified ownership more closely with ownership in place. *Id.* For purposes of this Article, qualified ownership is somewhere in between the two extremes. However, because qualified ownership also requires extraction to create an ownership interest in the oil and gas itself, it is most analogous to the nonownership theory.

73. *Id.* § 203.

74. *Id.* § 203.3.

75. *See, e.g., Bodcaw Lumber Co. v. Goode*, 254 S.W. 345 (Ark. 1923); *Stephens Cty. v. Mid-Kan. Oil & Gas Co.*, 254 S.W. 290 (Tex. 1923).

76. *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 829 (Tex. 2012). Yet it should be noted that some older Texas cases made statements supportive of a nonownership model. *See, e.g., Amazon Petroleum Corp. v. Railroad Comm'n*, 5 F. Supp. 633, 634–35 (E.D. Tex. 1934) (“[T]he right of one whose business consists in the taking and depletion of oil and gas, the natural resources of this state, to carry on that depletion is not an absolute, but a

Thus, the treatment of oil and gas as property rights may differ from state to state.⁷⁷ Most relevant for this Article are the treatment of oil and gas in states with current or potential future takings litigation over oil and gas, specifically New York, Texas, and California. Nonownership models of oil and gas provide an additional argument in New York and California that compensation for a taking of oil and gas rights should be greatly reduced (perhaps all the way to zero) because the state could restrict production without paying compensation. The ownership in place model of Texas and other states would weigh in favor of relatively higher compensation. In any case, once oil or gas is extracted from the ground, in all states it becomes a form of personal property that is no longer tied to real property.⁷⁸

Common law interests in property have been modified by legislatures in numerous jurisdictions through the means of oil and gas conservation statutes.⁷⁹ These statutes generally focus on the

qualified one, to be enjoyed only in accordance with the reasonable restrictions the state may impose.”).

77. It has been argued that the distinction between these different approaches to property rights in oil and gas may not affect the ability of the state to regulate production of oil and gas. A. W. Walker Jr., Bar Section, *Property Rights in Oil and Gas and Their Effect upon Police Regulations of Production*, 16 TEX. L. REV. 370 (1938). However, the question of whether the government may restrict oil and gas production without paying just compensation in order to protect public health, safety, or the environment is a separate matter, and this distinction may affect the takings analysis.

78. *Gas Prods. Co. v. Rankin*, 207 P. 993, 998 (Mont. 1922) (“[W]hen produced on the surface [oil and gas] become personal property and belong to the owner of the well.”). This discussion also raises the question, in light of the United States Supreme Court’s recent decision in *Horne v. Department of Agriculture* of whether oil and gas are more like raisins or oysters, or whether they are dangerous pesticides in the same way that raisins are a healthy snack. *Horne v. Dep’t of Agric.*, 135 S. Ct. 2419, 2431 (2015). The *Horne* case involved a government program regulating raisin production, but in order to find that a taking of personal property had occurred, the United States Supreme Court had to distinguish an older case with similar facts that involved oyster harvesting in Maryland. The Court distinguished raisins from oysters because oysters were *ferae naturae* and therefore were controlled by the state, making oyster harvesting a privilege subjected to greater state regulation than raisin harvesting. The Court concluded that “[r]aisins are not like oysters: they are private property—the fruits of the growers’ labor—not ‘public things subject to the absolute control of the state.’” *Id.* (quoting *Leonard v. Earle*, 141 A. 714, 716 (Md. 1928)). In a similar vein, the Court distinguished a regulatory scheme that required disclosure of trade secrets in return for a permit to sell pesticides, saying that “[r]aisins are not dangerous pesticides; they are a healthy snack.” *Id.* Unlike raisins, however, oil and gas are often treated as *ferae naturae* and the production of oil and gas can also be characterized as dangerous, like pesticide use.

79. DuVivier, *supra* note 43, at 404–07 (noting development of the Interstate Oil Compact Commission and state laws designed to prevent waste while protecting the rights of

prevention of waste, which would reduce the amount of oil and gas ultimately recoverable.⁸⁰ This situation would occur if landowners would compete against each other to extract oil and gas first, or if they do not space wells appropriately to avoid degrading the pressure in the reservoir inappropriately.⁸¹ These statutes also introduced concepts of spacing orders, unitization, and pooling.⁸² Under these statutes an owner of property in oil and gas might even be forced into a pool with neighboring owners against her will so that an oil and gas company can extract the minerals from her land, a process which has been derided as “private eminent domain.”⁸³

C. Interests in Oil and Gas

The previous Part explains the rights of a landowner in fee simple as they relate to oil and gas found beneath her property. Yet many smaller interests in oil and gas are possible in the United States. These include a severed mineral estate, royalty interests, or the lease of mineral rights to a third party (usually an oil and gas company) in order to facilitate extraction of the oil and gas.⁸⁴ Each of these subsets of a fee simple absolute might be used as the basis for a fracking-takings claim, and therefore a working knowledge of these property rights is critical to understanding how a fracking-takings claim could be valued.

landowners and royalty owners); *see also* John G. Sprankling, *Owning the Center of the Earth*, 55 U.C.L.A. L. REV. 979, 1010 (2008) (acknowledging statutes that “promote governmental intervention in oil and gas production at the expense of traditional property rights”).

80. *See, e.g.*, INTERSTATE OIL AND GAS COMPACT COMMISSION, 2004 MODEL OIL AND GAS CONSERVATION ACT, pt. II, § 2 (2004) (prohibiting waste).

81. DuVivier, *supra* note 43, at 405 (describing the incentives leading to waste).

82. *Id.* at 407.

83. Mark Jaffe, *Colorado Property Owners Faced with Possibility of Being Forced into Drilling Plans*, DENVER POST (Aug. 13, 2011, 3:41 PM), <https://www.denverpost.com/2011/08/13/colorado-property-owners-faced-with-possibility-of-being-forced-into-drilling-plans/> [<https://perma.cc/65SN-F4QB>] (describing the concept of “forced pooling” and noting “private eminent domain” charge from the governor of Pennsylvania). The issue of forced pooling is an interesting one that is deserving of further attention, especially the characterization of forced pooling as private eminent domain. Of particular interest are the questions of whether forced pooling is a taking of private property for public use, and if so, whether the compensation schemes for pooling constitutes just compensation.

84. WILLIAMS & MEYERS, OIL & GAS LAW, *supra* note 66, § 201 (recognizing “innumerable permutations” of particular subsets of rights in oil and gas, but focusing on three common ones of “mineral interests, royalty interests [and] leasehold interests”).

1. Oil and Gas Leases and Royalty Interests

A lease of oil and gas rights typically will include the right to go onto land to prospect for oil and gas and to extract and remove those from the property.⁸⁵ A lease will typically allow for some number of years for the initial development to occur, after which time it will expire absent any development.⁸⁶ But if drilling and production have occurred, the lease will continue in effect so long as appreciable quantities of oil and gas are being produced.⁸⁷ Leases are typically negotiated so that the underlying property owner will receive some kind of cash bonus at the outset and then retain a royalty interest in any extracted oil and gas.⁸⁸ A lease may also specify certain limitations or requirements on the operation of the oil and gas wells during the drilling, completion, and production phases.⁸⁹

Although a lease sounds like the relationship between a landlord and tenant regarding real property, in practice the relationship created by a lease of oil and gas rights can be quite different and the typical rules governing landlord-tenant disputes are often not applicable.⁹⁰ Of particular interest to the fracking-takings analysis is the requirement for development to begin during the duration of the lease, which then extends its life. A recent series of cases raised this issue in the context of the New York state moratorium on fracking that preceded the permanent ban in place at the moment. Thus, landowners in New York were successfully able to obtain a declaratory judgment that leases they had entered into with oil and gas companies had expired even though the companies asserted that the moratorium was a *force majeure* under the terms of their lease.⁹¹ Even beyond restrictions on fracking or other regulations on oil and gas development, many factors might cause a lease holder not to drill during the terms of the lease, such

85. WILLIAMS & MEYERS, OIL & GAS LAW, *supra* note 66, § 202.1.

86. *Id.*

87. *Id.*

88. *Id.*

89. *Id.* §§ 671, 673.

90. *See, e.g.,* Slaaten v. Cliff's Drilling Co., 748 F.2d 1275 (8th Cir. 1984).

91. Beardslee v. Inflection Energy, LLC, 798 F.3d 90, 93–94 (2d Cir. 2015) (*per curiam*) (declaring leases had expired after seeking certification from the New York Court of Appeals). The courts based their decision on a reading of the lease terms, which only applied the *force majeure* clause to the secondary term of the lease (production), not the primary term (initial drilling). *Id.* at 93.

as fluctuations in commodity price, unavailability or high costs of drilling rigs or other equipment, or lack of access to capital.⁹² Another issue is whether a lease of oil and gas rights is itself property. This is a complicated question but the short answer is “yes.” Texas courts, for example, have clarified that oil and gas leases create a “separate, real interest ‘amount[ing] to a defeasible title in fee to the oil and gas in the ground.’”⁹³ Thus a lease of oil and gas rights is considered a *profit a prendre*, which is a non-possessory interest in land to extract the minerals found thereon.⁹⁴ A *profit a prendre* is generally seen as subject to the protections of the Takings Clause.⁹⁵ Therefore, oil and gas leases also potentially must be valued in successful takings claims.

A royalty interest is typically a residual property interest left behind during the lease of oil and gas rights.⁹⁶ A royalty owner is typically entitled to either a share of any oil and gas that is produced, or a portion of the proceeds from the sale of those minerals.⁹⁷ But the royalty interest does not create a right to extract oil and gas directly.⁹⁸ Royalty interests may also be created under state laws, which allow for pooling or unitization of diverse oil and gas rights in a common pool.⁹⁹

92. See Phil Taylor, *Two Thirds of Federal Oil and Gas Drilling Permits Sat Idle in 2010*, N.Y. TIMES (Jan. 13, 2011), <https://archive.nytimes.com/www.nytimes.com/gwire/2011/01/13/13greenwire-two-thirds-of-federal-oil-and-gas-drilling-per-13123.html> [<https://perma.cc/M7HP-EA2E>] (discussing reasons why permits to drill on Bureau of Land Management’s lands are often not fully utilized).

93. *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 829 (Tex. 2012) (quoting *Tex. Co. v. Daugherty*, 176 S.W. 717, 719 (Tex. 1915)). Although the court does state that depriving owners of their oil and gas rights would be a taking of private property, *id.*, other cases have affirmed the authority of the state to regulate oil and gas property under its police power. *Brown v. Humble Oil & Ref. Co.*, 83 S.W.2d 935, 940 (Tex. 1935).

94. RESTATEMENT (THIRD) OF PROP.: SERVITUDES § 1.2(2) (AM. LAW INST. 2000) (“A profit a prendre is an easement that confers the right to enter and remove timber, minerals, oil, gas, game, or other substances from land in the possession of another.”).

95. See, e.g., *Bates Sand & Gravel Co., Inc. v. Commonwealth*, 393 N.E.2d 956, 957–58 (Mass. App. Ct. 1979) (saying that owner of a *profit a prendre* was entitled to compensation based on “the fair market value of [his] interest in the land,” which was equated to “the value of the sand as it lay undisturbed”); *U.S. v. Gossler*, 60 F. Supp. 971, 974–75 (D. Or. 1945) (taking of *profit a prendre* to remove gravel was compensable property interest).

96. WILLIAMS & MEYERS, OIL & GAS LAW, *supra* note 66, § 202.3.

97. *Id.*

98. *Id.*

99. *Id.*

2. Severed Mineral Estate

In addition to leasing mineral rights to an oil and gas company, a landowner might also either grant mineral rights to another party through the use of a deed, or transfer the land to another party while retaining the mineral rights.¹⁰⁰ This creates what is commonly referred to as a “split estate” where the minerals have been severed from the surface.¹⁰¹ The owner of a severed estate has the right to extract minerals from the land himself, or to lease those rights to an oil and gas company in exchange for payment and a royalty interest.¹⁰² However, unlike a fee simple, the severed mineral estate owner does not have rights in the surface other than those reasonably necessary to allow for the extraction of the oil and gas. Additionally, a lease might apply to all the minerals found on that property or only to a subset of those.¹⁰³

Because oil and gas wells were historically drilled vertically, the split estate meant that the owner of mineral rights could enter the surface and use a portion of the surface in order to extract the oil and gas. This is known as the rule of reasonable surface use.¹⁰⁴ However, the right to access one’s minerals does not allow the destruction of, or damage to, the surface beyond what is reasonable.¹⁰⁵ Additionally, it is important to note that the reasonable use doctrine was developed to resolve disputes between the surface estate and the mineral estate, and does not therefore address conflicts between neighboring landowners.¹⁰⁶ Some courts refer to the mineral estate as the “dominant estate,” although this terminology can be misleading and does not mean that the rule of reasonable surface use does not apply.¹⁰⁷

100. *Id.* § 202.2.

101. *Id.* § 215.

102. *Id.* § 202.2.

103. *See, e.g.*, *Westmoreland & Cambria Nat. Gas Co. v. De Witt*, 18 A. 724, 724 (Pa. 1889) (discussing a lease for oil and gas).

104. *See, e.g.*, *Gerrity Oil & Gas Co. v. Magness*, 946 P.2d 913, 926 (Colo. 1997).

105. *Id.*

106. WILLIAMS & MEYERS, *OIL & GAS LAW*, *supra* note 66, § 217 (discussing applicability of nuisance, negligence, trespass, and other principles to impacts of adjoining landowners due to oil and gas operations).

107. *See, e.g.*, *Getty Oil Co. v. Jones*, 470 S.W.2d 618, 621 (Tex. 1971) (“It is well settled that the oil and gas estate is the dominant estate in the sense that use of as much of the premises as is reasonably necessary to produce and remove the minerals is held to be impliedly authorized by the lease; but that the rights implied in favor of the mineral estate are to be exercised with due regard for the rights of the owner of the servient estate.”). The

III. VALUATION OF TAKINGS CLAIMS

This Part lays out the necessary background for understanding the issues associated with valuing a fracking-takings claim. As discussed in more detail in Part IV, this Article makes two principal arguments with respect to valuation of fracking-takings claims. First, the standard measure for valuing takings claims—fair market value—presents numerous evidentiary challenges in the fracking-takings context.¹⁰⁸ These challenges make it difficult, perhaps impossible, to correctly value any property interest that is taken by regulations on fracking. Second, even assuming the fair market value could be agreed upon by the parties or divined by the court, fair market value should not be equated to just compensation for a fracking-takings claim.¹⁰⁹ Instead, fairness may suggest that the public should bear some, but not necessarily all, of the burden on private property. This conception implies that just compensation should be determined on a case-by-case basis, with reference to the overarching goals of achieving fairness and efficiency. This conclusion goes against the commonly held view that the fair market value or the economic impact of a regulation should determine just compensation for any taking of private property.¹¹⁰

This Part, therefore, first addresses the theories underpinning just compensation law, principally fairness and efficiency. These theories call for a carefully calibrated just compensation award

reciprocal burden on the mineral estate is sometimes known as the accommodation doctrine. *Id.*; see also DuVivier, *supra* note 43, at 408 (discussing the *Getty Oil* case and noting that it created this doctrine by requiring that due regard be paid to the rights of the surface estate).

108. See *infra* Part IV.B.2 (discussing the uncertainty in valuing oil and gas before it is extracted).

109. See *infra* Part IV.B.1 (discussing the fairness concerns associated with awarding the fair market value of oil and gas). Fair market value of the property “taken” is often equated with the economic impact of a regulation on property, yet this approach does not always actually reflect the economic impact, particularly when dealing with a temporary loss of income-producing property. See William W. Wade, *Theory and Misuse of Just Compensation for Income-Producing Property in Federal Courts: A View from Above the Forest*, 46 TEX. ENVTL. L.J. 139, 140 (2016).

110. Although numerous commentaries and cases conflate the economic impact of a regulation with just compensation for a taking, I am not the first to argue that these distinct concepts are not necessarily equal. See, e.g., John D. Echeverria & Michael C. Blumm, *Horne v. Department of Agriculture: Expanding Per Se Takings While Endorsing State Sovereign Ownership of Wildlife*, 75 MD. L. REV. 657, 682–83 (2016) (arguing that the majority in *Horne* “plainly erred” in equating the value of raisins withheld under the regulatory scheme to just compensation required for the taking of those regulations).

using available valuation mechanisms to balance the interests of the public and the property owner. This Part also explores the valuation methods that courts have developed to determine the fair market value for taken property, and the importance of the date of valuation in the calculation. Understanding how these valuation mechanisms work and the implications of choosing between them is necessary to assess how well they fit the example of fracking-takings. The mismatch that will become apparent highlights that the traditional fair market value approach does not lead to fair or efficient just compensation awards for fracking-takings claims.

This Part concludes by providing a brief overview of the takings doctrine, highlighting several concepts which will inform the proper measure of just compensation for fracking-takings claims. The most important distinctions include: physical appropriations versus regulatory takings; permanent versus temporary versus indefinite takings; and offsetting benefits. Although each of these distinctions has many fair criticisms, each also has a solid basis in case law and potential relevance for understanding fracking-takings claims. As noted previously, the bulk of case law and scholarship focuses on the question of whether or not a taking has occurred, and only a small subset addresses the proper measure of just compensation.¹¹¹ Yet even though these represent two distinct questions, there are many connections between the policies underlying the choices in each context, as there are for rights and remedies in other areas of the law.¹¹² Thus, although much of the discussion of case law and scholarship in this Part is explicitly focused on the question of whether or not a taking occurred, it is also relevant to the question of how to determine just compensation once a taking has been found. This Article assumes that a court has already found an unconstitutional taking, but of course many of the arguments here in favor of less compensation would also be arguments against finding a taking.

A. Theories of Just Compensation

United States courts have long espoused fairness as the principal justification for the requirement for just compensation in takings

111. *See supra* notes 2–3 and accompanying text.

112. Christopher Serkin, *The Meaning of Value: Assessing Just Compensation for Regulatory Takings*, 99 NW. U. L. REV. 677, 679 (2005) (“In short, the compensation inquiry is not independent of the constitutional protection afforded to private property.”).

law, reflected in the oft-repeated formulation that government cannot force “some people alone to bear public burdens which, in all fairness and justice, should be borne by the public as a whole.”¹¹³ In addition to fairness, courts and scholars have also identified efficiency as a justification for the just compensation requirement.¹¹⁴ As discussed in more detail throughout this Article, each of these goals has particular resonance for fracking-takings claims. If just compensation means fairness, then compensation should consider both the harms and the benefits caused by regulation and should not reward private parties absent some labor or risk to capital. If just compensation means efficiency, then compensation must not prevent governmental regulation from forcing property owners to internalize the costs of actions on their property. This means that compensation should be limited to actual damages and not consequential damages, while also taking into account market failures which would otherwise allow oil and gas development to impose serious externalities on the public. Fairness and efficiency in the fracking context both point towards greater deference towards regulation of the oil and gas industry, and thus courts should resist high just compensation awards which would prove overly hostile to reasonable public health and safety regulations.

Professor Serkin has argued persuasively that the valuation method for just compensation includes a number of substantive decisions (which he terms “valuation mechanisms”) which can be adapted to various private property regimes.¹¹⁵ Serkin has also argued that the Fifth Amendment does not demand full compensation for all losses in the case of a taking, thus highlighting the independent nature of just compensation and substantive takings protection.¹¹⁶ This Article adopts a similar approach, pushing back against the all-or-nothing approach to just compensation that is sometimes assumed by courts and scholars. Fracking-takings claims in particular highlight the pitfalls of such an approach and suggest that a more nuanced balancing approach would better achieve the goals of fairness and efficiency that have been articulated in support of takings jurisprudence.

113. *Armstrong v. United States*, 364 U.S. 40, 49 (1960).

114. *See, e.g.*, Michelman, *supra* note 3, at 1173.

115. Serkin, *supra* note 112, at 678.

116. *Id.* at 679.

This Article is not alone in arguing against the all-or-nothing approach to compensation under the Takings Clause. Typically, however, this argument is made by proponents of greater property rights protection.¹¹⁷ This position comes from the view that too often, all compensation is denied when some compensation would be better than nothing. However, a case can be made that even in the cases where courts currently would find that a taking occurred, the goal of courts should not be to place the property owner in the same position she would have been had her property not been taken,¹¹⁸ but instead to determine how much compensation would be just under all the circumstances. One way to achieve this would be to calibrate the measure of just compensation based on a number of factors that would serve to adjust any calculation of fair market value.¹¹⁹

Additionally, much of the theoretical debate about just compensation has focused on the question about whether just compensation should make property owners objectively or subjectively whole. These competing theories will be useful for analyzing fracking-takings claims, and suggest that seeking to make property owners indifferent to takings does not match up well with the theoretical framework of just compensation. Thus, an objective measure of just compensation should be employed in fracking-takings cases.

1. Fairness

The text of the Fifth Amendment itself provides not simply that compensation be required for takings of private property, but that “just” compensation is required. In order to determine what amounts to justice in a particular case, Frank Michelman relies upon John Rawls’ theory of “justice as fairness.”¹²⁰ Under this theory, a participant in society should be assured “the maximum liberty consistent with a like liberty on the part of every other

117. See, e.g., Richard A. Epstein, *The Takings Clause and Partial Interests in Land; On Sharp Boundaries and Continuous Distributions*, 78 BROOK. L. REV. 589, 592 (2013) (“The proper approach to compensability does not depend on these elusive notions of degree. . . . All questions of degree are reserved for determining the proper level of compensation.”).

118. *United States v. 564.54 Acres of Land*, 441 U.S. 506, 510 (1979).

119. See Serkin, *supra* note 112, at 678.

120. Michelman, *supra* note 3, at 1219; see also John Rawls, *Justice as Fairness*, 67 PHIL. REV. 164 (1958).

participant.”¹²¹ Deviations from this fundamental equality are allowed so long as each participant is more well-off than she would be under strict equality due to the productive incentives created by inequality.¹²² Michelman applies these principles to the question of whether or not to compensate.¹²³ Under this formulation, government should pay private property owners for taking their property, unless the use of the property would have impinged on the liberty of others, or if payment would mean that society as a whole would be less well-off, including the impacted property owner.

The fairness principle is reflected in numerous court decisions, both on the question of whether a taking occurred as well as how much compensation is appropriate. For example, the United States Supreme Court has cautioned that government should not force “some people alone to bear public burdens which, in all fairness and justice, should be borne by the public as a whole.”¹²⁴ Courts are instructed to look at all of the “circumstances which are probative of what fairness requires in a given case.”¹²⁵ Fairness and justice are the concepts that underlie the Takings Clause.¹²⁶ The United States Supreme Court affirmed fairness as the guiding principle of takings law in its most recent takings case.¹²⁷ Fairness also animates courts that deviate from the fair market value standard based on unique circumstances.¹²⁸

Many of the rules and guidance laid out by the courts reflect the fairness principle. Prevention of windfalls to the property owner

121. Michelman, *supra* note 3, at 1219.

122. *Id.* at 1220.

123. *Id.* at 1221 (“What we want to know, then, is whether a specific decision not to compensate is fair.”).

124. *Armstrong v. United States*, 364 U.S. 40, 49 (1960); *see also* *Tahoe-Sierra Pres. Council, Inc. v. Tahoe Reg’l Planning Agency*, 535 U.S. 302, 321 (2002) (quoting *Armstrong*, 364 U.S. at 49).

125. *Palazzolo v. Rhode Island*, 533 U.S. 606, 635 (O’Connor, J., concurring).

126. *Tahoe-Sierra Pres. Council, Inc.*, 535 U.S. at 334.

127. *Murr v. Wisconsin*, 137 S. Ct. 1933, 1943 (2017) (quoting *Palazzolo*, 533 U.S. at 617–18) (affirming the proposition that the purpose of the Takings Clause is to require payment for takings when fairness and justice require).

128. *See, e.g., Corrigan v. City of Scottsdale*, 720 P.2d 513, 518–19 (Ariz. 1986) (noting that “[e]ach of these damages measures works well in some ‘takings’ cases and inequitably, if at all, in others” and that the court must balance between public and private interests).

has been identified as an important fairness consideration.¹²⁹ The principle is also reflected in state court cases, where courts caution that while the public is not to be enriched at the owner's expense, neither is the owner to be enriched at the public's expense.¹³⁰ Another formulation of this idea is the limitation of just compensation to actual damages and the denial of recovery for consequential damages such as lost profits.¹³¹ The fairness principle is also reflected in the long-standing distinction between harm regulation versus benefit regulation.¹³² If a property owner wishes to use his property in a way that infringes on the liberty of another (such as by harming his health or taking his life), then the property owner may be fairly prohibited from such use without requiring compensation. Fairness is also reflected in the rules requiring that offsetting benefits or average reciprocity of advantage¹³³ be considered in the determination of just compensation.¹³⁴ Thus, valuation of a fracking-takings claim

129. *Palazzolo*, 533 U.S. at 635 (2001) (O'Connor, J., concurring) (“[I]f existing regulations do nothing to inform the analysis, then some property owners may reap windfalls and an important indicum of fairness is lost.”).

130. *See, e.g., Corrigan*, 720 P.2d at 516 (quoting *San Diego Gas & Elec. Co. v. City of San Diego*, 450 U.S. 621, 659 (1981)) (Brennan, J., dissenting); *Miller Bros. v. Dep't of Nat. Res.*, 513 N.W.2d 217, 222 (Mich. Ct. App. 1994).

131. *Corrigan*, 720 P.2d at 519 (noting that regardless of measure of damages that is appropriate, compensation is only allowed for actual damages). Courts have repeatedly refused to allow consequential damages such as lost profits or additional costs of changing business strategy. *See, e.g., Yuba Nat. Res., Inc. v. United States*, 904 F.2d 1577, 1581–83 (Fed. Cir. 1990) (“[T]he measure of just compensation is the fair value of what was taken, and not the consequential damages the owner suffers as a result of the taking.”). Many of the takings cases which discuss consequential damages do not provide a clear definition of what is meant by that term, although they do provide examples of consequential damages which are not recoverable. These include injury to goodwill, going-concern value, loss of profits, moving expenses, or attorney fees. *See* Thomas W. Merrill, *Incomplete Compensation for Takings*, 11 N.Y.U. ENVTL. L.J. 110, 118 (2002).

132. Douglas W. Kmiec, *The Original Understanding of the Taking Clause Is Neither Weak Nor Obtuse*, 88 COLUM. L. REV. 1630, 1635 (1988) (“Perhaps the continued life of the [harm/benefit] distinction can be traced to its intuitive fairness.”).

133. *See infra* notes 283–285 and accompanying text.

134. *See, e.g., Agins v. City of Tiburon*, 447 U.S. 255, 262 (1980) (“In assessing the fairness of the zoning ordinance, these benefits must be considered along with any diminution in market value”); *Pa. Coal Co. v. Mahon*, 260 U.S. 393, 415 (1922) (recognizing average reciprocity of advantage); Raymond R. Coletta, *Reciprocity of Advantage and Regulatory Takings: Toward a New Theory of Takings Jurisprudence*, 40 AM. U. L. REV. 297, 334 (1990) (noting linkage between reciprocity of advantage and fairness). Although average reciprocity of advantage is usually factored into a determination of whether a taking has occurred, it is also relevant to the question of how much compensation should be required when a taking has

should take into account each of these various formulations of fairness.

2. Efficiency

Utilitarian arguments about property suggest that the law should encourage government interference with property rights when the change it effects will result in more efficiency gains than the costs associated with that interference.¹³⁵ Efficiency-based theories of just compensation often involve some kind of market failure, whereby government regulations to address market failures do not require the payment of compensation.¹³⁶ The traditional view is that government should be forced to internalize the cost of its regulatory actions.¹³⁷ This addresses what is known as “fiscal illusion,” whereby government ignores the costs of its regulations and therefore over-regulates in the absence of a taking.¹³⁸ Under this account, just compensation will deter government from taking property when the costs of just compensation “outweigh the public benefit of the taking.”¹³⁹ On the property owner side, market

occurred. Epstein, *supra* note 117, at 613 (discussing how in certain legal regimes the average reciprocity of advantage satisfies the just compensation requirement).

135. Michelman, *supra* note 3, at 1214–18 (developing his famous utilitarian formula for judging takings claims by comparing efficiency gains to both settlement costs and demoralization costs). Michelman also notes that efficiency and fairness might lead to dramatically different outcomes in some takings cases. *Id.* at 1223.

136. Joseph L. Sax, *Takings, Private Property and Public Rights*, 81 YALE L.J. 149, 155–72 (1971) (arguing that compensation for regulatory takings should not be required if regulation is addressing externalities, a classic market failure). Sax referred to the prevention of these externalities as public rights, which may be vindicated without compulsory compensation. *Id.* at 159.

137. Abraham Bell & Gideon Parchomovsky, *Givings*, 111 YALE L.J. 547, 580 (2001).

138. Serkin, *supra* note 112, at 705–08; *see also* Abraham Bell & Gideon Parchomovsky, *Taking Compensation Private*, 59 STAN. L. REV. 871, 881 (2007) (“The most prominent efficiency-based explanation for compensation references fiscal illusion.”).

139. James Geoffrey Durham, *Efficient Just Compensation as a Limit on Eminent Domain*, 69 MINN. L. REV. 1277, 1278 (1985). Like many assumptions of economic theory, the assumption that governments will respond rationally to the incentives provided by takings law may not necessarily pan out in practice. *See, e.g.*, Daryl J. Levinson, *Making Government Pay: Markets, Politics, and the Allocation of Constitutional Costs*, 67 U. CHI. L. REV. 345, 387 (2000) (noting the indeterminate effects of constitutional cost remedies and arguing that “we should have little confidence in any of the conventional assumptions about the deterrent effects of making government pay money for constitutionally significant harms”). It may also be difficult for government to assess with any accuracy what their potential liability might be. *See* CONG. BUDGET OFFICE, *REGULATORY TAKINGS AND PROPOSALS FOR CHANGE 61–75* (1998) (noting difficulties in estimating impacts of changes to takings regime for wetlands, including a difference of over 300 times between low- and high-end estimates). I am

failures may also be present when private property owners face risks due to regulation and therefore under-invest in their property.¹⁴⁰ This has led to suggestions that compensation for takings can act as a form of public insurance to compensate for the unavailability of private insurance against regulatory risks.¹⁴¹ Efficiency alone suggests that by balancing public and private interests, a “proper” level of regulation can be found for which governments are willing to pay just compensation in order to achieve a more efficient ordering of society.¹⁴²

Efficiency is also implicated by the uncertainty in the takings doctrine. If takings law is concerned about protecting distinct investment-backed expectations,¹⁴³ then uncertainty in outcomes means that investors do not know whether or not they will be compensated for regulatory risks and are left bearing the burden of uninsurable risk.¹⁴⁴ The primary reason that uncertainty affects efficiency in takings law is the concept of risk aversion, which reflects the willingness of an individual to pay to avoid a gamble.¹⁴⁵ When investors are risk averse, investment decisions are inefficient.¹⁴⁶ Additionally, government is also likely risk averse for several reasons. On a basic level, government represents voters who are themselves risk averse.¹⁴⁷ And of course government is made up of actual people, so there is no reason to think they would not also be risk averse in the context of adopting regulations that

sympathetic to this view of the limits of efficiency theory on government decision-making, and thus while I do not object to efficiency considerations informing the development of takings law, I do not think they should trump concerns over fairness and the need to defer to governmental decisions about the necessity of regulations that restrict property, particularly in the case of harm. These considerations also support efforts to limit the compensation that might be required for any fracking-takings claim.

140. See Lawrence Blume & Daniel L. Rubinfeld, *Compensation for Takings: An Economic Analysis*, 72 CAL. L. REV. 569, 582–84 (1984).

141. *Id.* at 590–92.

142. See, e.g., Richard A. Epstein, *Littoral Rights Under the Takings Doctrine: The Clash Between the Ius Naturale and Stop the Beach Renourishment*, 6 DUKE J. CONST. L. & PUB. POL’Y 37, 64 (2011) (“The reason for the just compensation requirement of the Takings Clause is to make sure that the coercive power of the state, which cannot be enjoined, is only used to transfer property from lower to higher-valued uses.”).

143. Penn Cent. Transp. Co. v. City of New York, 438 U.S. 104, 124 (1978).

144. Rose-Ackerman, *supra* note 23, at 1700.

145. See Blume & Rubinfeld, *supra* note 140, at 603–06. Blume and Rubinfeld distinguish between absolute risk aversion, which involves a fixed dollar amount gamble, and relative risk aversion, which involves a gamble of a percentage of his wealth. *Id.*

146. Rose-Ackerman, *supra* note 23, at 1700.

147. Blume & Rubinfeld, *supra* note 140, at 616.

might impose takings liability on the government. Additionally, there is some evidence to show that in the face of takings liability, the will of government to regulate can largely disappear.¹⁴⁸

Finally, efficiency suggests that takings law should be designed in a way to avoid the possibility that parties (either public or private) can game the system. Although the problem of gaming the system has been acknowledged in the law and economics literature, it has not received any deep treatment.¹⁴⁹ Courts have noted the potential for gaming the system as well. Justice Stevens pointed out this flaw with the categorical takings rule announced in *Lucas*—that “investors will manipulate the relevant property interests, giving the Court’s rule sweeping effect.”¹⁵⁰ Justice O’Connor has noted the need to take account of the transfer of title after enactment of a regulation in order to avoid giving too much power either to the government or to the private parties, which indicates that she was concerned about abuses of the system under categorical rules.¹⁵¹ Other justices have objected to the “bait-and-switch ploy” by a landowner that leaves the government in an impossible-to-defend position.¹⁵² When takings claims provide an opportunity for either government or property owners to game the system, they risk imposing liability on the other party that could not have been anticipated, and therefore create inefficiencies in either the market or in government regulatory schemes.

Efficiency arguments are also reflected in numerous statements or rules developed by the courts in takings cases. For example, the impact of takings liability on government was recognized in the first regulatory takings case, in Justice Holmes’ formulation that: “Government hardly could go on if to some extent values incident to property could not be diminished without paying for every such change in the general law.”¹⁵³

148. John D. Echeverria & Thekla Hansen-Young, *The Track Record on Takings Legislation: Lessons from Democracy’s Laboratories*, 28 STAN. ENVTL. L.J. 439, 444 (2009).

149. See, e.g., Bell & Parchomovsky, *supra* note 138, at 903 (noting the possibility for collusive transfers between private parties in an attempt to “game the system”).

150. *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1066 (1992) (Stevens, J., dissenting).

151. *Palazzolo v. Rhode Island*, 533 U.S. 606, 634–35 (2001) (O’Connor, J., concurring) (objecting to the extremes of giving exclusive significance or of ignoring investment-backed expectations).

152. *Id.* at 648 (Ginsburg, J., dissenting).

153. *Pa. Coal Co. v. Mahon*, 260 U.S. 393, 413 (1922).

3. Calibrating Just Compensation

Perhaps surprisingly, the conclusions of this Article in examining just compensation for fracking-takings claims point towards abandoning the explicit goal of full compensation through the calculation of the fair market value of taken property. A similar conclusion is reached by property rights advocates who fear that in an all-or-nothing compensation regime, property owners too often will receive nothing. Yet fracking-takings claims emphasize the risk that in the face of astronomical takings liability, government will simply retreat from the business of regulation. Thus, a careful case-by-case approach to just compensation can also advance the interests of promoting regulatory action to address serious issues like fracking.

This Article builds upon the approach laid down by Professor Serkin whereby the goals to be achieved by awarding just compensation require case-specific calibration. Calibrating just compensation is not a goal in and of itself, but rather serves as a means by which the valuation question can meet the overarching goals of fairness and efficiency. Serkin identified nine “valuation mechanisms” that courts use to calibrate just compensation awards.¹⁵⁴ These mechanisms include harm versus gain; allocating risk; permissible but unenacted regulations; benefit offset and average reciprocity of advantage; timing of valuation; and recharacterizing the property taken.¹⁵⁵

Serkin also identified a range of “contested takings theories” that have been advanced in support of various views on how takings law should be applied by the courts.¹⁵⁶ Serkin’s key insight was to connect the variety of theories of takings law with the valuation mechanisms previously discussed, arguing that no true value of property can be determined without first understanding the theory being promoted and the context of the particular case.¹⁵⁷ Thus, takings cases need not reflect a unified theory because instead they reflect a number of competing theories that may change over time

154. This list was not meant to be exhaustive. Serkin, *supra* note 112, at 703–04.

155. Serkin, *supra* note 112, at 687–703. Serkin’s remaining valuation mechanisms for fees and expenses, net harm, and replacement value are important ones, but not of particular relevance in the context of fracking-takings. These mechanisms might be used in valuing a fracking-takings claim, but the fracking-takings case study does not help to further illuminate those mechanisms beyond what Serkin has already described.

156. Serkin, *supra* note 112, at 704–29.

157. *Id.* at 681.

or vary between judges. Memorably, Serkin noted that: “Looking for consistency in takings cases is a little bit like finding shapes in the clouds: you can see them if you look hard enough, but they say more about the observer than the clouds themselves.”¹⁵⁸

The traditional economic model seeks to promote efficient government action by “forcing the government to internalize the costs of its [regulations].”¹⁵⁹ This theory matches with the efficiency rationale laid down by Michelman¹⁶⁰ and further developed by numerous other scholars. Yet as Serkin has noted, this model does not reflect the reality of takings law, because in only relatively rare instances is government required to pay just compensation for its actions.¹⁶¹ This account reinforces the conclusion that fairness, and not efficiency alone, is the primary theoretical underpinning of takings law. This should not be a surprise because the Fifth Amendment requires *just* compensation, not *efficient* compensation. Efficiency theory does have a role to play, but it should not trump the basic goal of fairness.

Serkin also identifies theories requiring high compensation, primarily hostility to government regulations and the “Just Desserts” theory of property.¹⁶² Intuitively it makes sense that finding takings of property in more settings, and awarding high values as just compensation, would act as a deterrent on government regulation. This hostility to government regulation is reflected in the property rights movement in the United States.¹⁶³ This movement has had some limited success in advancing its goals, and the result has been as expected—less government regulation.¹⁶⁴ However, despite broad hostility towards government regulation by some members of the United States Supreme Court, this high compensation theory has not gained as much traction as

158. *Id.* at 741.

159. *Id.* at 705.

160. Michelman, *supra* note 3, at 1208–13 (discussing utilitarian theories of property).

161. Serkin, *supra* note 112, at 707.

162. *Id.* at 708–13.

163. See CHARLES FRIED, ORDER AND LAW, ARGUING THE REAGAN REVOLUTION—A FIRSTHAND ACCOUNT 183 (1991). Leading proponents of the property rights movement include Richard Epstein and Richard Posner. See, e.g., EPSTEIN, *supra* note 2; RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 58–59 (7th ed. 2007); Richard A. Epstein, *A Clear View of the Cathedral: The Dominance of Property Rules*, 106 YALE L.J. 2091, 2099 (1997).

164. Echeverria & Hansen-Young, *supra* note 148, at 444 (discussing Fried’s quotation and noting that legislative attempts to advance the property rights agenda “[e]viscerates [r]egulatory [a]uthority”).

it might have.¹⁶⁵ Additionally, the “Just Desserts” theory has fallen out of favor and is not reflected in current scholarship on takings and property.¹⁶⁶

On the flip side, several theories of property suggest low compensation for takings claims, including deference to government regulations and insurance theory.¹⁶⁷ Deference to government regulation allows more room for government actors to resolve disputes between private parties, and lower compensation for takings would reduce the risk on government actors seeking to regulate private property. Going beyond the incentives for legislation and regulation, insurance theory suggests that too much protection of private property risks the creation of a moral hazard and inefficient overinvestment in property.¹⁶⁸ Under these and related theories, just compensation should be determined to be conservatively low in order to allow sufficient room for government action and to avoid a chilling effect on regulations.

Finally, a number of theories might require either high or low levels of compensation depending on the context.¹⁶⁹ Thus, a number of redistributive approaches to just compensation might suggest that more compensation should be required when property is taken from members of a disfavored group than when property is taken from the privileged.¹⁷⁰ Redistribution might be relevant in the fracking-takings context, where the property owner might be a wealthy corporation or the regulation might be intended to protect a vulnerable community. Another context-dependent theory is personality theory, which argues that compensation should be sensitive to whether personal connections to property justify higher

165. Richard J. Lazarus, *The Measure of a Justice: Justice Scalia and the Faltering of the Property Rights Movement Within the Supreme Court*, 57 HASTINGS L.J. 759, 823 (2006) (noting the disappointment of property rights advocates despite numerous opportunities to establish legal precedent favoring landowners bringing takings challenges).

166. Serkin, *supra* note 112, at 711.

167. *Id.* at 713–18. The idea here is that lower compensation awards “will reduce the economic risk of legislating” and society can trust that other political constraints will prevent legislative abuses. *Id.* at 713.

168. Blume & Rubinfeld, *supra* note 140, at 590–92; *see also* Serkin, *supra* note 112, at 714–18 (discussing Blume and Rubinfeld’s theory).

169. *See* Serkin, *supra* note 112, at 718–25.

170. *See* Wyman, *supra* note 3, at 282 (noting that wealthy property owners might “receive little or no compensation” under an objective measure of takings); *see also* Leslie Bender, *The Takings Clause: Principles or Politics?*, 34 BUFFALO L. REV. 735, 816–29 (1985).

protection than fair market value.¹⁷¹ Yet this theory is not likely to have much applicability to fracking-takings, where property owners are unlikely to have any deep connection to oil and gas that they simply wish to extract and sell for profit.

Unlike Serkin, this Article contends that the example of fracking-takings claims suggests that several of these theories of takings cannot be squared with the overarching goal of achieving fairness. Specifically, theories requiring high compensation, when applied to the fracking-takings context, would break down by either unduly inhibiting appropriate government regulation or by shifting the enormous risk of fracking development from private entities to the public while creating windfalls for mineral interest owners at the public's expense.¹⁷² Instead, low or context-dependent compensation theories are better suited to resolving fracking-takings claims.

4. Objective versus Subjective Valuation

Another question related to valuation of just compensation takes a step back from the question of the precise valuation method to be employed and asks whether takings law should make property owners objectively whole, or subjectively whole. The United States Supreme Court has often stated that the goal of the just compensation requirement is “to put the owner of condemned property ‘in as good a position pecuniarily as if [the] property had not been taken.’”¹⁷³ Professor Wyman has argued that this represents a first-best option which is not practical, and thus the Court adopted fair market value as a second-best option.¹⁷⁴ Justice Marshall has therefore described fair market value as a “relatively objective” method that is necessary due to the “serious practical difficulties in assessing the worth an individual places on particular property at a given time.”¹⁷⁵

171. MARGARET JANE RADIN, REINTERPRETING PROPERTY 146–65 (1993); Margaret Jane Radin, *Property and Personhood*, 34 STAN. L. REV. 957 (1982).

172. See *infra* notes 300–308 and accompanying text.

173. *United States v. 564.54 Acres of Land*, 441 U.S. 506, 510 (1979) (quoting *Olson v. United States*, 292 U.S. 246, 255 (1934)).

174. Wyman, *supra* note 3, at 252–53.

175. *564.54 Acres of Land*, 441 U.S. at 511. Wyman notes that fair market value does not meet her definition of an objective standard since it “is ultimately rooted in individual preferences, including those of the [owner].” Wyman, *supra* note 3, at 254.

Professor Wyman also noted the rise in calls for reform to “more fully realize the goal of paying expropriated owners enough to make them subjectively indifferent to takings,”¹⁷⁶ which were prompted by negative reaction to the Court’s decision in the *Kelo* case.¹⁷⁷ Numerous scholars and advocates have put forward varying theories of subjective compensation rules that would provide greater protection to private property in the eminent domain context.¹⁷⁸ In response, Wyman proposed an alternative objective measure of compensation, as a thought experiment, that is based not on whether the individual is indifferent to the taking, but whether “the considered judgments of others about what makes a person whole” have been satisfied.¹⁷⁹ This objective measure admittedly poses challenging problems of definition and of calculation, but perhaps no more than current subjective standards including fair market value. Yet the real value of this alternative method is not in its (im)practicality, but rather in the way it allows one to challenge assumptions so rooted in takings law as to be unnoticeable. For example, one implication of Wyman’s objective measure for just compensation is that it shifts the unit of measure from the property taken to the takee herself.¹⁸⁰ This shifting of the frame of reference calls into question whether wealthy owners should be treated the same as others, since the wealthy owner who loses one of her many properties would see little to no impact on her ability to have adequate shelter or ability to participate in a community.¹⁸¹ And even if this change to an objective measure meant that wealthy property owners would be more at risk of having property taken for public use, they would be better able to protect themselves through the political process or through private insurance, which may be preferable to compensating them from the public coffers.¹⁸²

176. Wyman, *supra* note 3, at 256.

177. *Kelo v. City of New London*, 545 U.S. 469 (2005). The court upheld expropriation of private homes to promote private development as a valid “public use” under the Takings Clause, and the decision “generated widespread public outrage.” Wyman, *supra* note 3, at 241.

178. Wyman, *supra* note 3, at 242 n.10 (citing to various scholarly proposals in aftermath of *Kelo* decision).

179. *Id.* at 274.

180. *Id.* at 281.

181. *Id.* at 282.

182. *Id.* at 283.

Subjective measures of just compensation for fracking-takings might not depend on the underlying value of the property, but rather on subjective views regarding how much compensation would be just. Many mineral rights owners feel that they have an unqualified right to their property, and that entitles them to the profits they might make if they were to extract and sell the oil and gas. Thus, a subjective approach to valuation would violate the general rule that a property owner can only recover for actual damages and not for restrictions which limit potential future income.¹⁸³ Therefore a subjective approach should be rejected for fracking-takings.

B. Methods of Valuing Just Compensation

With this sufficient basic understanding of the theories underlying just compensation, it is time to turn to the question of how to calculate the appropriate amount of just compensation required for a taking. Rigid or strict rules on valuation methodology would sacrifice fairness for the sake of certainty. The Federal Circuit has stated that “just compensation for a permanent taking is generally the fair market value of the property taken, whereas the recovery for a temporary taking is generally the rental value of the property.”¹⁸⁴ However, these two approaches are not adaptable to every situation or every type of property that might be taken, and so courts have developed a variety of different valuation methods.¹⁸⁵ The following Part provides an overview of those methods, before then examining the small handful of cases that have attempted to put a value on takings of oil and gas rights. Understanding how these valuation methods operate is essential to evaluating how well they can achieve the goals of fairness and efficiency in fracking-takings claims.

1. Valuation Methods in Regulatory Takings Cases

The expressed goal of most courts grappling with the just compensation question is to determine the fair market value of the

183. *Cf. Serkin, supra* note 112, at 700–01 (noting court discretion to allow for compensation for special uses of property).

184. *Bass Enters. Prod. Co. v. United States*, 133 F.3d 893, 895, 896–97 (Fed. Cir. 1998) (finding no permanent taking but remanding to determine if temporary taking occurred).

185. *Tretbar, supra* note 5, at 217–18.

property that was taken.¹⁸⁶ In eminent domain proceedings involving condemnation of real property, this is typically determined by using a comparable sales approach to appraise the fair market value.¹⁸⁷ The concept of fair market value certainly has its critics, particularly among those who believe that a property owner should be made subjectively indifferent to a taking.¹⁸⁸ The concept is relatively straightforward to apply, defined as “the most likely price that a property should fetch in a current competitive market under specified conditions of exchange between well-informed buyers and sellers.”¹⁸⁹ Yet this basic appraisal approach to fair market value, while it may work well in eminent domain proceedings, does not apply as readily in the regulatory takings context.¹⁹⁰

For temporary takings that are temporary physical appropriations, the starting point for just compensation would be the rental value of the property over the time of occupation. Thus in two cases involving occupation by the United States Army of facilities during World War II, just compensation was required and based on the rental value of the properties at issue.¹⁹¹ However, in regulatory takings cases the property owner may retain some limited use rights, which would justify a deviation downwards from the rental value.¹⁹² The considerations quickly get more complex the further one moves away from total occupation of a going concern.

A clear rental market may not always exist for the sometimes odd portions of property affected by regulatory takings. Thus, some other compensation methods for determining the fair rental value

186. See, e.g., *United States v. Miller*, 317 U.S. 369, 374 (1943).

187. Tretbar, *supra* note 5, at 215–16.

188. See, e.g., Gideon Kanner, *Condemnation Blight: Just How Just Is Just Compensation?*, 48 NOTRE DAME L. REV. 765 (1973) (discussing the phenomenon whereby the threat of condemnation reduces property values, thus lowering the fair market value when the property is eventually taken); Brian Angelo Lee, *Just Undercompensation: The Idiosyncratic Premium in Eminent Domain*, 113 COLUM. L. REV. 593 (2013).

189. Wade, *supra* note 109, at 148.

190. *United States v. Pewee Coal Co.*, 341 U.S. 114, 119–20 (1951) (Reed, J., concurring) (describing how market value works well enough for property taken absolutely, but temporary taking of operating properties makes market value or rental value too uncertain or unknowable).

191. *Kimball Laundry Co. v. United States*, 338 U.S. 1 (1949); *United States v. Gen. Motors Corp.*, 323 U.S. 373 (1945).

192. Thomas E. Schnur, Note, *Compensation and Valuation for Regulatory Takings*, 35 DEPAUL L. REV. 931, 955 (1986).

for temporary takings include the option price method and the lost profits method. Under the option price method, the court will calculate “the market value of an option to purchase the land for the period during which the . . . regulation is in force.”¹⁹³ Some courts have also employed a measurement based on lost profits, although they have awarded interest on the delayed lost profits rather than awarding the full lost profits.¹⁹⁴ However, other courts have refused to recognize lost profits as a basis for calculating just compensation, reasoning that lost profits amount to consequential damages which are not recoverable (as opposed to actual damages).¹⁹⁵ Furthermore, courts have cautioned against awarding compensation based on uncertain damage theories.¹⁹⁶ Another potential valuation method that has been rejected is the public benefits method, because just compensation is to be determined with respect to the “owner’s loss, not the taker’s gain.”¹⁹⁷

Numerous considerations affect a court’s choice of valuation method, based on the unique factual situation of each particular case. These considerations include: “whether the losses are speculative; when the taking actually occurred; whether it caused any damage; and whether it was an acquisitory or nonacquisitory setting.”¹⁹⁸ The court should attempt to strike the appropriate balance “between too little compensation on the one hand and providing a windfall on the other.”¹⁹⁹

193. *Id.* at 957.

194. Prince George’s Cty. v. Blumberg, 407 A.2d 1151 (Md. Ct. Spec. App. 1979); Schnur, *supra* note 192, at 958 (discussing *Blumberg*); see also *SDDS, Inc. v. South Dakota*, 650 N.W.2d 1, 19 (S.D. 2002) (rejecting numerous valuation methods before settling on the “difference between the interest on the present value of [the] cash flows, as they would have been with and without . . . delay” that was discussed in *Bass*).

195. *Yuba Nat. Res., Inc. v. United States*, 904 F.2d 1577, 1581–82 (Fed. Cir. 1990) (allowing only fair rental value, not difference in value of gold if it had been extracted earlier when price was higher); *Wheeler v. City of Pleasant Grove*, 833 F.2d 267, 271 (11th Cir. 1987) (determining that lost profits would allow for double compensation); see also *Tretbar*, *supra* note 5, at 218. The Arizona Supreme Court has noted that while a number of different valuation methods may be appropriate in any given case based on its unique factual circumstances, in all cases the just compensation award must be limited to actual damages. *Corrigan v. City of Scottsdale*, 720 P.2d 513, 519 (Ariz. 1986).

196. *City of Austin v. Teague*, 570 S.W.2d 389, 395 (Tex. 1978) (“It is not enough that profits merely be anticipated or hoped for; they must be established with reasonable certainty.”).

197. *Tretbar*, *supra* note 5, at 218 n.136.

198. *Corrigan*, 720 P.2d at 518.

199. *Id.*

The remaining methods for temporary takings generally involve some kind of derivation based on the market value of the property taken. Thus, in the market rate of return model, the court must determine the absolute value of the portion of property that was taken, and then calculate the return that would be achieved at market rates over the duration of the taking.²⁰⁰ Similarly, under the equity interest approach, the court would conduct the same market rate of return calculation, but instead of basing it on the value of property lost, it would be based on the share of equity that the owner would have in a future development project (thus discounting based on the need to borrow capital).²⁰¹ The *Herrington* approach²⁰² attempts to deal with the uncertainties of future development by weighting potential valuation amounts by their probability of occurring, but still derives from some calculation of the land put to its highest and best use.²⁰³

These possible valuation methods were discussed in some detail by the South Dakota Supreme Court in a case involving a state ballot measure that overturned a permit which had been granted for construction of a large new landfill intended to receive waste from outside the state.²⁰⁴ Because the Eighth Circuit had already decided that this decision of the voters amounted to a taking of private property, the state court was dealing solely with the question of just compensation.²⁰⁵ Even though the landfill company went out of business during the time that the permit was revoked, the court found this to be a case of a temporary taking, because the fact that the company did not survive indicated the “house-of-cards nature of [the company’s] financing” rather than the withdrawal of the permit was the cause of dissolution.²⁰⁶ This led the court to its comparison of alternative valuation methods for a temporary regulatory taking.

The *SDDS* court proceeded to discuss and dismiss many of the valuation methods previously discussed in this Part, on the

200. Tretbar, *supra* note 5, at 227–28.

201. *Id.* at 229–32. This method involves a fair amount of speculation on the part of the court and economic experts, and thus would create a lot of uncertainty in the fracking-takings context.

202. *Herrington v. County of Sonoma*, 790 F. Supp. 909 (N.D. Cal. 1991).

203. Tretbar, *supra* note 5, at 232–36.

204. *SDDS, Inc. v. South Dakota*, 650 N.W.2d 1, 3–4 (S.D. 2002).

205. *Id.* at 10, 12.

206. *Id.* at 13.

reasonable grounds that it was required to select an appropriate method based on the unique facts of the case.²⁰⁷ The court was particularly concerned with the speculative nature of deciding how the property might have been put to use along with the risk of giving full return to the landowner based on simply a delay in use of the property.²⁰⁸ The court analogized to the problem faced in the *Bass* cases²⁰⁹ that the early stages of a development would not allow the owner sufficient time to realize a return on the investment, and so a lost profits model would not award any compensation at all.²¹⁰ This led the court to adopt a “fair rental value” model instead, along the lines of that ultimately adopted by the Federal Circuit in the *Bass* case—the interest on the present value of cash flows with and without the restriction in place.²¹¹

2. Valuation Methods in Fracking-Takings Cases

The two most obvious approaches to valuing a fracking-takings claim, at least at first glance, both involve some form of determining the fair market value of the taken property. First, assuming a restriction would indefinitely delay extraction of oil and gas, courts might attempt to determine what a willing buyer would pay for the right to extract oil and gas without the restriction in place and compare that to the amount the willing buyer would pay for the right to extract oil and gas with the restriction in place. In theory this would fully capture any reduction in value caused by the restriction and therefore sustain the regulation going forward by providing just compensation. However, if the regulation is only temporary or the government rescinds the regulation after a taking is found, then a different method may be appropriate. The court

207. *Id.* at 14 (“Our task, then, is to fit this general rule [rental value of the property] to the specific facts of the case at hand.”).

208. *See id.*

209. These cases are discussed in the following Part in more detail. The court’s analogy between natural resource extraction cases (taking minerals out and leaving empty space behind) to its landfill situation (using empty space as the resource to be filled) was strained, in my view. Unlike oil and gas rights, the land on which the landfill was to be built could have been put to other uses. But of greater importance is the distinction that ultimately the *Bass* case ended in a determination that no taking, either permanent or temporary, had occurred. *See Bass Enters. Prod. Co. v. United States*, 381 F.3d 1360, 1370–71 (Fed. Cir. 2004). In contrast, the *SDDS* court was compelled to value the taking because of the prior ruling from the Eighth Circuit. *SDDS*, 650 N.W.2d at 6.

210. *SDDS*, 650 N.W.2d at 17.

211. *Id.* at 17–19.

might in this temporary case attempt to determine the present value of the oil and gas if extraction started on the date of valuation and compare that to the present value if the extraction started at the time the restriction lapsed. However, as discussed more fully below, each of these approaches has difficult problems of uncertainty and, ironically, the valuation method for the “temporary” taking has the potential to be higher than the permanent taking, due to its reliance on the profits to be made from extraction. These problems both undermine the goals of takings law and suggest that something less than fair market value would better approximate just compensation for fracking-takings.

Similar problems are inherent in the valuation methods that courts have employed in the rare cases involving taking of oil and gas rights. Courts have only begun to scratch the surface on dealing with fracking-takings claims. Only two published cases are available which considered the question of how to value fracking-takings claims, and in one of those cases, the court ultimately determined that no taking had occurred. In the more recent case, the Court of Federal Claims made several attempts at placing a value on delays in issuing drilling permits on a federal oil lease. However, each time the lower court set a compensation level, the Federal Circuit reversed, first holding that no permanent taking had occurred and then that no temporary taking had occurred either.²¹² An earlier case out of Michigan is the only case to find that a restriction on oil and gas development amounted to a regulatory taking.²¹³ Yet this case notably was decided in the immediate aftermath of the *Lucas* decision and thus did not apply later United States Supreme Court precedent which restricted the applicability of the categorical total take rule. As such, the Michigan case might have come out differently had it been decided later, as was reflected in a more recent ruling from the Michigan Court of Appeals.²¹⁴ Additionally, the actions of the state government leading up to the *Miller Bros.* decision has been

212. See *Bass Enters. Prod. Co.*, 381 F.3d at 1364–65 (laying out procedural history of case going back to initial 1996 judgment from the Court of Federal Claims).

213. See *Miller Bros. v. Dep’t of Nat. Res.*, 513 N.W.2d 217 (Mich. Ct. App. 1994). After the court remanded the case to apply a different valuation methodology, the district court entered an even higher award against the government, and eventually the case settled. See *infra* note 215.

214. *Schmude Oil, Inc. v. Dep’t of Env’tl. Quality*, 856 N.W.2d 84, 86–87 (Mich. Ct. App. 2014) (per curiam).

criticized, suggesting that with better lawyering and strategic action on the part of the state natural resources agency, the adverse decision could have been avoided.²¹⁵ Nevertheless, both the *Miller Bros.* and *Bass* cases are informative for the ways that the courts grappled with the difficult issue of valuation of taken oil and gas property rights. These older cases raise many of the same issues as fracking-takings claims would going forward, although the scale of oil and gas development that has been enabled by fracking would magnify the concerns present in these cases, which were already quite significant.

In *Bass*, the Court of Federal Claims first calculated the economic impact of the regulation “by comparing the fair market value of the property before and after” the date of the alleged taking.²¹⁶ Eventually the court valued the taken property interest in the lease at \$8,938,736 plus interest.²¹⁷ On remand, the Court of Federal Claims considered whether a temporary taking had occurred, and finding that it had, calculated just compensation based on “the interest earned on the oil and gas profits” that would have been received during the delay.²¹⁸ The amount of the temporary taking was found to be \$1,137,808.²¹⁹ However, after the *Tahoe-Sierra* decision was handed down, the Court of Federal Claims found no temporary taking on reconsideration as the delay in permitting was not extraordinary, and this conclusion was upheld on appeal by the Federal Circuit.²²⁰

In *Miller Bros.*, the trial court equated fair market value with just compensation, and thus awarded damages of \$71,479,000, plus interest, costs, and attorney fees.²²¹ Although the appellate court did acknowledge the uncertainty about the value of unproven oil and gas rights, it then proceeded to direct the trial court to calculate just compensation because “[a]lthough it is impossible to

215. Keith Schneider, *What Happened in the Nordhouse Case*, MICH. LAND USE INST. (Apr. 19, 1997), http://www.mlui.org/mlui/news-views/articles-from-1995-to-2012.html?archive_id=1407#WselE4jwZ9N [<https://perma.cc/5Y2S-4DWY>] (noting that state government intended to compel the company to use directional drilling to access oil and gas beneath wilderness area before lawyers bungled the case leading to a \$94 million settlement).

216. *Bass Enters. Prod. Co. v. United States*, 35 Fed. Cl. 615, 619 (1996), *rev'd*, 133 F.3d 893 (Fed. Cir. 1998).

217. *Bass Enters. Prod. Co. v. United States*, 133 F.3d 893, 895 (Fed. Cir. 1998).

218. *Bass Enters. Prod. Co. v. United States*, 381 F.3d 1360, 1364 (Fed. Cir. 2004).

219. *Id.*

220. *Id.* at 1370–71.

221. *Miller Bros. v. Dep't of Nat. Res.*, 513 N.W.2d 217, 220 (Mich. Ct. App. 1994).

know whether there is oil and gas under the protected area without drilling wells, plaintiffs persuasively demonstrated that they almost certainly would have discovered some oil and gas had they been allowed to drill in the protected area.”²²² In answering the question of the valuation method, the court professed to be balancing the competing interests of ensuring that the “public must not be enriched at the property owners’ expense. But neither should property owners be enriched at the public’s expense.”²²³ The court focused on the indefinite nature of the deprivation of the use of property, as opposed to the permanent deprivation entailed in a condemnation proceeding. Refusing to compel the state to pay compensation for the full value of the property and transfer the property rights to the state, the court devised a method of approximating the rental value of the property. That method was the interest on the present value of the income stream that the property could have produced (which had been estimated at \$70 million).²²⁴ This methodology thus makes quite a huge logical leap from a showing of reasonable certainty that “some” oil would be produced to basing a damage calculation on the estimated value of the unproven oil reserve. Effectively, the court took all of the risk out of the situation and forced the public to bear the burden of paying for the oil to be kept in the ground based on the price the oil could have fetched if extracted (which no reasonable person would do). By sweeping past the uncertainty and ignoring potential means of limiting the impact of the permit denial, the court dramatically overstated the actual harm to the industry and thus created a windfall at public expense.

222. *Id.* at 222. Although at first blush this formulation may seem to comply with the “reasonable certainty” requirement, the court did not actually say that the ultimate valuation would be reasonably certain, but instead just that some oil would be found. Left unanswered was whether enough oil would be found to justify the exploration and production costs.

223. *Id.* at 222 (citation omitted).

224. *Id.* at 224. The court did recognize that the harm may be offset by the value of developing other assets outside the protected area sooner than they would have been otherwise, which at least represented the limited capital and opportunity costs faced by the industry. Yet ultimately the trial court awarded \$120.8 million on remand, compared to \$71.5 million in 1991, *Schneider*, *supra* note 215, thus showing the failure of the appellate court’s attempt to limit the award due to the fact that the oil would still remain in the ground and be available for extraction in the future. Thus, the court effectively allowed for double-counting of the resource, valued once as taken property paid out of public funds, with the possibility of being valued again on the private market following actual extraction of the resource. This is an untenable result that hopefully will not be repeated by any other courts.

More interesting will be application of the problems laid out in Part IV to current fracking-takings litigation or the prospect of future litigation arising out of state or local bans on fracking. There are currently two pending takings challenges to fracking-regulation, and there is speculation that more may eventually find their way to the courts.

The first pending fracking-takings case is in Dallas, but this case presents an unusual fact pattern that means its resolution is not likely to be predictive of fracking-takings claims more broadly. In this case, the city leased gas rights to a private developer for \$19 million, but then failed to grant the company approval to drill at any feasible location in the city.²²⁵ The denial was based on a decision by the Planning Commission, and the City Council subsequently enacted more restrictive setback measures that effectively precluded any location for wells.²²⁶ The Texas Court of Appeals reversed an initial lower court ruling by finding that the company had alleged a viable claim for inverse condemnation, and thus the case will now proceed in the trial court.²²⁷ However, under this unusual fact pattern, the questions of fairness and equity are likely tipped more in favor of compensation for the gas company, where it invested \$19 million in a gas lease only to be denied approval to drill.²²⁸ Thus, this case may not shed much light on a more typical fracking-takings claim. The New York example would appear to be more representative.

In New York, the Governor initially enacted a moratorium on fracking to allow time for a study by the state health department. Following the completion of that study, the state put in place a permanent ban on fracking. As a result, many expected that takings claims would soon follow, given that parts of the large Marcellus Shale deposit lie beneath New York.²²⁹ Only one takings claim was filed, by an attorney who owns land in upstate New York,

225. *City of Dallas v. Trinity E. Energy, LLC*, No. 05-16-00349-CV, 2017 WL 491259, at *1 (Tex. App. Feb. 7, 2017). The litigation raises several other issues besides takings, including breach of contract, fraud, promissory estoppel, and negligent misrepresentation.

226. *Id.* at *2.

227. *Id.* at *5.

228. *But see* *Beardslee v. Inflection Energy, LLC*, 798 F.3d 90 (2d Cir. 2015) (per curiam) (New York State moratorium on fracking did not extend oil and gas leases, which concluded without any development occurring.). This result suggests that Trinity may not succeed in its claims against Dallas, although the New York case is somewhat distinguishable in that the lessors were not the same party which imposed the fracking limitation.

229. *Campbell*, *supra* note 18.

but his case was thrown out in a state trial court, a decision which was upheld earlier this year by the Appellate Division.²³⁰ The dismissal was based on lack of standing because the plaintiff would not be harmed since he has no concrete plans or ability to obtain a permit to drill,²³¹ and thus the case seems unlikely to succeed.²³²

Looking beyond these two pending cases, it is possible that a takings claim might be brought in New York by a plaintiff who actually has standing to challenge the fracking ban. For example, a property owner who has plausible plans to work with an oil and gas operator to extract oil and gas using fracking might be able to present a viable takings claim that would not be so easily dismissed. Furthermore, New York is not alone in banning fracking, as Maryland has recently done so,²³³ and efforts are underway in other states to do the same.²³⁴ Some local governments have also banned fracking, including Monterey County in California, which has an active oil and gas industry.²³⁵ Thus, it seems inevitable that somewhere, someone will bring a fracking-takings claim that will be able to proceed to resolution on the merits. If so, and courts find that a taking has occurred, then courts will have to engage with the problems inherent in valuation of such claims that this Article identifies in Part IV.

C. Date of Valuation

Another important piece of the just compensation puzzle is choosing the date on which the taking occurred. The various states have taken a somewhat varied approach to answering this question, with potentially dramatic implications for the valuation of a

230. See *Morabito v. Martens*, 53 N.Y.S.3d 213 (N.Y. App. Div. 2017).

231. *Id.* at 215.

232. Although the state court takings challenge was unsuccessful, the plaintiff recently filed a takings claim in federal court as well. Complaint, *Morabito v. New York*, No. 17-cv-6853 (W.D.N.Y. Dec. 12, 2017). Yet the standing issue does not appear to have been addressed in the new federal case, and thus it too seems unlikely to proceed. A motion to dismiss is currently briefed and awaiting a decision by the judge. Motion to Dismiss, *Morabito v. New York*, No. 17-cv-6853 (W.D.N.Y. Feb. 6, 2018).

233. Henry, *supra* note 17.

234. Arek Sarkissian, *Florida Legislators' Stalemate on Study Kills Fracking Ban Bill*, NAPLES DAILY NEWS (Mar. 30, 2017, 11:15 PM), <https://www.naplesnews.com/story/news/politics/2017/03/30/legislative-stalemate-kills-fracking-ban-florida/99825242/> [<https://perma.cc/95B8-8RDR>]; Benjamin Spillman, *Nevada Legislature Could Ban 'Fracking' for Fossil Fuels*, RENO GAZETTE J. (May 31, 2017, 4:11 PM), <https://www.rgj.com/story/life/outdoors/2017/05/31/nevada-fracking-ban-racing-against-time/358635001/> [<https://perma.cc/CT75-YVCC>].

235. Hauter, *supra* note 17.

regulatory takings claim, and in particular a fracking-takings claim. Although most states' date of valuation statutes deal explicitly with eminent domain proceedings alone, similar concerns apply to the valuation of regulatory takings. The date of valuation has two primary effects in a just compensation calculation: 1) the value of the underlying property might be time-sensitive such that different options for the date of valuation might result in dramatically different values; and 2) interest accrues on the value from the date of the taking, so the further back in time the taking occurred, the greater the potential just compensation award.²³⁶

The basic rule is that takings are to be valued on the date that property is taken.²³⁷ Yet this simple-sounding standard gets complicated in practice.²³⁸ Even in relatively straightforward eminent domain proceedings, some states do not allow the government to take the property until after just compensation has been determined by the court, presenting a chicken and egg problem since the date of taking has not occurred at the time the valuation is determined.²³⁹ As a result, some states have passed statutes to specify the date or dates upon which the taking is to be valued. For example, California allows several potential dates of valuation: the date on which the government deposits probable compensation with the court; in the case of a trial that occurs within a year of the commencement of the proceeding, then the commencement of the proceeding is the date of valuation; otherwise, it is the date on which the trial commenced, unless the delay was due to the landowner.²⁴⁰ Texas states that the date of the hearing on damages by the special commissioners is to be used if the entire tract or parcel of real property is condemned.²⁴¹ New York does not appear to specify a particular date of valuation in its

236. The interest issue might be partially or perhaps totally offset by differences in the value over time, assuming the value increases over time. Yet it should be obvious that property values do not necessarily increase over time, which creates the potential that interest will inflate the value of a takings claim. However, it should be noted that in the eminent domain context, the United States Supreme Court has argued that interest should not accrue on just compensation since market interest only has a tenuous connection to land values. *Kirby Forest Indus., Inc. v. United States*, 467 U.S. 1, 17–19 (1984).

237. *United States v. 564.54 Acres of Land*, 441 U.S. 506, 511 (1979).

238. Serkin, *supra* note 112, at 696.

239. JULIUS L. SACKMAN, *NICHOLS ON EMINENT DOMAIN* § 8.05[3] (3d ed. 2001) (illustrating the early valuation date when compensation is required before taking).

240. CAL. CIV. PROC. CODE §§ 1263.110–130 (West 2018).

241. TEX. PROP. CODE ANN. § 21.042(b) (West 2017).

eminent domain code.²⁴² Federal law specifies the date of taking for some types of eminent domain, but not all.²⁴³ Federal courts have set the date of trial as the date of valuation, while noting the potential that the award might be modified based on a material change in the value of the property between the date of trial and the payment of just compensation.²⁴⁴

The problem can easily become even more complicated for regulatory takings that are not physical occupations, because it might be difficult to say when precisely the regulation acted to take private property. Additionally, in cases that rely on private parties to sue for a taking, why should a property owner potentially be rewarded by sitting on his rights and not bringing a takings claim as soon as his property was taken? If the property does not increase in value over time, yet the owner is awarded interest dating back to enactment of the regulation, then the system rewards the private party for sitting on his rights. A system that does not award interest on the assumption that property increases in value, or that determines the value of property at the time of the trial, would avoid this incentive to sit on rights in hopes of a windfall in the future.

While the United States Supreme Court has disclaimed application of market interest rates in the eminent domain context,²⁴⁵ numerous lower federal courts and state courts have allowed for the recovery of interest in regulatory takings cases. One example is the *Miller Bros.* case discussed previously.²⁴⁶ In another takings case involving coal mining rights after the passage of the federal Surface Mining Control and Reclamation Act,²⁴⁷ federal courts found that a taking of the right to mine a particular deposit of coal occurred at the time of passage of that statute in 1977.²⁴⁸ Eventually the case ended in settlement for \$60 million plus interest, but because the settlement was in 1995, the interest

242. N.Y. EM. DOM. PROC. §§ 501–514 (McKinney 2018).

243. Compare 40 U.S.C. § 3114(b) (2012) (vesting of title at filing of declaration of taking along with deposit of compensation), with 40 U.S.C. § 3113 (2012) (lacking a mention of date of taking or valuation in condemnation proceedings).

244. Kirby Forest Indus., Inc. v. United States, 467 U.S. 1, 17–18 (1984).

245. *Id.*

246. Schneider, *supra* note 215 (accruing interest on \$120 million award amounting to \$35,000 every day).

247. Surface Mining Control and Reclamation Act, 30 U.S.C. §§ 1201–1328 (2012).

248. Whitney Benefits, Inc. v. United States, 18 Cl. Ct. 394 (1989), *opinion corrected*, 20 Cl. Ct. 324 (1990), *aff'd*, 926 F.2d 1169 (Fed. Cir. 1991).

amounted to \$140 million.²⁴⁹ This highlights the importance of the date of valuation and how it can dramatically transform a just compensation award, depending on how long the claim takes to resolve.

D. Takings Primer and Key Concepts

The development of takings law has been characterized by a tug-of-war between the desire for clear and predictable rules versus the reality that the world is complex and often requires a careful balancing of competing interests. This is most clearly evident as courts have grappled with the question of whether a particular government action amounts to a taking, but is also present in the smaller number of cases deciding how to measure just compensation. As a result, substantive takings law includes numerous *per se* standards which carve out specific actions which automatically amount to a taking of private property (although sometimes even the *per se* rules have exceptions), yet in the majority of the difficult cases, the court relies ultimately on a balancing of numerous factors to determine if compensation will be required on a case-by-case basis.²⁵⁰ Similarly for valuation, courts often refer to fair market value as the measure of compensation, but in difficult cases they have employed a number of valuation methods different from fair market value.²⁵¹ The case law thus reflects the appeal of simple and well-defined *per se* rules that ultimately break down in hard cases, resulting in a return to case-by-case considerations in order to achieve a just result. Fracking-takings, as discussed in more detail in Part IV, present a very difficult case, and therefore, a case-by-case approach that limits uncertainty is required in order to achieve a fair and efficient result. This Part will therefore explore the most important parts of substantive takings law and the limited law on valuation of just compensation which will then inform the analysis with respect to fracking-takings.

249. CONG. BUDGET OFFICE, *supra* note 139, at 10 box 1. Interest payments are useful to avoid incentives for delay and dragging out the litigation process, yet for takings of mineral rights, awarding interest does not recognize that market interest rates do not necessarily track changes in value of the underlying minerals, which may lose value over the relevant time period.

250. *Murr v. Wisconsin*, 137 S. Ct. 1933, 1943 (2017) (“A central dynamic of the Court’s regulatory takings jurisprudence, then, is its flexibility.”).

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

1. Regulatory Takings Law

One of the most critical distinctions in takings law is that between physical and regulatory takings. Fracking-takings will almost always constitute regulatory takings, and thus, precedent from physical takings cases should only be applied cautiously, if at all. Physical takings involve acquisition of property for public use, while regulatory takings prohibit private uses.²⁵² Although the line between these categories is not completely clear,²⁵³ the United States Supreme Court has itself recognized the distinction and cautioned against reflexively applying precedent from one category to the other.²⁵⁴

Historically, courts focused on actual expropriation of private property by the government and commonly rejected takings claims that would today be viewed as regulatory takings.²⁵⁵ The requirement of just compensation as the price for the use of eminent domain is not generally controversial, although important questions and debate surround how to measure just compensation in eminent domain proceedings.²⁵⁶ That changed with Justice Holmes' landmark decision in the *Penn Coal* case, which spawned the new doctrine of regulatory takings. As a result, courts today

252. *Tahoe-Sierra Pres. Council v. Tahoe Reg'l Planning Agency*, 535 U.S. 302, 323 (2002).

253. *See, e.g., Loretto v. Teleprompter Manhattan CATV Corp.*, 458 U.S. 419 (1982) (finding that a regulation which authorized cable company to install cable line amounted to a physical invasion of property). Additionally, the breakdown between physical and regulatory takings presented here does not include what is typically seen as a separate third category of takings called exactions. *See Dolan v. City of Tigard*, 512 U.S. 374 (1994); *Nollan v. Cal. Coastal Comm'n*, 483 U.S. 825 (1987).

254. *Tahoe-Sierra*, 535 U.S. at 321–25 (differentiating between physical and regulatory takings and cautioning that “it [is] inappropriate to treat cases involving physical takings as controlling precedents for the evaluation of a claim that there has been a ‘regulatory taking’”); *but see San Diego Gas & Elec. Co. v. City of San Diego*, 450 U.S. 621, 651 (1981) (Brennan, J., dissenting) (discussing the “essential similarity” between regulatory takings and other takings such as condemnation); Andrea L. Peterson, *The False Dichotomy Between Physical and Regulatory Takings Analysis: A Critique of Tahoe-Sierra’s Distinction Between Physical and Regulatory Takings*, 34 *ECOLOGY L.Q.* 381 (2007) (arguing that fairness is the fundamental issue for both physical invasions or regulatory use restrictions).

255. *See, e.g., Mugler v. Kansas*, 123 U.S. 623 (1887).

256. Wyman, *supra* note 3, at 242–43 (discussing “proposals to increase compensation for takings” in light of the *Kelo* decision allowing taking of private homes for economic redevelopment). There are several valuation questions in common between eminent domain cases and regulatory takings cases, but there are some valuation questions that are unique and challenging for regulatory takings cases alone.

may be asked to determine if “regulation goes too far”²⁵⁷ and thus requires compensation, even though the government has not actually “taken” any property in the most literal sense of the word.

The default test applied to regulatory takings claims was announced by Justice Brennan in the *Penn Central* case. According to that test, courts will weigh a number of factors to determine whether a regulation has gone too far, including “[t]he economic impact of the regulation,” “the extent to which the regulation has interfered with distinct investment-backed expectations,” and “the character of the governmental action.”²⁵⁸ The economic impact and perhaps the interference factor have a clear connection to the valuation question that is the focus of this Article, but they should not be conflated with just compensation. In assessing the economic impact and interference with distinct investment backed expectations, courts are concerned with the relative impact of the regulation as against the value of the entire property and the absolute magnitude of the impact.²⁵⁹ This is a quite different question from asking how much compensation is just, once the absolute amount of economic harm is determined.²⁶⁰ Regardless, the problems in valuing fracking-takings claims discussed below are relevant both for determining the appropriate level of just compensation as well as whether a taking has occurred in the first place.

The broad overview just presented raises a few more complicated issues, which should be flagged before moving on. First, comparing the economic impact of the regulation to the remaining value of the property at issue involves a difficult question of definition known as the “denominator problem.”²⁶¹ The typical formulation is that courts should look to the “parcel as a whole,” although deciding what constitutes the whole property is not a

257. *Pa. Coal Co. v. Mahon*, 260 U.S. 393, 415 (1922).

258. *Penn Cent. Transp. Co. v. City of New York*, 438 U.S. 104, 124 (1978).

259. See Michelman, *supra* note 3, at 1192; see also *Lost Tree Vill. Corp. v. United States*, 707 F.3d 1286, 1292 (Fed. Cir. 2013) (“Definition of the relevant parcel affects not only whether a particular regulation is a categorical taking under *Lucas*, but also affects the *Penn Central* inquiry into the economic impact of the regulation on the claimant and on investment-backed expectations.”).

260. Michelman, *supra* note 3, at 1192.

261. See *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1054 (1992) (Blackmun, J., dissenting); *Pa. Coal*, 260 U.S. at 419 (Brandeis, J., dissenting); Michelman, *supra* note 3, at 1192.

simple task.²⁶² Additionally, the task is further complicated when a parcel of property is sub-divided into separate estates such as the surface estate and mineral estate.²⁶³ The most recent takings case from the United States Supreme Court addressed the denominator problem, holding that the hallmark flexibility of takings doctrine applied to the question of defining the denominator.²⁶⁴

Second, the character of the governmental action factor from *Penn Central* also implicates some broader considerations, such as the importance of the public purpose and the harm versus benefit question. Professor Echeverria has explained that the magnitude alone of the public interest served by a regulation should not be enough to avoid regulatory takings liability, even if the public interest “outweighs” the burden on property.²⁶⁵ This is so because “no one would argue that the government should be able to avoid paying for a right-of-way because a road will serve an important [public] transportation purpose.”²⁶⁶ However, in cases where a regulatory burden applies “broadly across the community,” then the value or importance of the regulation should influence the decision on whether the regulation amounts to a taking.²⁶⁷ But going beyond the magnitude of the public interest, the harm versus

262. *Murr v. Wisconsin*, 137 S. Ct. 1933, 1948–49 (2017).

263. *Compare* *Animas Valley Sand & Gravel, Inc. v. Bd. of Cty. Comm’rs*, 38 P.3d 59, 68 (Colo. 2001) (finding that the mineral estate was part of the entire property including the surface estate), *with Pa. Coal*, 260 U.S. at 415 (distinguishing not just between surface rights and the right to mine coal but also the right of support). Justice Stevens has also noted the potential for manipulation whereby investors “may market specialized estates” to take advantage of categorical rules requiring compensation per se for a total taking of property. *Lucas*, 505 U.S. at 1065 (Stevens, J., dissenting).

264. *Murr*, 137 S. Ct. at 1949 (identifying the treatment of the land under state and local law, the physical characteristics of the land, and the prospective value of the regulated land as factors to be considered in assessing reasonable expectations of landowners). The Federal Circuit also recently grappled with the denominator problem. *Lost Tree Vill. Corp.*, 707 F.3d at 1292–93 (discussing the state of the “parcel as a whole” doctrine at the time). However, this case might have reached a different outcome if the court had applied the standard articulated in more detail by *Murr*. The Federal Circuit reached final resolution of this case before the *Murr* decision was announced. *Lost Tree Vill. Corp. v. United States*, 787 F.3d 1111 (Fed. Cir. 2015).

265. John D. Echeverria, *Making Sense of Penn Central*, 23 UCLA J. ENVTL. L. & POL’Y 171, 175–76 (2005).

266. *Id.* at 176.

267. *Id.*

benefit question should, according to Echeverria, be relevant in the *Penn Central* analysis.²⁶⁸

One final complication worth mentioning is that some regulatory takings are encompassed by a categorical rule, creating an exception to the default balancing test of *Penn Central*.²⁶⁹ Thus, the United States Supreme Court has carved out the category of regulations which deny an owner “all economically beneficial uses” of property.²⁷⁰ This test is commonly known as a “total taking” or simply the *Lucas* test. Yet this seemingly broad carve out has been subsequently limited because a total take is rare.²⁷¹

2. Permanent Takings, Temporary Takings, and Indefinite Delays

The next important distinction that will bear on the problem of valuing fracking-takings is the distinction between permanent takings, temporary takings, and indefinite delays. Temporary restrictions on the use of property such as moratoria are easily understood as temporary takings. But the United States Supreme Court has also clarified that even a permanent restriction on property use, once declared to be a taking of private property, does not force the government to pay the full value of the permanent restriction; instead, government may effectively convert the permanent taking into a temporary taking.²⁷² Yet fracking-takings claims do not fit neatly into either category. Even a “permanent” ban on fracking does not actually take any property but rather indefinitely delays potential extraction of mineral resources. Thus, the “one-off” nature of mineral extraction means that valuation methods calculated for ongoing uses of property may not match well.

Sometimes courts will find that a temporary restriction amounts to a taking, and sometimes not. Thus, when voters in South Dakota approved a ballot measure that revoked a permit for a landfill, this

268. *Id.*; see also Michelman, *supra* note 3, at 1236–37 (recognizing that the “harm-prevention/benefit-extraction test,” while not justified on efficiency grounds, does have a “strong intuitive appeal” and justification on fairness grounds).

269. *Tahoe-Sierra Pres. Council v. Tahoe Reg'l Planning Agency*, 535 U.S. 302, 325 (2002) (noting the oddity of “a regulatory takings case that, nevertheless, applied a categorical rule”).

270. *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1019 (1992).

271. See *Tahoe-Sierra*, 535 U.S. at 319.

272. “[T]he landowner has no right under the Just Compensation Clause to insist that a ‘temporary’ taking be deemed a permanent taking.” *First English Evangelical Lutheran Church v. County of Los Angeles*, 482 U.S. 304, 317 (1987).

action was found to constitute a taking of private property.²⁷³ The fact that the restriction proved to be only temporary did not excuse the state from liability.²⁷⁴ Yet a temporary delay in approving permits to drill did not ultimately amount to a taking of an oil and gas lease.²⁷⁵ Courts often put a lot of weight on whether the restriction was temporary from the outset or not, although the effect of a permanent regulation which is invalidated or rescinded is not practically different from a temporary restriction which expires after the same duration.

The distinction between temporary and permanent takings is particularly important in choosing the method of valuation. The most common view is that permanent takings require payment of fair market value, while temporary takings require payment of the rental value for the property.²⁷⁶ Yet as in other areas of takings law, case-by-case considerations may require a different valuation methodology to achieve the ultimate result of ensuring fairness.²⁷⁷

Because of the non-renewable resources in question, fracking-takings claims do not fit neatly into the permanent or temporary categories. Thus, perhaps a fracking-takings claim should be analyzed as an indefinite delay instead of either a permanent or temporary taking of the use of property.²⁷⁸ A regulation that creates an indefinite delay is distinguishable from either a

273. *SDDS, Inc. v. South Dakota*, 650 N.W.2d 1, 19 (S.D. 2002).

274. *Id.* at 10 (stating that it would not reopen the Eighth Circuit's determination that the ballot measure constituted a taking). It is important to note, however, that this case was decided just before the United States Supreme Court announced the *Tahoe-Sierra* decision, and so perhaps a different result might have been reached in light of the clarification that a temporary restriction does not automatically create a taking.

275. *Bass Enters. Prod. Co. v. United States*, 381 F.3d 1360, 1370–71 (Fed. Cir. 2004). This case was decided after *Tahoe-Sierra*, and explicitly discussed the implications of that decision. *Id.* at 1364.

276. *Yuba Nat. Res., Inc. v. United States*, 821 F.2d 638, 641 (Fed. Cir. 1987).

277. As but one example, the South Dakota Supreme Court decided to use the difference between interest on the developer's cash flows to determine just compensation for the temporary taking of the permit to develop the Lonetree landfill. *SDDS*, 650 N.W.2d at 19. Additional alternative methodologies are discussed *supra* notes 193–203 and accompanying text.

278. Although not fracking-takings cases, there is some contrary authority to this suggestion for other takings claims involving property rights in minerals. *See, e.g., Yuba*, 821 F.2d at 641–42 (temporary prohibition on gold mining); *Fla. Rock Indus., Inc. v. United States*, 791 F.2d 893, 904 (Fed. Cir. 1986) (enjoining limestone mining under Clean Water Act).

permanent restriction or a temporary taking with a definite end,²⁷⁹ and is perhaps a more useful way to think of a taking that relates to extraction of mineral resources. Unlike uses of property such as residential or commercial buildings which provide a continuing and ongoing source of income, the extraction of specific oil and gas can only occur once.²⁸⁰ Oil and gas is even different from a *profit a prendre* in renewable resources such as timber or water, because the extraction of the resource can occur only once. Thus, permanent and temporary takings make sense in the context of takings of real property such as restrictions on development in sensitive wetlands, or restrictions on the height of buildings. Yet for mineral rights, a ban on fracking is better viewed not as a permanent ban on extracting oil and gas, but rather as an indefinite delay of extraction until either the ban is lifted or new technology allows extraction with more acceptable impacts on the surrounding community. A different way of thinking about this is that mineral rights will typically have some sort of remaining value,²⁸¹ even if current restrictions and technology limitations mean that the minerals cannot currently be extracted.

The reason indefinite delay is useful as a concept is that the typical valuation method for temporary takings is the rental value of the property. Yet no one would rent mineral rights for a time period when they know they would not be allowed to extract the

279. Of course, any “permanent” regulation enacted by government could be thought of as an indefinite restriction, since the regulation might be lifted in the future. However, for extraction of minerals the indefinite delay matters more because the owner does not necessarily lose anything. No one can predict with any certainty what the value of mineral resources will be in the future, especially for volatile oil and gas. Thus, assuming that the owner will suffer harm from delay is not appropriate. It may well be that the value of taken oil and gas will be greater in the future, even taking account of the time value of money. Awarding high levels of just compensation based on interest on lost income streams, without transferring the mineral rights to the government, would therefore risk double-compensation for the property owner. See *infra* Part IV.B.1, for greater discussion of these issues.

280. This does not mean that oil and gas may only be extracted once from the same piece of property, as developments in technology may allow for extraction of oil and gas in separate stages.

281. History has shown that mineral rights thought to have little value ended up being quite valuable. Thus, it is reasonable that even in the case of restrictions on current extraction methods, mineral rights would retain value, perhaps even significant value. On the flip side, if mineral interest owners argue that their property is rendered valueless by regulations on fracking, then the government should be able to immediately initiate condemnation proceedings to take the mineral interest, perhaps only paying a nominal value of \$1.

minerals, and so a different valuation method is needed for this type of taking.²⁸²

3. Offsetting Benefits

Contrary to property rights advocates' claims, regulation of property does more than just harm property owners; regulation usually benefits property owners and property values as well. In some cases, the benefits of the regulatory scheme overall may outweigh the negative effects,²⁸³ or they may at least mitigate the impacts,²⁸⁴ thus making a taking less likely or reducing the amount of just compensation required. The term for this is offsetting benefits in the just compensation context, or average reciprocity of advantage for the substantive taking question.²⁸⁵

Although the United States Supreme Court is not always consistent in applying this principle,²⁸⁶ it is broadly recognized in takings law.²⁸⁷ Thus, in the *First English* case the California courts on remand recognized the reciprocity of safety benefits that First English enjoyed in exchange for the burden of not being allowed to construct buildings along the riverbed area prone to flooding.²⁸⁸ This reflected the broad recognition that zoning regulations, while restricting uses on private property, also confer many benefits on the same property.²⁸⁹ This reasoning was reaffirmed in the most

282. *Contra* Miller Bros. v. Dep't of Nat. Res., 513 N.W.2d 217, 222–23 (Mich. Ct. App. 1994) (equating indefinite delay with a temporary restriction on property).

283. *See, e.g.*, Brown v. Legal Found. of Washington, 538 U.S. 216, 240 (2003) (precluding liability for taking when no net loss suffered by property owner).

284. Daryl J. Levinson, *Framing Transactions in Constitutional Law*, 111 YALE L.J. 1311, 1338–39 (2002) (discussing application of the concept in railroad eminent domain cases).

285. *See* Serkin, *supra* note 112, at 695 (noting that offsetting benefits for compensation raises the “same issues” as average reciprocity of advantage for whether a taking occurred).

286. *See, e.g.*, Horne v. Dep't of Agric., 135 S. Ct. 2419, 2432 (2015) (rejecting the government's argument that the benefits of raisin regulatory scheme should offset value of taken raisins); United States v. Pewee Coal Co., 341 U.S. 114, 118 (1951) (“[I]t is immaterial that the governmental operation resulted in a smaller loss than [the takee] would have sustained if there had been no seizure of the mines.”).

287. Echeverria & Blumm, *supra* note 110, at 680 (noting that even if a taking has occurred, property owner must establish a loss in order for the Takings Clause to be violated).

288. *First English Evangelical Lutheran Church v. County of Los Angeles*, 258 Cal. Rptr. 893, 905 (1989).

289. *Agins v. City of Tiburon*, 447 U.S. 255, 262 (1980) (“In assessing the fairness of the zoning ordinances, these benefits must be considered along with any diminution in market value that appellants might suffer.”).

recent takings case from the United States Supreme Court.²⁹⁰ Thus, it appears to be a well-settled principle that offsetting benefits should be considered in takings cases.

IV. VALUING FRACKING-TAKINGS CLAIMS

Now it is time to turn to the valuation of fracking-takings claims. The key overarching principles animating this discussion are that 1) fair market value is incredibly difficult for courts to determine accurately; 2) the fair market value of the property taken does not necessarily equal either the economic impact of the regulation or just compensation. There are many conceivable instances where economic impact and just compensation might diverge. In particular, equating the value of the property which is taken with the just compensation required has led courts astray from the underlying purposes of the takings regime. Such an all-or-nothing approach, requiring either no compensation or full compensation for the value of property taken, does not allow for a nuanced approach which fully accounts for the competing interests of private property owners and the broader public.²⁹¹ To be sure, courts often repeat the simplistic phrase that the goal of just compensation is to put the owner “in as good a position pecuniarily as if his property had not been taken.”²⁹² Yet there is no defensible reason based in fairness or efficiency why a property owner whose property is burdened by a regulation that “goes too far” should be made completely whole, while an owner burdened by regulation that doesn’t go too far could have the greater part, or perhaps even the vastly greater part, of his property value taken without compensation. A more sensible and fair approach would be one that gives some compensation to an owner when regulation goes too far, but not the full value of the taken property. In practice,

290. *Murr v. Wisconsin*, 137 S. Ct. 1933, 1948 (2017) (“[T]his restriction is mitigated by the benefits of using the property as an integrated whole, allowing increased privacy and recreational space, plus the optimal location of any improvements.”); *see also Living on Earth: Enviro Win at Supreme Court*, PUB. RADIO INT’L (June 30, 2017) (Professor Richard Lazarus explained how benefits of regulatory scheme benefitted owners of property along a river by protecting the fragile ecosystem, which made this a regulatory givings case, rather than a regulatory takings case, due to offsetting benefits.).

291. Serkin, *supra* note 112, at 680 (calling for “more nuanced resolutions to cases that often seem to require a broader range of options than paying ‘all’ or paying ‘nothing.’”).

292. *United States v. 564.54 Acres of Land*, 441 U.S. 506, 510–11 (1979) (quoting *Olson v. United States*, 292 U.S. 246, 255 (1934)).

even if not in words, courts often achieve this result by employing the various valuation mechanisms which can better calibrate a just compensation award. The example of fracking-takings only highlights these fairness and efficiency concerns, as discussed below.

A. Categorizing Fracking-Takings

In order to assess the issue of valuing fracking-takings claims with any specificity, it is necessary to define the context in which fracking-takings claims might arise. This will then enable a classification of the fracking-takings claims based upon the distinctions laid out in Part II. As explained previously, the focus of this Article is on takings challenges based on relatively recent bans on fracking at the state or local level, such as the takings challenges that are ongoing in Dallas and New York.²⁹³

First, fracking bans are regulatory takings, and thus, most fracking-takings claims will be resolved under the balancing test of *Penn Central* rather than bright-line rules that require compensation no matter how small the impact or how much value remains in the property. The rare exception of *Lucas*' total taking of property would be limited, even in the case of oil and gas leases.²⁹⁴ This means that a court evaluating a fracking-takings claim would need to be able to calculate a value for whatever is defined as the parcel as a whole and compare that to the impact that the fracking ban would have on the property. Additionally, courts would have leeway to calibrate a just compensation award using valuation mechanisms that could ensure that fairness and efficiency are not sacrificed, as discussed in the following Part.

Second, fracking-takings could result in either permanent or temporary takings. Yet the astronomically high values that would result from standard fair market value measurements of just compensation implies that if a court were to find that a fracking ban amounted to a permanent taking, government would likely relent and abandon its ban in an attempt to lower the liability, which easily would have the potential to bankrupt a local government or even cause serious budgetary issues in a state as

293. See *supra* notes 225–235 and accompanying text. As discussed previously, those claims have problems, but similar claims might be brought in jurisdictions that restrict the use of fracking to extract oil and gas.

294. Lynch, *supra* note 13, at 86–89.

large as New York. Thus, the subsequent discussion in this Part will focus on the various methods for calculating temporary takings, which attempt to approximate the rental value of a temporary fracking ban that does not actually reduce the amount of oil and gas available to be extracted. Also, it is unclear whether delay would actually cause a harm or benefit to the property owner, as the costs of production may have declined in the interim, or the price of oil may have gone up, meaning the property has greater value than it did before. Actual harm is a predicate to a successful fracking-takings claim,²⁹⁵ but the presence of harm does not automatically require takings liability, especially if the “harm” is simply the denial of opportunity to capture a windfall due to formerly high prices for oil or gas.²⁹⁶

Third, fracking-takings claims are inherently uncertain due to the unproven nature of the oil and gas reserves. The valuation methods should therefore reflect that greater uncertainty. Valuation methods that do not compensate for that uncertainty would result in property owners shifting the risk and uncertainty inherent in oil and gas exploration onto the public. Although this might hold up well on efficiency grounds (if a numeric value can ethically be put on public health and safety), on fairness grounds there is no justification for the rent seeking that would occur if property owners could convert uncertain oil and gas profits into certain just compensation.

Fourth, fracking-takings claims are usually focused on the loss or delay of income from the extraction of oil and gas, and thus do not represent impacts to a going concern.²⁹⁷ This means that while economic methods such as lost profits are appropriate for assessing the economic impact of a delay on a going concern, such calculations are not appropriate in valuing just compensation for fracking-takings claims (except as an upper limit on compensation).²⁹⁸

295. See *Corrigan v. City of Scottsdale*, 720 P.2d 513, 519 (Ariz. 1986).

296. As discussed below, I use the term windfall to mean unexpected or unforeseen profit that results from luck rather than labor or taking risks. See *infra* notes 300–301 and accompanying text.

297. See *Yuba Nat. Res., Inc. v. United States*, 904 F.2d 1577, 1582 (finding “no existing business or going concern that the government took” in a takings case involving gold mining).

298. Lost profits should be used as an upper bound, because it is entirely possible in the fracking-takings context that no harm would be caused by a delay or even a permanent restriction, where either alternative methods of production exist that don’t rely on fracking,

Fifth, and finally, one might argue that fracking-takings claims should receive less protection through high valuation methods in states that have adopted the nonownership or qualified ownership models of mineral rights such as oil and gas. This would flow from the state's broad authority to regulate the extraction of oil and gas, similar to wild animals such as oysters. Thus, the fracking ban in New York is likely on relatively firm ground, but even if it was found to be a taking, a court should be hesitant to impose substantial liability given the state's authority to regulate the methods of extraction of oil and gas. However, even in states that have adopted the ownership in place model, such as Texas, courts in practice have still recognized the authority of the state to regulate the industry.²⁹⁹

B. Problems in Valuing Fracking-Takings

The example of fracking-takings highlights several difficulties with determining just compensation. This Part identifies those issues and how they map onto the theoretical justifications for just compensation. The first set of issues relates to fairness, and highlights several of the valuation rules which must be carefully applied to a fracking-takings claim, in spite of numerous difficulties. Key fairness concerns include avoiding windfalls to private landowners, accounting for offsetting benefits of regulation, and the risk-shifting associated with lost profits. A number of other issues relate to efficiency concerns such as the uncertainty and range of potential fracking-takings liability, which risks unduly deterring appropriate regulations. These uncertainties arise from the date a taking is valued and the highly fluid nature of the costs and price associated with oil and gas development, which is tied to the temporary or indefinite nature of the taking. In order to

where the price of the oil and gas dropped to make extraction unprofitable, or other economic realities that would not be reflected in the fair market value of mineral rights. *See* Wade, *supra* note 109, at 140 (discussing takings claim related to water rights for pecan farming and noting that actual economic losses were likely less than an award based on appraisal values instead of present value of lost income).

299. Robert E. Hardwicke, *The Rule of Capture and Its Implications as Applied to Oil and Gas*, 13 TEX. L. REV. 391, 415 (1935) ("Whether the ownership or non-ownership-in-place rule prevailed in a jurisdiction would, it seems, be wholly immaterial on the question of legislative power to adjust and protect conflicting property rights by reasonable rules."); *see also* WILLIAMS & MEYERS, OIL & GAS LAW, *supra* note 66, § 204.3 (finding "no significant differences in result" between government power to regulate oil and gas operations in ownership-in-place versus nonownership jurisdictions).

provide the appropriate deference to government regulations, courts must be sure to set clear upper bounds on any fracking-takings claim, including actual damages, excluding lost profits, and limitations based on investment that might be obscured by more traditional fair market value approaches. Finally, this Part will discuss objections to this approach by theories of just compensation that are hostile to government regulation.

1. Fairness Concerns in Fracking-Takings

i. Windfalls

Before delving any further into the problems associated with windfalls in the fracking-takings context, it is necessary to clearly lay out the meaning of that term. This Article adopts the definition of a windfall as an “unexpectedly large or unforeseen profit.”³⁰⁰ Legal definitions of windfall typically add a luck distinction as well to say that a windfall is “a result of good fortune rather than as a result of effort, intelligence, or the venturing of capital,”³⁰¹ this Article does the same. Both of these definitions often apply in the fracking-takings context, where the tremendous current value of oil and gas interests in the past decade or so was often unexpected or unforeseen, and in most if not all instances the mineral rights owner lucked into this value instead of acquiring it through effort, intelligence, or investment of capital.

Mineral interest owners who are prevented from extracting oil and gas on their property due to fracking bans, yet nevertheless seek just compensation from the government, would therefore often experience a windfall if they succeed. Such a windfall would violate the fundamental purpose of takings law to achieve a fair

300. XX *Windfall*, OXFORD ENGLISH DICTIONARY (2d ed. 1989).

301. Eric Kades, *Windfalls*, 108 YALE L.J. 1489, 1491 (1999) (quoting Comment, *Taxation of Found Property and Other Windfalls*, 20 U. CHI. L. REV. 748, 748 (1953)). Some might object that when property increases in value due to developments in technology that enable extraction of oil and gas, this is simply part of owning property and not really a windfall. Or one might state that law typically “leaves the thing with its founder, without any effort to isolate luck from skill.” Richard A. Epstein, *Luck*, SOC. PHIL. & POL’Y, Autumn 1988, at 17, 18. Yet there is good reason to treat windfalls differently in the takings context, where accumulations of value due to luck would be more fairly distributed across society broadly, rather than concentrated in a small number of individuals. Redistribution of those windfalls would not frustrate efficiency concerns since by definition the windfall was not a result of productive activity. Kades, *supra* note 301, at 1492.

result.³⁰² It would not be fair to make the public pay a private property owner who happens to have shale oil or gas on his property to not extract that oil and gas. That property owner may have invested little to no money and simply seeks to reap a windfall by threatening to extract the oil and gas on his property.³⁰³ Requiring the public to pay him as if he had successfully extracted the oil and gas, without putting significant sums of capital at risk, would remove all of the risk from the process of exploration and production of oil and gas and shift the costs of that risk onto the public.

This type of windfall is quite different from that considered (and dismissed) by Justice Scalia in his *Palazzolo* concurrence, where he envisioned savvy real estate developers or stock traders using knowledge to profit at the expense of the ignorant.³⁰⁴ Instead of rewarding knowledge and punishing ignorance (which is debatable as a public policy), the fracking-takings situation simply rewards those who hold property interests in minerals that had little-to-no value before the development of modern fracking techniques, but today have incredibly high value. This change in circumstance was

302. *Palazzolo v. Rhode Island*, 533 U.S. 606, 635 (2001) (O'Connor, J., concurring) (“[I]f existing regulations do nothing to inform the analysis, then some property owners may reap windfalls and an important indicum of fairness is lost.”).

303. Numerous examples can be found of this phenomenon, where property rights previously thought to have little to no value suddenly experienced a dramatic increase, through no action or investment on the part of the owner. See, e.g., Janet Lorin, *Mineral Rights Start Gushing Cash for Colleges*, BLOOMBERG (Aug. 7, 2017, 5:00 AM), <https://www.bloomberg.com/news/features/2017-08-07/mineral-rights-start-gushing-cash-for-colleges> [<https://perma.cc/PLZ2-85AV>] (discussing examples of mineral rights donated to universities that were expected to decline in value but ended up dramatically increasing due to fracking). In the fracking-takings concept, a property owner who simply seeks to lease his mineral rights to an operating company has come into this fortune through luck. Therefore, awarding just compensation to the property owner who is precluded from leasing mineral rights is a good example of a windfall since that property owner would be unexpectedly making a large sum of money through luck rather than effort, intelligence, or venturing of capital. The operating company would potentially have a better claim of not capturing a windfall because it would be venturing capital and expending effort to extract the oil and gas. However, a regulation that prevents extraction would also prevent the investment by the company and therefore limit or perhaps defeat any claim to just compensation.

304. *Palazzolo*, 533 U.S. at 636–37 (Scalia, J., concurring). Profit in real estate investment or stock trading would not meet the common definition of windfall which does not include profiting based on intelligence or putting capital at risk through investment, and thus Justice Scalia appears to have made a straw-man argument in this case. Thus, absent some indication that a property owner in oil and gas invested in the property with some expectation that fracking technology would advance and enable extraction of oil and gas, the gain in value of that property is correctly considered a windfall.

likely due to no labor, knowledge, or investment on the part of the owner, and thus constitutes a windfall. Rewarding people simply for owning property that became valuable through luck may be fine if they can reap those rewards without harming others. But when they seek to force society to choose between the two evils of paying private parties for doing nothing or accepting public harm from private actions, those bringing fracking-takings claims would not have a solid grounding in fairness that they should receive just compensation.³⁰⁵

A short example is useful to illustrate this point. Assume that a property owner owns land in fee simple that is valued at \$50,000. That land was not known at the time it was purchased to have any oil and gas deposits that could be extracted economically, and so the value of the oil and gas rights is \$0. But then modern developments in fracking come along, entirely through the efforts and investment of others, and now the property would be worth \$100,000 if fracking were allowed. If the property owner brings a fracking-takings claim for \$50,000, he would be seeking to have the public pay him that \$50,000 to reward him for having done nothing but own property. This situation is not materially different from the situation of a “golden meteor” falling on his land, which would be a windfall. A rule requiring full, all-or-nothing compensation in this instance would not promote the goal of efficiency because the property owner is not doing anything that would be incentivized or discouraged based on whether or not full compensation is awarded. Therefore, increases in the value of oil and gas property rights that do not involve any effort or investment of capital should be treated as a windfall and not included in any just compensation award. Courts would therefore be justified, under the principles of fairness and efficiency, to find that a taking had occurred but to award only a nominal amount as just compensation.

This is not to say that all potential fracking-takings claims would involve a windfall. If an oil and gas developer has paid a substantial sum of money to obtain a lease to develop oil and gas, then the investment of that money would not be a windfall. In that case, there would be less of a concern that the property owner would be paid for having done absolutely nothing. Or if the property owner had already extracted the oil and gas and thereby taken possession

305. See Michelman, *supra* note 3, at 1220 (noting that fairness would require that no party be made worse off).

of it, then of course if government regulation confiscated the oil and gas, that would require compensation for the full value. But for most property interests in oil and gas that would be affected by a ban on fracking, the owner would not yet possess the oil and gas and potentially invested nothing in his property to make it more valuable. As a result, in many (perhaps most) situations a fracking-takings claim would be asking the public to pay a private party not to reap a windfall. This would be unfair and would not promote efficiency but would instead simply transfer resources from the public to private property owners.

Furthermore, in the case of oil and gas leases, there are good reasons why courts might decline to award full compensation for a taking of the leasehold because such property interests are highly speculative, and many leases that are entered into lapse without any oil and gas exploration, even in the absence of fracking bans.³⁰⁶ But even if a court did find that just compensation was necessary for a fracking-takings claim in this most favorable of contexts, the valuation method would need to ensure that just compensation only included actual harm and not consequential damages such as lost profits.³⁰⁷ Thus the actual costs associated with obtaining the lease should operate as an upper bound on any just compensation award.

One final consideration in requiring just compensation for taking of oil and gas leases is the limited duration of these property interests. As such, liability related to a fracking ban should relatively quickly disappear as leases expire. And any future leases that are entered into after the effective date of a fracking ban should be non-starters,³⁰⁸ especially where the price of the lease was reduced based on the expectation that fracking would not be allowed.

306. See, e.g., *Beardslee v. Inflection Energy, LLC*, 798 F.3d 90 (2d Cir. 2015) (per curiam).

307. *Corrigan v. City of Scottsdale*, 720 P.2d 513, 519 (Ariz. 1986) (limiting just compensation to actual damages). For further discussion on calibrating just compensation awards, see *infra* Part IV.B.3.

308. The appropriate focus for any fracking-takings claim in this situation would not be a leaseholder who expends money unreasonably, knowing that a regulation would prohibit fracking, but instead the mineral rights holder whose investment would be even further limited. Cf. *Palazzolo*, 533 U.S. at 633–34 (O'Connor, J., concurring) (noting that the notice of regulatory scheme is relevant, though not determinative, on takings analysis under *Penn Central* factors).

ii. Offsetting Benefits

Valuation methods that do not take account of the many offsetting benefits of the regulation of fracking would also undermine the fairness goal of just compensation law. Thus, in valuing a fracking-takings claims, courts should take a broad approach to measuring the offsetting benefits of regulation and use those to adjust downward the fair market value calculation.³⁰⁹ The specific offsetting benefits will depend on the facts of each case, and in particular the nature of the property right and the character of the community.

First, particularly in cases where there is no split estate, the value of the surface will be more valuable when fracking is restricted or otherwise regulated to limit impacts at the surface. Thus, land that is zoned for residential or commercial use will remain suitable for such uses due to not having industrial-scale fracking operations ongoing. The owner of surface land where fracking is prohibited similarly benefits from zoning laws which prevent the operation of a refinery, a factory, or a power plant. Similar to those heavy industrial activities, fracking operations increase noise and light pollution, toxic air pollution, smog, and traffic impacts, to name but a few,³¹⁰ and therefore restrictions on fracking will increase the value of the surface.³¹¹ However, this offsetting benefit may not be as relevant for fracking-takings claims involving split mineral estates or oil and gas leases, if the court adopts a narrow view of the parcel as a whole.

Second, under basic principles of supply and demand, restrictions on the supply of oil and gas should increase the value of the remaining supply.³¹² This might partially or even entirely offset the decrease in value due to restrictions on fracking, depending on the facts of each case. This issue will of course be highly fact-specific. Thus, if the claimant owns many other mineral interests that allow for production of significant oil and gas, then the offsetting benefit will be greater. If the claimant only owns a right to access a limited amount of minerals that is completely

309. See Serkin, *supra* note 112, at 714.

310. See *supra* note 24.

311. See Ron Throupe et al., *A Review of Hydro "Fracking" and Its Potential Effects on Real Estate*, J. REAL EST. LITERATURE, 2013, at 205, 227.

312. See *Echeverria & Blumm, supra* note 110, at 680–81 (noting that restrictions on supply of raisins might not produce any net harm, due to increases in value of remaining raisins).

frustrated by a restriction on fracking, then this offsetting benefit may not exist. However, courts should be careful to inquire into this issue to ensure that the claimant actually suffers some harm and is not rewarded beyond what is fair, taking account of the benefits of the regulation.

Third, in many instances the mineral rights owner will have benefited from the existing regulatory scheme when producing minerals from other formations in the past. Many states have oil and gas conservation statutes, which were originally focused on preventing waste and protecting correlative rights in a common pool resource.³¹³ If the mineral rights holder benefited from that orderly and efficient production in the past, it should be factored into a just compensation determination for a fracking-takings claim. This highlights the need to look to benefits of the broad regulatory scheme and not just the narrow regulation being challenged.

Fourth, because the minerals are not actually taken from the ground, they remain to be extracted in the future. Because in the future supplies of oil and gas are generally expected to be more limited, this means that the value of the resources can be broadly expected to increase over time. The costs of extraction might also be expected to decrease in the future as technology improves or new technologies are developed. This increase in value might exceed the rate of inflation or of market interest, therefore meaning that the delay in extraction of oil and gas might not cause any harm. Of course, there is uncertainty inherent in this prediction as well, but courts should not ignore the very real possibility that the benefits of delay might outweigh the costs.

Fifth, and finally, any mineral interest owner who is restricted from producing oil and gas will also benefit from the restrictions on others because of the reduction in carbon dioxide and methane emissions that result from the development, transportation, and ultimate use of oil and gas. Fossil fuel development and consumption is the largest contributor to climate change, and by keeping oil and gas in the ground or at least spreading out its use over a longer time horizon, everyone will benefit from having a less unstable climate. Economists have developed the social cost of carbon metric as a way to quantify the societal costs of carbon

313. *See supra* notes 79–81 and accompanying text.

emissions, and so broad restrictions on oil and gas production can have significant benefits which will be shared by everyone, including the owners of mineral interests and their successors.

Each of these offsetting benefits (and any others that may be identified in the future) provide an important means by which the value of just compensation awards for fracking-takings claims should be reduced. Failure to incorporate these offsetting benefits would run afoul of the fairness principle underlying takings law. Yes, the public should bear some burdens which fairness dictates should not be borne by private parties alone,³¹⁴ but fairness also dictates that the public should not both provide benefits to private property owners and also compensate them for costs that do not account for those benefits. Ignoring offsetting benefits would risk double-compensating owners which would make the public worse off.

iii. Risk Shifting

Just compensation for fracking-takings claims also presents threats to the fairness justification to the extent that valuation methods allow for shifting of the risks of development from private parties to the government.³¹⁵ The concern over allocation of risk has been recognized in other contexts, such as the more typical regulatory takings claims of restrictions on development for zoning or other reasons.³¹⁶ Additionally, similar concerns over fairness have been raised in the public debates over the Wall Street Bailout during the Great Recession beginning in 2008.³¹⁷ The situation is different although still analogous in the takings context, including the fracking-takings context. Thus, a developer would not purchase land to be developed into a shopping center simply by subtracting the costs of development from the value of the land with the shopping center built, but would instead purchase it for less to account for the many risks associated with the development,

314. *Armstrong v. United States*, 364 U.S. 40, 49 (1960).

315. For an enlightening discussion of the fairness implications associated with risk-taking, see Alexander W. Cappelen et al., *Just Luck: An Experimental Study of Risk Taking and Fairness*, 103 AM. ECON. REV. 1398 (2013).

316. Serkin, *supra* note 112, at 690.

317. See, e.g., Joe Nocera, *Economists of the World, Unite!*, N.Y. TIMES: EXECUTIVE SUITE (Sept. 25, 2008, 6:16 PM), <https://executivesuite.blogs.nytimes.com/2008/09/25/economists-of-the-world-unite/> [<https://perma.cc/QQE7-U8HD>] (arguing against fairness of taxpayer bailout of losses incurred in risky business ventures).

including the risk that the venture would not be a success.³¹⁸ The developer would also presumably expect to receive some kind of return on the capital invested in the project. Awarding just compensation for a taking in this context based on the expected value of the property with future development would therefore have to take account of the numerous risks involved.³¹⁹

The risk shifting problem also presents fairness concerns based on the remedy. In the case of a permanent taking, presumably the title to the minerals should actually be transferred to the government. But the government likely has no intention of extracting the oil and gas itself, and thus a valuation method based on extracted value would not represent the “highest and best use” as determined by society. Yet if the government did seek to extract the oil and gas at some point in the future (or to lease the right to do so in return for a royalty interest), then the risk would have been entirely shifted to the public. Awarding just compensation based on the potential profits of extracting oil and gas, even if discounted to accurately reflect risk, takes away the gambling aspect of developing oil and gas. Of course, the property owner would take the expected value of development by putting no capital at risk—such a deal would be too good to be true.

A simplified example is helpful to illustrate this point.³²⁰ Assume that the anticipated cost to develop oil and gas from a particular property is \$10 million.³²¹ Assume that 50% of the time, that cost estimate will be accurate, but 25% of the time costs will increase to \$15 million. On the flip side, 25% of the time costs will decrease to \$5 million. This represents uncertainty on the costs, delays in permitting, accidents, etc. On the other side of the equation, assume that the value of the oil and gas has an equal chance of being either \$10 million or \$15 million. This represents uncertainty associated with the amount of oil and gas that will be

318. Serkin, *supra* note 112, at 690–92.

319. *Id.* at 691.

320. In this highly stylized example, I am not including many other economic concepts such as the time value of money that would be used to calculate the net present value of future income streams.

321. Since estimates for the costs of onshore wells in the United States range from approximately \$5 million to \$8 million, \$10 million is likely an underestimate of the amount of money at stake in a typical development project, which often consists of many wells located at one facility and extending miles beneath the ground in different directions.

produced combined with fluctuations in price.³²² In this case, the expected profit would equal the sum of the probability of each outcome, or \$2.5 million. That would represent a 25% return on investment, which is quite high. Yet 50% of the time, the investment of \$10 million would have made no profit or even lost money. As such, the property owner could not establish that actual damages would be more likely than not to occur. This example thus highlights how awarding compensation based on lost profits, even through sophisticated economic means which seek to account for all the risks associated with development, would unfairly compensate private property owners at the expense of the public, who would then assume the risk of any actual future development of oil and gas.

Probability of Outcomes	Revenue \$10M/.5 chance	Revenue \$15M / .5 chance
Cost \$5M/.25 chance	Profit \$5M/.125 chance	Profit \$10M / .125 chance
Cost \$10M / .5 chance	Profit \$0/.25 chance	Profit \$5M/.25 chance
Cost \$15M/ .25 chance	Loss \$5M/.125 chance	Profit \$0/.125 chance

2. Efficiency Concerns in Fracking-Takings

Fracking-takings claims also present risks to the efficiency justification underlying the just compensation requirement. To the extent that just compensation is supposed to provide intelligible signals to government officials and private parties regarding the appropriate level of regulation and the best investment of capital, the incredibly high uncertainty associated with valuing fracking-takings claims calls into question the standard assumption that those actors can meaningfully take this information into account for their decision-making. As a result, in the face of this enormous uncertainty, government officials can be expected to be overly cautious in regulating fracking.³²³ This is not fiscal illusion, but

322. The actual variations in expected profits might be significantly higher, as price fluctuations alone might cause the value to be double or half expectations. See Lynch, *supra* note 13, at 94 (noting dramatic variations in oil prices in recent years).

323. See *Murr v. Wisconsin*, 137 S. Ct. 1933, 1947–48 (2017) (noting that basing takings claim on lot lines “would frustrate municipalities’ ability to implement minimum lot size regulations by casting doubt on the many merger provisions that exist nationwide today”).

fiscal fear. There is almost no way to entirely remove the uncertainty for fracking-takings claims, as the oil and gas industry is a notoriously boom-and-bust industry with a demonstrated history of alternating between enormous profits and enormous losses.³²⁴ But while eliminating uncertainty entirely may not be possible, reducing the magnitude of potential takings liability or the range of potential outcomes will achieve some reductions in risk-aversion from government regulators.

There are several sources of uncertainty in valuing a fracking-takings claim in each of the three key variables—the amount of oil and gas, the cost to extract it, and the price at which it can be sold.³²⁵ As an initial matter, no one knows with any precision how much, if any, oil and gas will be recoverable until wells are drilled and the minerals are extracted. Oil and gas reserves are classified within the industry as proved, probable, or possible, each with a declining certainty going as low as 10% probability.³²⁶ The second source of uncertainty deals with the cost side of extracting oil and gas. Although costs have been declining in recent years, the costs per well are incredibly high and highly variable as well.³²⁷ Thus an oil and gas development containing large numbers of wells would easily cost tens or even hundreds of millions of dollars. Any uncertainty in this context is thus highly consequential. A final major source of uncertainty is in the price. Although industry has a number of tools to try to hedge against fluctuations in the market prices of oil and gas, the commonly reported prices of major benchmarks like West Texas Intermediate crude oil give a sense of

324. See, e.g., Stanley Reed, *Oil Companies at Last See Path to Profits After Painfull Spell*, N.Y. TIMES (Aug. 1, 2017), <https://www.nytimes.com/2017/08/01/business/energy-environment/oil-prices-bp-exxon.html> [<https://perma.cc/7VD9-KF7J>] (noting that BP recently reported quarterly profits of \$144 million compared to a loss of \$1.4 billion the same period a year earlier); Schumpeter, *supra* note 38 (describing the high cash-burn rate in the industry dealing with a dramatic decline in oil prices).

325. Similar to the computer science principle of “garbage in, garbage out,” flaws in the inputs to valuation calculations will inevitably lead to flaws in the output.

326. *Petroleum Reserves Definitions*, SOC’Y PETROLEUM ENGINEERS, <http://www.spe.org/industry/petroleum-reserves-definitions.php> [<https://perma.cc/AMG4-A5C9>] (last visited Aug. 1, 2017). For more mature fields, to be sure, proven reserves are much more likely and would have much greater than 50% probability that the amount of minerals recoverable will exceed estimates.

327. U.S. ENERGY INFO. ADMIN, TRENDS IN U.S. OIL AND NATURAL GAS UPSTREAM COSTS 2 (2016) (noting “considerable cost variability” and a range of capital costs per onshore well of \$4.9 million to \$8.3 million). The cost of fracking is typically the largest share of the costs. *Id.* (noting completion costs ranging from \$2.9 million to \$5.6 million).

the variation in prices. The price of oil, in particular, is largely determined by world-wide markets and are influenced by global supply and demand, geopolitical stability and cartels in key oil producing regions, and investment bets on Wall Street.³²⁸ Any valuation methods which seek to estimate lost income or the value of oil and gas that is kept in the ground will rely on a calculation of value = amount*(price-cost).³²⁹ The uncertainty in each of the three key input variables thus compounds to create even greater uncertainty in the valuation calculation.³³⁰

The approach endorsed by the Michigan court in the *Miller Bros.* case highlights some of these flaws. The court did at least acknowledge the uncertainties in its decision, highlighting the unproven nature of the oil and gas rights at issue and the ways that uncertainty prevents courts from accurately assessing the market value of mineral rights.³³¹ Yet it dramatically missed the mark in basing its decision on what it termed to be “the worth of the development” or the “cash value of [the] property.”³³² Thus, instead of requiring a “reasonable certainty” about the ultimate valuation,³³³ the court instead found that “plaintiffs persuasively demonstrated that they almost certainly would have discovered some oil and gas had they been allowed to drill in the protected area.”³³⁴ But being assured that “almost” certainly “some” oil and gas would have been found is not the same as establishing with reasonable certainty that \$70 million worth of oil and gas would have been found. This is particularly troubling in light of the

328. David Sheppard, *The Five Main Drivers of Oil Prices*, FIN. TIMES (Apr. 5, 2016), <https://www.ft.com/content/334a0b5c-fb0b-11e5-8f41-df5bda8beb40>.

329. As argued below, any calculation based on lost profits should be calibrated using a variety of the valuation mechanisms identified by Serkin. Thus, the valuation methodology would be much more complex than this simple example, including offsetting benefits, net present value, incorporating externalities through the use of the social cost of carbon, and numerous other means of getting the calculation closer to the “correct” value.

330. One might think that the uncertainty might be reduced for at least the price variable by using an average price over some sufficiently long amount of time. However, this approach would effectively take all the risk out of the endeavor, inappropriately shifting the risk onto the public as discussed above. So, while this approach may be economically sound, it does not meet the fairness or efficiency goals of takings law.

331. *Miller Bros. v. Dep’t of Nat. Res.*, 513 N.W.2d 217, 221 (Mich. Ct. App. 1994).

332. *Id.* at 222.

333. *City of Austin v. Teague*, 570 S.W.2d 389, 395 (Tex. 1978).

334. *Miller Bros.*, 513 N.W.2d at 222. The court did not even attempt to apply any sort of risk discount to its valuation, which would at least have better calibrated the damages and created less of a windfall for the industry.

court's dismissal of alternate means of extraction by the use of directional drilling, which would have avoided the need to drill vertical wells on sensitive land, by simply saying that directional drilling could not have been used to extract "all the oil and gas there may be under the protected area."³³⁵ Thus the court failed to compare how much oil and gas could have been produced under the challenged restriction compared to no restriction, thus dramatically inflating the just compensation award.³³⁶ Finally, the court attempted to scale back the just compensation award by focusing not on the value of the oil and gas left in the ground, but instead on an approximation of the "rental" value of the property based on the market interest rates of delaying the income stream.³³⁷ Yet in spite of this instruction, the trial court on remand found an even higher amount, over \$120 million as compared to the previous value of just over \$70 million.³³⁸ In the end, the case settled for \$94 million.³³⁹

Under the efficiency theory of just compensation, the government should have anticipated this judgment and only restricted drilling in the wilderness area if it was willing to pay to protect the dunes. Or at the very least, governments going forward should be incentivized to regulate only in cases where they value the interests being protected more than the amount of takings liability. Or governments should simply increase taxes or find another way to raise revenue to pay for all the environmental regulations that are demanded by the public. The fracking-takings example thus reveals this logic as pie-in-the-sky reasoning, divorced from reality. Whatever the merits of efficiency-based reasoning in the eminent domain context, where government is actively choosing whether or not to take private property and dedicate it to

335. *Miller Bros.*, 513 N.W.2d at 220 (describing as immaterial the disputed factual questions of the extent and value of the property taken). And of course, with the benefit of hindsight we know that the technology of directional drilling has advanced tremendously since the early 1990s, making the court's decision to ignore the directional drilling possibility even more questionable. See Golden & Wiseman, *supra* note 30, at 973.

336. As a result, the Michigan courts did not abide by United States Supreme Court precedent in analogous fact patterns. See, e.g., *Williamson Cty. Reg'l Planning Comm'n v. Hamilton Bank of Johnson City*, 473 U.S. 172, 190-91 (1985) (discussing when a denial of permission to develop property does not demonstrate the effect of regulations on the land).

337. *Miller Bros.*, 513 N.W.2d at 224. The appellate court also directed the lower court to consider enhancements to other property that would be developed sooner. *Id.*

338. Schneider, *supra* note 215.

339. *Id.*

public use, in the regulatory takings context, reliance on efficiently incentivizing government regulators is simply not realistic. The example of the *Miller Bros.* case shows that government did not anticipate the filing of the lawsuit or the large liability ultimately imposed on the public.³⁴⁰ I would go further and argue that the government could not have anticipated either the takings liability or the incredibly high damages award. Additionally, common sense, accumulated experience, and even careful study all lead to the conclusion that when faced with potentially devastating liability, governments will largely choose not to regulate.³⁴¹ Governmental decisions not to regulate thus would only be deemed “efficient” if one starts from the premise that government regulation is always or usually harmful.

Other valuation methods besides those used in the *Miller Bros.* case also suffer from great uncertainty and therefore do not meet the efficiency justification for just compensation. These methods include the option value, the market rate of return, the interest on lost profits, the equity interest approach, and the *Herrington* approach.³⁴² Each of these methods suffers from the same flaw in that they are based off of a calculation of the value of the oil and gas were it to be extracted, which is highly uncertain and runs against court admonitions that consequential damages should not be recoverable in takings suits.³⁴³

Reducing or eliminating uncertainty should not be pursued to the extreme, however, because this would create unfortunate tradeoffs in fairness. Thus, although there are legitimate concerns about too much uncertainty undercutting the efficiency rationale, these concerns weigh in favor of reducing uncertainty, yet still retaining the flexibility of case-by-case adjudication. The importance of considering the totality of factors of each individual case is reflected throughout takings jurisprudence. This makes

340. *Id.* (noting that “the lawsuit was a surprise” and that the industry’s “lawyers took advantage of an opportunity to reap a windfall without a single turn of the drillbit”).

341. *Id.*; see also Echeverria & Hansen-Young, *supra* note 148, at 444.

342. See the discussion of valuation methods *supra* Part III.B.1.

343. *Yuba Nat. Res., Inc. v. United States*, 904 F.2d 1577, 1581–83 (Fed. Cir. 1990) (“[T]he measure of just compensation is the fair value of what was taken, and not the consequential damages the owner suffers as a result of the taking.”); Tretbar, *supra* note 5, at 219 (“Each of the commonly accepted methods discussed in this Comment rely on a determination of the fair market value of the property with the invalid regulation in effect and without it.”). Consequential damages typically involve losses that flow from, but are not a direct result of, the taking of property, such as lost profits. See *supra* note 131.

sense because such fulsome consideration allows the court to ensure that a fair result is achieved in each case, which would be frustrated by rigid rules. Putting more emphasis on fairness when it conflicts with efficiency is appropriate because the Takings Clause requires payment not of “efficient compensation” but rather “just compensation.”³⁴⁴ Therefore, valuation methods for fracking-takings claims, as for all takings claims, should be chosen first to achieve the greatest fairness, and only secondarily to promote efficiency in a manner that is consistent with fairness.

The sensitivity of valuation methods to the date of the valuation also implicate efficiency concerns because of the dramatic changes in valuation caused by the changes in the price of oil or other causes of booms and busts in the oil and gas industry. If the taking is valued on the date of trial or the date of commencement of the proceeding, then both private parties and government will have an incentive to wait until the time that the price favors their side to initiate an action (either eminent domain by the government, or inverse condemnation claim by a private party). Thus, a restriction on fracking might not have any economic impact at the time it was enacted if the price for oil was low and the costs to extract it were high, but if the industry waits long enough, the price may go up or costs may go down, or both, meaning that now the oil could be extracted if the restriction were not in place. Thus, date of valuation choices based on the commencement of the proceeding or the date of trial might mean that a law that was previously valid would be declared invalid many years later not because the regulation changed to “go too far,” but because the underlying property values changed to make the regulation finally have a negative impact. On the flip side, if interest is allowed back to the time a restriction was first adopted, then a private party could be rewarded for sitting on his rights and waiting to bring a takings claim that would be inflated due to accrued interest. Or the threat of increasing liability due to interest might also force government to settle too soon rather than continue to contest liability or the proper measure of damages. All of this uncertainty raises the possibility that a private property owner may reap a windfall simply due to fluctuations in the global oil market and not due to the fruits of his labor. The unpredictability of the just compensation

344. U.S. Const. amend. V.

award also would not be functioning properly according to the traditional law and economics view to combat fiscal illusion, because the government cannot be expected to take into account such dramatically fluctuating liability, except perhaps by declining to regulate at all in order to avoid the risk of liability.

The uncertainty and time-sensitive nature of valuation methods also provides ample opportunity for both government and private actors to game the system. Property owners might wait to initiate a fracking-takings claim only when prices for oil and gas are high, thus potentially inflating the value of any just compensation award.³⁴⁵ Government actors might also time their regulatory decisions or even initiate condemnation proceedings at a time when the price for oil and gas are relatively low, perhaps so low that the minerals cannot be economically extracted at that time.³⁴⁶ This type of gaming the system thus would frustrate the efficiency goals of takings law by preventing society from achieving the efficient levels of investment and regulation sought by law and economics theory.³⁴⁷ There should in theory be one right answer about how much regulation is too much, which is not dependent on the whims of the global market for oil.

3. Deference to Regulation in Fracking-Takings

Ultimately, this Article argues in favor of a valuation methodology that provides the necessary deference to regulation.³⁴⁸ Courts need not be limited to the all-or-nothing approach in determining just compensation for fracking-takings claims. By refusing to award relatively high damages awards for fracking-takings, courts can avoid the problems of incentivizing under-regulation by government officials³⁴⁹—or more likely, an

345. See Lynch, *supra* note 13, at 94–95.

346. *Id.* Or a forward-thinking government might seek to condemn mineral interests outside of currently productive areas in order to reduce the threat of future liability if restrictions on oil and gas might be enacted in the future. This would have the benefit of giving government greater clarity regarding its authority to regulate, but would presumably offend property rights advocates by transitioning from a system of private ownership of mineral rights to one of public ownership. The implications of such an approach are deserving of further study.

347. Bell & Parchomovsky, *supra* note 138, at 903.

348. Serkin, *supra* note 112, at 713–14.

349. Tahoe-Sierra Pres. Council, Inc. v. Tahoe Reg'l Planning Agency, 535 U.S. 302, 337 (2002) (discussing “serious financial constraints on the planning process” that would be imposed by a stricter standard for moratoria).

utter lack of regulation on an industry which imposes numerous externalities on society. Additionally, courts should be hesitant to award high damages awards because of the ultimately temporary nature of any restriction on fracking. The oil and gas will always remain in the ground to be extracted in the future, when the regulation is lifted or new technology allows for extraction with less impacts on society. The only property interest that may be truly lost would be a mineral lease, yet those temporary rights to extract oil and gas were always inherently risky and regulation is but one cause why a lease may lapse.³⁵⁰

How should courts faced with fracking-takings claims achieve this result, beyond simply finding no taking of private property?³⁵¹ Many of Serkin's valuation mechanisms can and should be applied to fracking-takings claims in order to appropriately calibrate just compensation awards. This means that damages awards should force industry to internalize the costs of their business operations by factoring in the social cost of carbon and other measures of the impact that the oil and gas industry has on society,³⁵² which would represent factoring in "[p]ermissible but [u]nenacted [r]egulations."³⁵³ Courts should also broadly take into account offsetting benefits of the regulation being challenged, such as the benefits to the surface from not having industrial development located in sensitive areas, the benefits of a comprehensive regulatory system that encourages orderly development of oil and gas while protecting public health, safety, and the environment, and impacts on other properties that might benefit from decreased supplies of oil and gas which may affect the local or regional price.³⁵⁴ These limitations would be particularly relevant where the property owner owns a fee simple estate that is not split into surface

350. Changes in price, lack of capital, or other more attractive investment options could also result in a lapsed lease.

351. As I have argued previously, fracking-takings claims are unlikely to succeed. *See* Lynch, *supra* note 13, at 96–97. The issues raised in this Article only further support that conclusion. However, the goals of just compensation law can still be achieved by appropriately limiting a just compensation award and avoiding excessive damages.

352. *See, e.g.,* Richard L. Revesz et al., *Letter—The Social Cost of Carbon: A Global Imperative*, 11 REV. ENVTL. ECON. & POL'Y 172 (2017); *see also* Peter Howard & Jason Schwartz, *Think Global: International Reciprocity as Justification for a Global Social Cost of Carbon*, 42 COLUM. J. ENVTL. L. 203, 210–21 (2017) (laying out history and development of the social cost of carbon metric).

353. Serkin, *supra* note 112, at 692.

354. *See* Serkin, *supra* note 112, at 694–96; *supra* Part IV.B.1.ii.

and mineral estates, although such considerations might still apply to mineral interest owners or even leaseholders who own other leases as well.³⁵⁵

Another way for courts to appropriately limit excessive fracking-takings awards would be to use measures to set an upper bound on any award. Thus, because fracking-takings claims are unlikely to involve a going concern due to the one-off nature of oil and gas extraction, courts would be justified in trying to determine an appropriate value for the property taken. But this valuation should not exceed the actual harm to the property owner in the form of actual expenses of acquiring a lease or applying for a permit.³⁵⁶ Calculations of lost profits are another way to put a limit on actual damages, and where the lost profits are less than the value of the property taken, it would be appropriate for courts to use this as an upper bound on a just compensation award.³⁵⁷ While using lost profits as a floor for just compensation awards would not be fair or efficient as discussed above, using it as a ceiling would provide another check for courts to ensure that seemingly logical economic measures were not misrepresenting the actual impact of a regulation on private property. The most difficult case here would likely be royalty owners, who conceivably would have a property interest whose entire value would be taken by a regulation. Yet even a nominal just compensation award would not necessarily run afoul of the fairness and efficiency criteria because the transfer of royalty interests on the market would be inherently speculative and uncertain.

4. Against Hostility to Regulation in Fracking-Takings

Of course it must be recognized that the approach to valuing fracking-takings claims discussed earlier in this Part might offend

355. Consideration of the value on other leases or mineral interests might not be appropriate in determining whether a taking had occurred at all, but nothing prevents courts from considering this information in determining what compensation is required in the interests of fairness and efficiency.

356. See, e.g., *Corrigan v. City of Scottsdale*, 720 P.2d 513, 519 (Ariz. 1986). Actual damages might even be zero if a property owner attempts to bring a taking claim without making any investment in the property. Although the United States Supreme Court has held that lack of investment is not a bar to finding a taking, it would be appropriately considered in valuing just compensation, and the lack of investment could justify a nominal award.

357. See Wade, *supra* note 109, at 140 (noting that fair market value calculation inflated just compensation award where regulation's impact on profitability of a farm was relatively minor).

advocates of a strong property rights movement or other theories requiring high compensation.³⁵⁸ Yet for the reasons discussed previously and in this Part, hostility to regulation of oil and gas would prevent government from correcting market failures caused by the externalities of extracting oil and gas through fracking and would unfairly require the public to pay for protection of its health and safety. The right of the public to health and safety should not be held hostage by the astronomical value of oil and gas that can be produced with modern fracking technology. As a result, high compensation awards for takings of oil and gas rights should be limited to cases of actual physical takings through eminent domain or to regulatory takings claims involving bad faith on the part of regulators.³⁵⁹ The acknowledged goal of the property rights movement is to reduce government regulations on private property. Yet this goal not only lacks the nuance of a calibrated just compensation system that can better achieve the goals of fairness and efficiency, but it also largely cuts out any role for the political process to play by making regulation cost-prohibitive.³⁶⁰ The property rights movement would also represent a dramatic departure from our legal tradition by relying “on a radical premise that has never been part of our law or tradition: that a private property owner has the absolute right to the greatest possible profit from that property, regardless of the consequences of the proposed use on other individuals or the public generally.”³⁶¹ It also serves to reinforce existing distributions of wealth, which may not themselves be fair or which may run afoul of truly objective measures of just compensation from the perspective of the property owner and not

358. See EPSTEIN, *supra* note 2 (laying out the property rights argument in great detail and force); FRIED, *supra* note 163, at 183 (describing the “aggressive” and “radical” property rights movement and how it would lead to “much less regulation”); Serkin, *supra* note 112, at 708–13.

359. Serkin, *supra* note 112, at 710 (noting that courts usually compensate for regulatory blight explicitly only after finding bad faith on part of the government).

360. See, e.g., James E. Krier, *Takings from Freund to Fischel*, 84 GEO. L.J. 1895 (1996) (reviewing WILLIAM A. FISCHEL, *REGULATORY TAKINGS: LAW, ECONOMICS, AND POLITICS* (1995)).

361. Gerald Torres, *Taking and Giving: Police Power, Public Value, and Private Right*, 26 ENVTL. L. 1, 4 (1996) (quoting *Environment Regulations and Property Rights, 1995: Oversight Hearings on Proposals to Supplement the Legal Framework for Private Property Interests, with Primary Emphasis on the Operation of Federal Environmental Laws Before the Senate Comm. on Environment and Public Works*, 104th Cong. (1995) (testimony of John R. Schmidt, Associate Attorney, Department of Justice), available at 1995 WL 379304, at *2).

the property itself.³⁶² For all these reasons, the property rights movement bears quite a burden to show that its preferred legal regime would better achieve the goals of fairness and efficiency, a burden which it has not carried. Thus, the United States Supreme Court has thus far rejected attempts to develop this radical agenda,³⁶³ and it has been right to do so.

Limited or nominal just compensation awards for fracking-takings claims would encourage government regulation of fracking, or at least create more room for it. While there may be some concern that just compensation awards which are too low would encourage over-regulation, there is little empirical support for the idea that the oil and gas industry is over-regulated. Quite the contrary, if reductions in potential takings liability did result in overregulation, the financial incentives at play in the extraction of oil and gas mean that such over-regulation can be expected to be addressed through political processes without the need to resort to constitutional protection under the Takings Clause.

Limited or nominal just compensation for fracking-takings claims is therefore appropriate in light of the systematic and anecdotal evidence that high takings awards deter government regulation.³⁶⁴ When government officials believe that mineral rights holders have a “right” to extract oil and gas, regardless of the impacts on the surrounding community, then society as a whole is made worse off due to under-regulation of fracking. Especially for an activity like fracking that is so potentially harmful on its surrounding community (and indeed the climate of the entire planet), courts should not risk deterring regulation which would predictably result in the oil and gas industry imposing externalities on society, which would be unfair to the public as well as economically inefficient.

A strong property rights approach which is hostile to regulation of fracking would lead to undesirable results. Many of the conflicts between fracking and local communities reflect the reality that

362. See Wyman, *supra* note 3, at 284; see also THOMAS PIKETTY, CAPITAL IN THE TWENTY-FIRST CENTURY (Arthur Goldman trans., 2014). A full discussion of the problems associated with wealth and income inequality is beyond the scope of this Article, but takings law should at a minimum not further increase inequality, and it may be useful as a tool for reducing inequality. Cf. Treanor, *supra* note 2, at 847 (discussing Madison’s understanding that “government had to be free to advance some economic interests at the expense of others without incurring the obligation to make whole those who were injured”).

363. See Lazarus, *supra* note 165, at 823.

364. Echeverria & Hansen-Young, *supra* note 148, at 444.

fracking is very disruptive and potentially harmful to its neighbors. Thus, if the high cost of potential takings claims deters reasonable regulation of fracking, then the oil and gas industry will continue to impose these externalities on the surrounding community. Such harms include noise and light pollution, toxic air pollution, increased heavy truck traffic on local roads, and safety concerns related to explosions or other inevitable accidents, to name but a few.³⁶⁵ Instead, deference to regulators is appropriate in this situation, and other mechanisms besides constitutionally-required compensation awards, such as the political process, are available to ensure that regulators do not overreach. Showing such deference and avoiding hostility to regulation therefore requires valuation methods which reduce both the uncertainty around the calculations and the overall amount of compensation.

V. CONCLUSION

The nature of oil and gas rights as property are different in many key respects from a fee simple interest in land. Oil and gas rights allow for the one-time extraction of the resource from the land, and may be severed from the land or leased to oil and gas companies for development. The treatment of oil and gas also varies from state to state. In some states, such as New York and California, the property owner does not own oil and gas until it is extracted, while in other states such as Texas, the property owner is considered to own the minerals in place. This implies that just compensation for regulations on fracking might differ from state to state based on its view of oil and gas as property.

The issue of how to value just compensation when a taking has occurred has received relatively less attention from scholars and courts than the question of whether or not a taking occurred. Yet many of the same considerations inform both of those key questions in takings doctrine. The major theories behind just compensation are fairness and efficiency. Fairness and efficiency both suggest that just compensation should be carefully calibrated on a case-by-case basis. Thus, the most common methods for valuing just compensation, fair market value and rental value, should be adjusted in fracking-takings claims in order to avoid

³⁶⁵ For a more detailed discussion of the negative impacts of fracking, see Lynch, *supra* note 13, at 43–45.

unfair or inefficient compensation. This conclusion flows from the fact that fracking-takings claims are regulatory and not physical takings; that regulation of fracking indefinitely delays extraction of oil and gas rather than denying ongoing use of property; and that the scheme for regulating fracking creates numerous offsetting benefits which might reduce the value of just compensation.

Applying valuation methods to fracking-takings claims reveals several difficulties in properly determining just compensation. Fairness concerns would be implicated if compensation for a taking would amount to a windfall, would not take account of the offsetting benefits of regulation, or would eliminate the risk of oil and gas development for the property owner. Efficiency concerns would also be implicated by the large uncertainty associated with determining the value of oil and gas in the ground. Uncertainty affects every stage of the valuation calculation, including the amount of oil and gas which can be extracted, the cost of extraction, and the highly volatile market price for the resource. The uncertainty combined with the large absolute value of oil and gas can be expected to unduly inhibit government regulation of oil and gas. Reality bears out this expectation, as restrictions on oil and gas based on public health and safety concerns are rare and minimal. Just compensation for fracking-takings claims should therefore be limited on the low side to allow appropriate deference to regulation which is often necessary to address the serious externalities associated with oil and gas development.

Ultimately, the numerous problems in valuing fracking-takings discussed in this Article suggest that courts should take an extremely cautious approach in deciding fracking-takings claims. If courts do not heed this advice and nevertheless find that fracking bans amount to a taking of private property, then it is imperative for courts to employ theoretically supportable valuation methods that are consistent with the underlying rationales of fairness and efficiency. Courts should also employ valuation mechanisms to calibrate just compensation awards, avoiding the perils of an all-or-nothing approach that either denies compensation entirely or awards astronomical takings liability on government, potentially devastating public coffers. Therefore, courts should not allow for awards based on lost profits which are not only highly speculative, but which also create a potential for double-compensation of property owners who might be able to extract oil and gas in the

future if fracking bans are lifted or alternative means of production are developed. Courts must employ valuation methods which do not reward property owners with windfall profits at the expense of public funds or impose a chilling effect on government regulations. This means that valuation methods based on interest on cash flows, income streams, or the present value of resources thought to be in the ground should not be allowed. Because no reasonable person would individually choose to pay someone to leave their oil and gas in the ground, it is difficult to imagine, and perhaps impossible to develop, a defensible valuation methodology for just compensation in a fracking-takings case. Attempts to analogize to the rental value of real property ignore the very real differences between whatever form of property that oil and gas embodies and property interests in land.

Therefore, the best course of action would be for courts to avoid high just compensation awards that would be unfair to the public and inefficiently deter government regulation. Because government is not literally taking private property, and because oil and gas effectively has a limited one time use component, courts should not be overly concerned with delays in extraction of oil and gas. Decisions to ban fracking can always be reversed in the future, while decisions to require compensation for fracking-takings would have long-lasting and potentially irreversible negative effects.