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IS FRACKING THE NEXT FINANCIAL CRISIS? A DEVELOPMENT LENS FOR UNDERSTANDING SYSTEMIC RISK AND GOVERNANCE

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Natural gas sits in deposits across vast regions of the United States, and hydraulic fracturing (fracking) is the current method used to extract it. Fracking for natural gas has been billed as the next economic boon to poor communities and the key to mitigating the negative effects of climate change. But fracking also involves risks: risks to our environment, to our communities, and to our markets. To date, the debate about fracking—and efforts to address concerns about the risks of fracking—has largely been a debate about who should regulate, the federal government, the states, or some combination of the two. Framing the current fracking debate as a federalism question is a mistake.

This Article argues that the narrow frame of the current fracking debate misses important features of the problem. It argues that fracking is best understood within the much broader context of development in the United States, and more specifically as an example of an approach to development called "hybridity." The Article maps hybridity as comprised of the following three key features: (1) private

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actors engaged in difficult-to-regulate activities, (2) involvement of public goods, and (3) creation of systemic risk. Drawing together the financial crisis of 2008, the BP oil spill of 2010, and fracking shows that all three share the common features of hybridity, and give rise to a similar suite of concerns. Regulation alone is not sufficient to address these concerns. Instead, the Article proposes several ways in which the hybridity of fracking might be disrupted, thereby easing the overall risks of fracking while realizing its potential benefits.

Hybridity: An approach to economic development that is not easily regulated, engages a public good, and creates systemic risk.

I. INTRODUCTION

America is dying, and fracking may be here to save it.

In the summer of 2012 we watched the worst drought on record since the Dust Bowl unfold.[1] Farmers from Kansas to Texas witnessed the slow death of cattle and the gradual drying up of wells used to sustain life for generations.[2] The same summer, overpowering fires swept through Colorado, utilizing the dry landscape ravaged by mountain pine beetles as timber to fuel the fires.[3] A few months later, a devastating "superstorm" named Sandy swept through the northeastern United States.[4] The storm brought with it a deadly mix of snow, sleet, rain, and high wind, all of which brought the nation's largest eastern cities to an unprecedented standstill.[5] The storm marked the tail end of a year punctuated by global extremes and firsts.[6]

1. John Eligon, *A Drought Leaves Cracks in a Way of Life*, N.Y. TIMES, Oct. 4, 2012, at A24 ("Nearly two-thirds of the continental United States is in moderate to exceptional drought, according to the government, the most widespread dryness in five and a half decades.").

2. John Eligon, *Drought Disrupts Everyday Tasks in Rural Midwest*, N.Y. TIMES, Aug. 24, 2012, at A13 ("The wells supplying people's homes are running dry here at the heart of the nation's drought, . . . centered in the parched earth of the southern Midwest."); Michael Overall, *From Dust to Dust*, TULSA WORLD, Sept. 18, 2012, at A9 (drawing a comparison to the Dust Bowl, the author provides evidence of drought-caused cattle death, noting the experience of a ten-year-old who "came home from school one day to find the family's cattle lying in a ditch"). See *infra* notes 3–11 and accompanying text for more discussion on troubling climate trends and their effect.

3. Climate scientists have noted the relationship between continuing weather changes, mountain pine beetle infestation, drought, and increased wildfires. Essentially, warmer temperatures during the winter have increased mountain pine beetle reproductivity. The effect has been an infestation of beetles that feed on and kill pine trees; the dead trees then act as fuel for wildfires. *See* Sally Embrey, Justin V. Remais & Jeremy Hess, *Climate Change and Ecosystem Disruption: The Health Impacts of the North American Rocky Mountain Pine Beetle Infestation*, 102 AM. J. PUB. HEALTH 818, 822 (2012) ("Increased fire risk poses one of the most immediate human health concerns stemming from pine beetle infestation. Massive forest die-off increases fuel loads, thus escalating the risk of fire. Additionally, pine beetle outbreaks often coincide with prolonged periods of drought, which itself contributes to increased risk and severity of forest fires.") (footnote omitted).

4. Tom Howell Jr., *Sandy Socks East Coast: Superstorm Hits 50 Million with Rain and Wind*, WASH. TIMES, Oct. 30, 2012, at A1.

5. *Id.*

6. Just as the United States experienced extreme weather conditions, the same was true for much of the rest of the world. Severely cold weather in central and eastern Europe killed eight

Research suggests that these events sit squarely within a larger trend of rising temperatures, ocean acidification, and general degradation of the planet.[7] Climate instability is the new normal.[8] The focus is no longer only on averting climate change, but on adapting to climate change.[9] What has become increasingly evident is that the earth humans will inhabit in the next generation will be unlike the earth upon which prior civilizations once thrived.[10] There is, as Professor J.B. Ruhl suggests, "no analog" to our climate future.[11]

hundred people in February alone. The southern Philippine island of Mindanao was hit with its strongest storm ever, killing over one thousand, while the United Kingdom experienced its worst drought in four decades, just as the United States had. *See* Justin Grieser, *Top 5 International Weather Events of 2012*, WASH. POST (Dec. 31, 2012, 11:36 AM), http://www.washingtonpost.com/blogs/capital-weather-gang/post/top-5-international-weather-events-of-2012/2012/12/31/971dc172-5362-11e2-8b9e-dd8773594efc_blog.html. Back in the United States, severe drought and wildfires were preceded by a string of deadly tornados in the spring, which ravaged through the Midwest. Over the course of just five days, one hundred fifty tornados were reported to have hit across a dozen states. Alan Taylor, *Tornados Roar Through South, Midwest*, ATLANTIC (Mar. 5, 2012), http://www.theatlantic.com/infocus/2012/03/tornadoes-roar-through-south-midwest/100256/.

7. Seth Borenstein, *Study Links Warming to Some 2012 Wild Weather*, FT. WAYNE J. GAZETTE (IND.), Sep. 6, 2013, at 9A (citing to a study by the National Oceanic and Atmospheric Administration in which scientists found that the magnitude and likelihood of the summer heat waves in the United States, Superstorm Sandy flooding, and droughts in Europe were increased due to climate change).

8. Recent data suggests that 2001–10 was the most active decade since 1855 for tropical cyclones. Between 1981 and 2010, an average of twelve named storms occurred per year, while in 2005 alone there were twenty-seven named storms. WORLD METEOROLOGICAL ORGANIZATION, WMO-NO. 1119, THE GLOBAL CLIMATE 2001–2010: A DECADE OF CLIMATE EXTREMES SUMMARY REPORT 11 (2013).

9. *See Facing the Consequences: Adapting to Climate* Change, ECONOMIST, Nov. 27, 2010, at 85 ("Analysts who have long worked on adaptation to climate change—finding ways to live with scarcer water, higher peak temperatures, higher sea levels and weather patterns at odds with those under which today's settled patterns of farming developed—are starting to see their day in the uncomfortably hot sun.").

10. *See* BILL MCKIBBEN, EAARTH: MAKING A LIFE ON A TOUGH NEW PLANET xiv (1st ed. 2010). The author begins by illustrating the severity of climate change by describing notable and noticeable small-scale changes in his community that have occurred since his previous writings on the subject in the late 1980s to illustrate the severity of climate change. These rapid changes in climate activity inform McKibben's underlying hypothesis—we can no longer avoid the serious consequences associated with global climate change. *Id.* Instead, in this new era of climate change, we must

> consider—urgently—how to live [in this world]. We can't simply keep stacking boulders against the change that's coming on every front; we'll need to figure out what parts of our lives and our ideologies we must abandon so that we can protect the core of our societies and civilizations. There's nothing airy or speculative about this conversation; it's got to be uncomfortable, staccato, direct.

Id.

11. J.B. Ruhl, *Climate Change and the Endangered Species Act: Building Bridges to the No-Analog Future*, 88 B.U. L. REV 1, 5 (2008). A no-analog climate future suggests that we lack any experience on which to base projections of ecosystem change and that the models currently employed to "allow active management decisions as climate change takes effect are presently rudimentary and imprecise." *Id.* at 11.

In the United States, amid this extreme and unprecedented[12] climatic instability, a weakened economy limps along.[13] Millions of Americans continue to beat the pavement in search of employment.[14] As of 2013, New York City, a beloved paragon of American success, boasted an 8.5% unemployment rate,[15] consistent with the nation's 7 to 10% unemployment rate from 2009 through mid-2013.[16] Among African-Americans in the city, the rate is much higher. One report estimates that, more than four years after the beginning of the Great Recession, a shocking 50% of African-American males ages eighteen to twenty-five were out of work, and those who did eventually find employment spent a year doing so.[17] Moreover, the gap between America's wealthiest and poorest

12. *See, e.g.*, Bill McKibben, *The Reckoning,* ROLLING STONE, Aug. 2, 2012, at 52. McKibben contends that while the seriousness of our environmental predicament increases, it receives little political consideration. In June of 2012, record high temperatures were recorded 3,215 times. While temperatures increase, so too does the rate by which carbon-emitting energy sources are used. Year after year, record amounts of carbon dioxide have been spilled in the atmosphere. Pairing these numbers together, scientists suggest that in just sixteen years there will be a temperature increase of about eleven degrees Fahrenheit, which would create conditions that make the planet uninhabitable. *See also* Kenneth Chang, *Research Cites Role of Warming in Extremes*, N.Y. TIMES, Sept. 6, 2013, at A6 (noting that climate-related sea-level rise is creating a "looming crisis" for coastal communities); Justin Gillis, *Climate Panel Cites Near Certainty on Warming*, N.Y. TIMES, Aug. 20, 2013, at A1 (stating that a temperature increase of five degrees Fahrenheit "would lead to widespread melting of land ice, extreme heat waves, difficulty growing food and massive changes in plant and animal life, probably including a wave of extinctions").

13. Since the end of the Great Recession, real GDP growth has hovered around 2.1%. Andrew Fieldhouse, *5 Years After the Great Recession, Our Economy Still Far from Recovered*, HUFFINGTON POST (Aug. 26, 2014, 5:59 AM), http://www.huffingtonpost.com/andrew-fieldhouse/five-years-after-the-grea_b_5530597.html; *see also U.S. Poverty Rises Despite Economic Recovery*, REUTERS (Sept. 17, 2013, 7:06 PM), http://www.reuters.com/article/2013/09/17/us-usa-economy-poverty-idUSBRE98G0PN20130917. See *infra* notes 14–23, 81–92 and accompanying text for a discussion of the financial crisis and its effects on the American economy.

14. As of September 2013, the unemployment rate stood at 7.3%, down from the prior year when it was 8.1%. Even so, the addition of jobs has been sluggish with the Labor Department having to revise its numbers downward for the previous two months after concluding job growth was less than expected. Dominic Rushe, *U.S. Unemployment Rate Drops to 7.3% Amid Sluggish Economic Recovery*, GUARDIAN (Sept. 6, 2013, 9:14 EDT), http://www.theguardian.com/business/2013/sep/06/us-jobless-numbers-economic-recovery. As of December 2014, the unemployment rate declined to 5.6%. U.S. DEP'T OF LABOR, BUREAU OF LABOR STATISTICS, ECONOMIC NEWS RELEASE (2015), *available at* http://www.bls.gov/news.release/empsit.nr0.htm.

15. *Labor Statistics for the New York City Region*, N.Y. STATE DEP'T OF LABOR, http://www.labor.ny.gov/stats/nyc/ (last visited Mar. 6, 2015). In August 2013, the state of New York outpaced the rest of the country in job growth. Press Release, New York State Department of Labor, State's Private Sector Job Count Grows by 22,700 in August, 2013 to Historic Record High (Sept. 19, 2013), http://labor.ny.gov/pressreleases/2013/september-19-2013.shtm. Nonetheless, unemployment figures loomed above 8% in New York City. In August 2013, despite hiring gains, the unemployment rate rose from 8.4 to 8.6%. Patrick McGeehan, *New York City's Jobless Rate Increased to 8.6% in August Despite Hiring Gains*, N.Y. TIMES, Sept. 20, 2013, at A26.

16. U.S. DEP'T OF LABOR, BUREAU OF LABOR STATISTICS, CHARTING THE LABOR MARKET: DATA FROM THE CURRENT POPULATION SURVEY (CPS) (Mar. 6, 2015), *available at* http://www.bls.gov/web/empsit/cps_charts.pdf.

17. Patrick McGeehan, *Blacks Miss Out as Jobs Market Rebounds in City*, N.Y. TIMES, June 21, 2012, at A1.

citizens continues to grow.[18] Indeed, the rich appear to be getting richer, while the poor inch ever further away from the American dream.[19] After several generations of steady growth[20] and stabilization of the middle class,[21] deep inequality is the new economic reality in the United States.[22] As of late 2013, 46.5 million people—15% of the country—were living in deep poverty.[23]

18. As of 2013, the poverty rate stood at about 15%, which is defined as an average income of $23,492 for a family of four. Forty-four percent of those living in poverty, though, are living in "deep poverty," which is defined as living at half of the poverty rate. Since 2000, levels of deep poverty have been continually rising and have almost surpassed the highest level since the data has been available in 1975. Neil Shah, *U.S. Poverty Rate Stabilizes—For Some*, WALL ST. J. (Oct. 11, 2013, 10:41 AM), http://online.wsj.com/news/articles/SB10001424052702304500404579127603306039292; *see also* Eduardo Porter, *Inequality in America: The Data Is Sobering*, N.Y. TIMES, July 31, 2013, at B1 (noting that inequality in America is stark in comparison to other industrialized countries by focusing on statistics beyond the federal poverty line). Among the indicators that contribute to systemic poverty is education. Sixty percent of disadvantaged children in the United States go to underresourced schools, which have fewer and lower quality resources, and the literacy gap between the top U.S. test takers—who fall at the ninetieth percentile of distribution—and those scoring in the middle is almost as big as the gap between the average score in the United States and Azerbaijan. *Id.*

19. *See U.S. Poverty Rises Despite Economic Recovery*, *supra* note 13 (noting that "[t]he recovery from the worst recession since the 1930s has been marked by a jump in stock prices to record highs, aided in part by the Federal Reserve's ultra easy monetary policy"); *see also* Annie Lowrey, *A Budget Focus on Inequality*, N.Y. TIMES (Apr. 10, 2013, 4:52 PM), http://economix.blogs.nytimes.com/2013/04/10/a-budget-focus-on-inequality/?_php=true&_type=blogs&_r=0 (noting that "it is not a bad time to be rich. Job growth in high-wage professions has been decent, if not spectacular"). However, the middle class has suffered mightily in the Great Recession, as median income has declined and the "recovery has seen middle-class jobs effectively replaced with low-income jobs." *Id.* Viewing economic statistics in isolation does not provide a full picture with respect to the attainability of the American dream. While economic statistics are certainly bleak for many in the United States, arguably nervousness and uncertainty that plague most Americans' lives have also coalesced to create a greater barrier to the achievement of the American dream than a depressed economy; there is now a psychological disconnect between reality and the belief in achieving the American dream. A recent survey found that almost half the country feels that it is not possible to achieve the American dream in our economy. *The American Dream Might As Well Be Dead: Here's Proof*, HUFFINGTON POST (Oct. 25, 2013, 9:07 AM), http://www.huffingtonpost.com/2013/10/25/american-dream-dead_n_4156505.html.

20. *See, e.g.*, Christopher Matthews, *Is U.S. Economic Growth a Thing of the Past?*, TIME (Sept. 4, 2012), http://business.time.com/2012/09/04/is-u-s-economic-growth-a-thing-of-the-past ("[S]ince the end of World War II, the U.S. economy has averaged GDP growth of more than 3% per year.").

21. *See* Hedrick Smith, *Middle Class Mayday*, L.A. TIMES, Aug. 4, 2013, at 25 (arguing that economic growth for middle-class Americans peaked in the mid-1970s—from 1945 to 1973, the income of the average family grew 95%—but since then, while American productivity has increased dramatically, average family income has not).

22. Economist Emmanuel Saez found from 1993 to 2000 the top 1% of the United States population posted the largest gains in household income at 86.1%, but in the bottom 99% growth was many times less, at 6.6%. University of California at Berkeley, Emmanuel Saez, Professor of Economics, Director, Center for Equitable Growth, *Emanuel Saez*, UNIV. OF CAL. AT BERKELEY, http://elsa.berkeley.edu/~saez/ (under heading "Papers by Topic" locate listing for "Income Inequality in the United States, 1913–1998" with Thomas Piketty, *Quarterly Journal of Economics*, 118(1), 2003, 1–39; then click "Tables and Figures Updated to 2012 in Excel format, September 2013).

23. *See U.S. Poverty Rises Despite Economic Recovery*, *supra* note 13 (noting that against a poverty threshold of $23,492 for a family of four, in 2012, "[a]bout 16.1 million children and 3.9 million people aged 65 years and older were living in poverty").

And yet, there is a flash of hope for both climate change and economic conditions. An oil and natural gas boom is afoot,[24] which could reduce America's dependence on foreign oil, provide a "cleaner" energy future by reducing our dependence on carbon-intensive coal,[25] keep energy costs low, and also bring desperately needed financial resources to cash-strapped regions.[26] Approximately 616 trillion cubic feet of natural gas (the equivalent of 102 billion barrels of crude oil) lay trapped in shale deposits, or "plays," around the country.[27] The largest shale play in the United States runs through Appalachia.[28]

24. Estimates by the U.S. Energy Information Administration suggest that by 2040 domestic crude oil and natural gas production will help to lower domestic consumption of imported energy from 30%, its 2005 percentage, down to 4%. U.S. ENERGY INFO. ADMIN, ANNUAL ENERGY OUTLOOK 2014 EARLY RELEASE OVERVIEW (2014), *available at* http://www.eia.gov/forecasts/aeo/er/pdf/0383er (2014).pdf.

25. Conventional wisdom holds that the use of natural gas as an energy source is environmentally more sustainable than burning coal because natural gas burns much cleaner; however, increased scrutiny into natural gas production reveals possible environmental pitfalls that may be associated with natural gas. *See, e.g.*, Suzanne Goldenberg, *Fracking Produces Annual Toxic Waste Water Enough to Flood Washington DC*, GUARDIAN (Oct. 4, 2013, 7:01 EDT), http://www.theguardian.com/environment/2013/oct/04/fracking-us-toxic-waste-water-washington (citing study which found that fracking in America generated 280 billion gallons of toxic waste water, enough to flood all of Washington D.C. beneath a twenty-two foot lagoon of toxic sludge); David Jolly, *French Court Upholds Ban on Hydraulic Fracturing*, N.Y. TIMES, Oct. 12, 2013, at B2 (citing to the European resolve that hydraulic fracturing is not an environmentally sound technique, which forms the basis of France's decision to disallow production of natural gas through this method); Richard Harris, *Natural Gas May Be Easier On Climate Than Coal, Despite Methane Leaks*, NPR (Sept. 16, 2013, 5:55 PM), http://www.npr.org/2013/09/16/223122924/despite-leaks-during-production-natural-gas-still-better-than-coal (citing study that found that methane, which leaks into the atmosphere as a byproduct of natural gas production, could potentially wipe out the positive climatic benefits of natural gas). Moreover, there is increased discussion and concern that the popularization of natural gas production may lead to a lag in the development of more efficient and environmentally sound renewable energies. *See generally* Chirag Rathi, *Will Natural Gas Compete or Coexist with Renewable Power?*, POWER ENGINEERING, Nov. 2012, at 14 (noting that other potentially efficient means of renewable energy have "yet to be even explored"); Donald F. Santa Jr., *Is North American Natural Gas Infrastructure Up to Complementing Wind, Solar?*, NAT. GAS & ELEC., August 2011, at 7, 7 (questioning what the "greater use of renewable energy sources mean[s] for the natural gas industry"); Richard G. Smead, *Natural Gas—Competitor With Renewables, Bridge Fuel, or One of the Gang?*, NAT. GAS & ELEC., Sept. 2009, at 27, 29 (recognizing the "challenge . . . to find a long-term fit for natural gas with the development of alternatives").

26. In 2012, New York Governor Andrew Cuomo came under fire for his energy proposal, which limited the sites of hydrofracking to a few counties, all which are economically depressed. *See* Danny Hakim, *Cuomo Proposal Would Restrict Gas Drilling to a Struggling Region*, N.Y. TIMES, June 14, 2012, at A1. A recent study found that lifting New York's hydraulic fracturing ban could generate $11.4 billion in economic output and help cash-strapped counties. TIMOTHY J. CONSIDINE, ROBERT W. WATSON & NICHOLAS B. CONSIDINE, THE ECONOMIC OPPORTUNITIES OF SHALE ENERGY DEVELOPMENT NO. 9, at 21 (2011), *available at* http://www.manhattan-institute.org/pdf/eper_09.pdf. The counties that would reap the benefits of this policy change have suffered a cumulative loss of forty-eight thousand payroll jobs between 2000 and 2010. *Id.* at "Executive Summary." Despite those potential benefits, in 2014, New York imposed a statewide ban on fracking. Thomas Kaplan, *Cuomo Bans Fracking, Saying Risks Trump Economic Potential*, N.Y. TIMES, Dec. 17, 2014, at A1 (discussing how, after much contention, New York banned hydraulic fracturing in the state).

27. ANTHONY ANDREWS ET AL., CONG. RESEARCH SERV., R40894, UNCONVENTIONAL GAS SHALES: DEVELOPMENT, TECHNOLOGY, AND POLICY ISSUES 2 (2009), *available at* https://www.fas.org/

Myriad others of various sizes and depths dot the landscape underlying some of the country's most populous regions—such as the Delaware River Basin (comprising New York, Delaware, Pennsylvania, and New Jersey), and those long revered for their natural beauty, such as Colorado, Wyoming, and the Great Lakes Region.[29] A frequently referenced Energy Information Agency map of shale plays in the United States locates gas deposits in nearly half of the states in the Union.[30] This abundance might mitigate the effects of climate change by displacing more carbon-intensive coal, and yield enormous wealth for regions sitting on natural gas deposits.

Indeed, some of the poorest regions in the country[31] have begun to cash in on natural gas deposits through fracking, a method of oil and natural gas development that deploys the unconventional mechanism of hydraulic fracturing.[32] Moreover, fracking appears to be everywhere: on private land, federally owned land, state-owned land, and even the ocean floor.[33] Utilizing vertical and horizontal drilling techniques, fracking allows developers economically to extract natural gas from previously unreachable deposits. This technology has revolutionized the energy industry and permanently altered the rural landscape.

Not only is natural gas touted as the savior that will create jobs[34] and deliver Americans from the evils of oil dependence, its proponents argue that natural

sgp/crs/misc/R40894.pdf (noting that of the existing natural gas resources in the United States, shale gas represents a third, or the equivalent of approximately 102 billion barrels of crude oil).

28. *Id.* at 2–3.

29. *Id.* at 3.

30. *Lower 48 States Shale Plays*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/oil_gas/rpd/shale_gas.pdf (last updated Jan. 8, 2015).

31. *See* Derrick Howard, *Hydraulic Fracturing in the Appalachian Basin: Incorporating Environmental Justice to Regulate Natural Resource Exploration*, 7 APPALACHIAN NAT. RESOURCES L.J. 113, 123–26 (2013) (discussing poverty in Appalachia due to coal mining and the introduction of fracking to an already impoverished region); *see also* John MacCormack, *Life on the Shale*, MYSA: SAN ANTONIO'S HOME PAGE (May 1, 2013, 9:44 PM), http://www.mysanantonio.com/news/local_news/article/Life-on-the-Shale-3450563.php (explaining that the shale boom has changed the attitude of young workers in the economically depressed Texas region who were previously looking to move away because of slim opportunities and low wages). In addition, as a result of shale production, many already impoverished communities are saddled with additional social, environmental, infrastructure, and economic costs. The "boom-and-bust" nature of the industry places additional burdens on municipalities, which see their population grow as new enterprise settles in, spurring a greater need for state resources. At the same time, the impermanent nature of the industry jobs means that additional tax revenues cannot be depended upon to cover these additional costs. Susan Christopherson & Ned Rightor, *How Shale Gas Extraction Affects Drilling Localities: Lessons for Regional and City Policy Makers*, 2 J. TOWN & CITY MGMT. 350, 358–61 (2012).

32. See *infra* Part III.D.1 for an explanation of the fracking process.

33. Miyoko Sakashita, *Now They're Fracking California's Oceans?*, HUFFINGTON POST (Jan. 23, 2014, 6:58 PM), http://www.huffingtonpost.com/miyoko-sakashita/now-theyre-fracking-california_b_4046648.html.

34. Prior to the state's ban, a 2011 estimate by the New York State Department of Environmental Conservation put new job creation at between 13,491 and 53,969 including direct and indirect employment impacts. N.Y. STATE DEP'T OF ENVTL. CONSERVATION, FACT SHEET:

gas will cure our climate-change ills by producing "cleaner," more efficient energy.[35] In the long run, this cleaner energy will be the tide that lifts all boats. The country shall prosper as never before, which will mean a boon for the financial markets. More importantly, these vast stores of "clean" energy will allow Americans to continue consuming energy, guilt-free, at the highest rates in the world.[36]

Not so fast.

Natural gas may in fact provide both an economic boon to poor communities and help to reduce carbon emissions in the United States, but the picture is more complex. Some research suggests that relying on fracking as the method for curing climate and economic ills could leave us much worse off, debilitating fragile rural areas,[37] polluting ground water,[38] slowing more

ECONOMIC IMPACTS OF HIGH-VOLUME HYDRAULIC FRACTURING IN NEW YORK STATE (2011), *available at* http://www.dec.ny.gov/docs/materials_minerals_pdf/econimpact092011.pdf.

35. *See* Joe Nocera, Op-Ed., *About My Support for Natural Gas*, N.Y. TIMES, Apr. 16, 2011, at A21 (writing generally about his support for natural gas and stating that natural gas is cleaner than oil); *see also* Jim Inhofe & Carl Levin, Op-Ed*., Fill 'er Up—With Natural Gas*, WALL ST. J., Feb. 28, 2014, at A11 ("Vehicles running on natural gas have cleaner emissions than gasoline-fueled vehicles."); Joe Nocera, Op-Ed., *How to Frack Responsibly*, N.Y. TIMES, Feb. 28, 2012, at A25 ("Fracking's enemies can stamp their feet all they want, but that gas is too important to leave it in the ground."); Joe Nocera, Op-Ed., *Pass the Boone Pickens Bill*, N.Y. TIMES, Apr. 11, 2011, at A25 ("Natural gas is cheaper than oil. It's cleaner. And it's ours."); Suzanne Goldenberg, *US Surpasses Russia as World's Top Oil and Natural Gas Producer,* GUARDIAN (Oct. 4, 2013, 4:13 PM EDT), http://www.theguardian.com/business/2013/oct/04/us-oil-natural-gas-production-russia-saudi-arabia (noting that the United States surpasses Russia as top producer).

36. Christopher Helman, *President Obama Gets It: Fracking Is Awesome*, FORBES (Feb. 12, 2013, 10:32 PM), http://www.forbes.com/sites/christopherhelman/2013/02/12/president-obama-gets-it-fracking-is-awesome/ ("Thanks to fracking, lower natural gas prices already save consumers $100 billion a year . . . . Thanks to fracking, the United States can become not only energy independent of the rest of the world . . . but definitely more energy secure. Fracking saves us money; fracking creates jobs; fracking reduces greenhouse gas emissions. God bless fracking.").

37. The changes in Williston, North Dakota, a so-called fracking boomtown and self-proclaimed "Boomtown, USA," is emblematic of many of the drastic changes taking place in fracking country. *See* Ben Kesling, *Oil Boomtown Williston, N.D., Looks for a Stable Future*, WALL ST. J. (April 1, 2014, 7:51 PM), http://online.wsj.com/news/articles/SB10001424052702304026304579451561009244936. In Williston, so-called man camps have sprouted to house and feed the hundreds of workers who have descended upon the area to work for fracking companies. Women, a scarcity within the community, have also experienced shifts in the sense of safety and security within the community. *A Tale of Two Rushes: There's Gold in Them There Wells*, ECONOMIST, Dec. 21, 2013, *available at* 2013 WLNR 31767768; *see also* Susan Christopherson & Ned Rightor, *The Boom-Bust Cycle of Shale Gas Extraction Economies*, *in* THE ECONOMIC CONSEQUENCES OF MARCELLUS SHALE GAS EXTRACTION: KEY ISSUES, CARDI REPORTS NO. 14, at 4 (Susan Christopherson, ed., 2011) 4, *available at* http://www.greenchoices.cornell.edu/downloads/development/shale/Economic_Consequences.pdf (noting that "[w]hen drilling ceases because the commercially recoverable resource is depleted, there is an economic 'bust'—population and jobs depart the region, and fewer people are left to support the boomtown infrastructure"); *see also* Edna Wheless, *Boom Time; Haynesville Shale Changes Rural Landscape and Lifestyle*, LOUISIANA LIFE, Nov.-Dec. 2009, *available at* http://www.myneworleans.com/Louisiana-Life/November-December-2009/Boom-Time/ (discussing effects of additional trucks and traffic on local community).

38. *See* Stephen G. Osborn, Avner Vengosh, Nathaniel R. Warner & Robert B. Jackson, *Methane Contamination of Drinking Water Accompanying Gas-Well Drilling and Hydraulic*

fundamental energy transformation, and destabilizing the financial markets.[39] According to the research, many of the environmental harms could be irreversible, and the economic harm far-reaching.[40]

The debate over fracking, its benefits, and its risks or harms is not isolated to academic corridors. Recent films, such as *Gasland* and *Promised Land*, point to the dangers associated with fracking and challenge its long-term sustainability.[41] Pro-fracking narratives have also emerged in films such as *Fracknation*, which support fracking as a way out of the energy and economic morass the country now faces.[42] The debate is lively, and at times less than civil.[43] More often than not, the question of which level of government should regulate fracking, state or federal, is the focus.[44]

Within this narrow debate, proponents of federalism argue that states and localities are well suited to regulate fracking. On the other hand, opponents argue, fracking is too important an issue to leave to the states, localities, or industry. Leaving regulation to the states could lead to a race to the bottom. The federal government should move quickly to fill gaps in the existing regulatory framework and regulate fracking in the areas upon which it touches—water and air. In the middle is yet another group of scholars that urges a flexible approach to governance. They argue that an integrated federal and state approach to regulate the fracking industry may give rise to more broad-based solutions that have the buy-in of affected communities.

Fracturing, 108 PROC. NAT'L ACAD. SCI. U.S.A. 8172, 8172 (2011), *available at* http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3100993/pdf/pnas.1100682108.pdf (finding evidence of methane contamination of shallow drinking water in three areas overlying the Marcellus Shale in Pennsylvania and the Utica Shale in New York, which could be caused by fracking); *see also* Kate Galbraith, *California Plans Tighter Control of Fracking, but Not Enough for Some*, N.Y. TIMES, Dec. 14, 2013, at B3 (noting opposition to using fracking in the Monterey Shale, which holds approximately two-thirds of the United States' recoverable shale oil, due to concerns about water and air pollution and earthquakes resulting from the disposal of fracking flowback, as well as opposition to offshore fracking in California).

39. Of particular concern is the potential environmental impact of fracking on land subject to federal mortgages. When landowners lease land to fracking operators, the banks holding mortgages to such land bear the financial risk associated with a potential decline in property value due to environmental degradation. Ian Urbina, *U.S. May Restrict Mortgages on Properties Leased for Oil and Gas Drilling*, N.Y. TIMES, Mar. 19, 2012, at A12.

40. See *infra* Part III.D.4 for a discussion of the potential environmental, social, and economic risks associated with fracking.

41. GASLAND (New Video Group 2010); PROMISED LAND (Focus Features 2012).

42. FRACKNATION (Hard Boiled Films 2013).

43. Anti-fracking protests and arrests have been common in regions facing fracking decisions. Dan Bacher, *In a Drought Emergency, Why Is California Pushing Fracking*, RED, GREEN, AND BLUE, Jan. 25, 2014, *available at* 2014 WLNR 2193167; Molly Born, *Green Groups March Downtown Pittsburgh; Handful Arrested*, PITT. POST-GAZETTE, Oct. 21, 2013, at A1, *available at* 2013 WLNR 26490305; *Protesters Arrested as They Try to Stop 'Fracking' Trucks*, MANCHESTER EVENING NEWS, at 15, Nov. 28, 2013, *available at* 2013 WLNR 29953964.

44. *See, e.g.*, Michael Burger, *The (Re)federalization of Fracking Regulation*, 2013 MICH. ST. L. REV. 1483, 1486 (2013) ("The debate over who should regulate fracking—the federal government or the states—has followed a parallel track to the broader cultural debates."). See *infra* Section IV for an overview of the current debate over fracking regulation.

This Article seeks to expand the lens of the governance debate. It argues that fracking and its regulation are best understood in the much broader context of the current U.S. development moment. The backdrop of the current U.S. development moment is characterized by extremes: extreme poverty, extreme gaps in wealth, extreme challenges to food production,[45] extreme variability within the ecosystem,[46] and extreme civil unrest.[47] At this moment, there is a struggle to create economic development initiatives, like fracking, that do not further exacerbate these extremes. When seen through a development lens, fracking can be understood as more than an isolated method of extracting natural gas; it is connected to a broader narrative regarding the approach to development in this development moment.

Through a development lens, similarities among other development methodologies, such as high-risk mortgage lending or deep-sea drilling, and fracking crystalize. Indeed, all are characterized by a development approach that this Article refers to as "hybridity." Hybridity is a descriptive term that captures the complexity and problematic features of the current approach to development in the United States. Hybridity refers to the mixture of components that comprise the current approach to development. Under a hybridity approach, private actors engage in difficult-to-regulate activities that involve public goods and give rise to systemic risks.

45. Although, according to the U.S. Department of Agriculture (USDA), U.S. farm output "more than doubled between 1948 and 2011, growing at an average annual rate of 1.49 percent," since 1995, the level of food security of Americans, defined by the USDA as when a family is "unable . . . to meet the needs of all their members because they had insufficient money or other resources for food" has steadily risen. In 2012, 14.51% of Americans were identified by the USDA as food insecure, compared with 11.94% in 1995. *Agricultural Productivity in the U.S.,* U.S. DEP'T OF AGRIC., ECON. RESEARCH SERV., http://www.ers.usda.gov/data-products/agricultural-productivity-in-the-us.aspx (last updated June 13, 2014); *Overview: Key Statistics & Graphics,* U.S. DEP'T OF AGRIC., ECON. RESEARCH SERV., http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/key-statistics-graphics.aspx (last updated Jan. 12, 2015) (download chart data for specific numbers). Moreover, the declining global honeybee population could lead to future disruptions in the U.S. food supply. Since 2005, honeybees have been dying at alarming rates. In 2012, the malady, colony collapse disorder, led to the loss of 40 to 50% of the hives required to pollinate fruit and vegetables in the U.S. Nearly one-fourth of the U.S. diet depends on bee pollination, and fewer bees eventually leads to higher food prices. Douglas Quenqua, *Existential Animal News and the World's Lightest Solid*, N.Y. TIMES, Apr. 2, 2013, at D2.

46. NAT'L RES. COUNCIL OF THE NAT'L ACADS., ABRUPT IMPACTS OF CLIMATE CHANGE: ANTICIPATING SURPRISES (2013), *available at* http://www.nap.edu/openbook.php?record_id=18373.

47. The Occupy Wall Street protests and civil unrest in Wisconsin in 2011 and 2012 marked a shift in the American discourse. Occupy Wall Street sparked a national discussion regarding inequality in America; the "99%" became a term that referred to Americans struggling to eke out a living in a society where the "1%" holds the vast majority of wealth. The discussion expanded beyond Wall Street into other cities and became a movement known as "Occupy." The Wisconsin protests against Republican Governor Scott Walker began as a protest against the governor's efforts to limit the bargaining rights of public employees and became the impetus for a national debate regarding the rights of workers. Kate Zernike & Susan Saulny, *Standoffs, Protests and a Prank Call*, N.Y. TIMES (Feb. 25, 2011), http://www.nytimes.com/2011/02/25/us/25states.html?pagewanted=all (noting conflicts in Wisconsin, Ohio, Indiana, Oklahoma, and Tennessee related to the rights of union workers).

Section II of the Article provides the framing. It introduces the development lens that facilitates the pulling together of seemingly disparate events: the financial crisis, the BP oil spill, and fracking. Part II.B then describes the current development moment. Section II ends with an introduction to hybridity: private activity within a regulatory vacuum that regularly touches upon public goods and creates systemic risk.

Section III examines hybridity as an approach to development in the current development moment. Parts III.A–C illustrate the dominant features of hybridity through two recent examples: the financial crisis and the BP oil spill. Part III.D then turns specifically to fracking. After providing an overview of the fracking method of extracting natural gas, Part III.D argues that fracking also fits within a hybrid approach to development.

Section IV argues that locating fracking within the development and hybridity frame should inform our approach to fracking. The Section explores and critiques the regulatory approaches thus far proposed to address gaps in fracking regulation: state regulation, federal regulation, and an emerging, new governance (or experimentalist) approach. It critiques these proposals as too narrowly confined to regulation that is not likely to disrupt the hybridity of fracking. Instead of relying exclusively on regulatory schemes, Parts IV.B–C propose several ways in which the hybridity of fracking might be disrupted, thereby easing the overall risks associated with fracking.

A coherent response to fracking would therefore focus on (1) exposing difficult-to-regulate private actors to the risks of their activities, (2) creating transactions that allow for proportionate risk and benefit sharing among public and private actors to mitigate harm to public goods, and (3) reducing project scale to minimize systemic risks. This conclusion suggests that, on the whole, a regulatory debate alone will not resolve the concerns of fracking, but an exploration of its hybridity may.

II. FRAMING THE CURRENT U.S. DEVELOPMENT MOMENT

This Section situates the current development moment within the context of several historical moments of economic development that are characterized by distinct approaches. These conceptual moments provide a useful frame from which to turn inward and view the current approach to development in the United States. Development is itself a contested term;[48] however, for ease of discussion, this Article adopts a simplified definition of development: to foster economic growth.[49] This definition incorporates the Western orientation of

48. *See, e.g.,* Ruth E. Gordon & Jon H. Sylvester, *Deconstructing Development*, 22 WIS. INT'L L.J. 1, 9–10 (2004) (arguing that "the contemporary concept of development has a quite short history" and began as a political project in the years following World War II).

49. Indeed, development is rooted in a paradigm that relies on a numerical valuation of poverty. For example, the $1.25 a day standard is used by the United Nations to quantify whether an individual lives in poverty. *Millennium Development Goal, Goal 1: Eradicate Extreme Poverty & Hunger*, UNITED NATIONS, http://www.un.org/millenniumgoals/poverty.shtml (last visited Mar. 6, 2015); *see also* JAMES M. CYPHER & JAMES L. DIETZ, THE PROCESS OF ECONOMIC DEVELOPMENT 6 (3d ed.

development, which originated in the United States and has dominated both the discourse and methods of development since World War II.[50]

Part II.A briefly outlines the history of modern development and traces the primary approaches to development since World War II. Part II.B argues that development in the United States is situated against a backdrop of extremes that comprise an immutable development moment. This moment is on par with the unique moments before it and is also characterized by specific approaches to economic growth.

A. Development: A Brief History of Context and Responses

The conceptualization of development in terms of "moments" is familiar within the development literature. In *The New Law and Development*, David Trubek and Alvaro Santos introduce three conceptual moments of development that begin at different points along a historical timeline.[51] This Part highlights the key features of each of Trubek and Santos's development moments.

The Western development clock begins after World War II when Western leaders converged on Bretton Woods, New Hampshire, to develop unified strategies to both govern a war-ravaged Europe and rebuild the continent. Thus, the Bretton Woods agencies—the International Monetary Fund and the International Bank for Reconstruction and Development (the World Bank)—and the United Nations were born, and a new method of global governance emerged.[52] The approach to development in the First Moment is characterized by a strong developmental state, import substitution, and the wholesale exporting of law from north to south.[53]

Over time, less-developed southern nations were incorporated into the evolving global governance framework. These states, identified as impoverished and in need of economic development, were integrated into the international community as subjects of development. In order to enhance the economic engines of poorer southern states, the North relied on rule of law initiatives and the exporting of U.S. legal models, grounded in legal liberalism.[54] Much of this exportation occurred in the postcolonial states of the global South, which were struggling to gain independent economic footing. The process of development

2009) (stating that in 1985, one of every three people in the world—1.1 billion total—were classified as "extremely poor" by the World Bank, based on having less than $1 a day, and that by 2002, 100 million fewer individuals were classified as such).

50. David M. Trubek & Alvaro Santos, *Introduction: The Third Moment in Law and Development Theory and the Emergence of a New Critical Practice*, *in* THE NEW LAW AND ECONOMIC DEVELOPMENT 1 (David M. Trubek & Alvaro Santos eds., 2006) (noting that "it was only after World War II that systematic and organized efforts to reform legal systems became part of the practice of international development agencies" and that "development agencies turned to law as an instrument for state policy aimed at generating economic growth").

51. *Id*. at 2–3.

52. Gordon & Sylvester, *supra* note 48, at 22–30.

53. Trubek & Santos, *supra* note 50, at 5.

54. David M. Trubek & Marc Galanter, *Scholars in Self-Estrangement: Some Reflections on the Crisis in Law and Development Studies in the United States*, 1974 WIS. L. REV. 1062, 1070, 1086 (1974).

was thought necessary to increase state capacity to spur economic growth.[55] It was assumed that more laws, modeled on the U.S. legal system, would bring about greater access to justice, decrease corruption, and ultimately result in prosperity.[56]

The failure to acknowledge the cultural contexts in which legal liberalism was exported proved fatal to the First Moment.[57] An incoherent idea of the complex identity of the developmental state allowed for entrenchment of power by southern elites, and the deepening of poverty for those who lacked access to newly established legal institutions.[58] For these reasons, the development community largely deemed the First Moment a colossal failure.[59] Even those who served as its key architects remained deeply ambivalent and even skeptical of the rule of law development approach during this moment.[60]

The Cold War years marked a break from the strongly state-led approaches to development. Development proponents in the global North deemed the development state inefficient and incapable of leading its own development initiatives, and so, in the 1980s, Western leaders emerged with new sets of ideas to foster economic growth in the global South.[61] The Second Moment began during the Thatcher-Reagan era, and its approach is marked by neoliberalism: a turn to markets to resolve development issues.[62] During this time, neoliberalism, as reflected in the so-called Washington Consensus, gained prominence.[63] Under a neoliberal approach to development, its proponents suggested that private entities and the market, rather than public actors, would expertly and efficiently lead southern states to economic growth.[64]

As the privately led, free-market approach to development became more widely accepted during the Second Moment, southern states appeared no better-off. Indeed, developmental states suffered tremendously during this period.[65] Many postcolonial Latin American and African nations lacked resources to implement state-led development projects, and turned to the Bretton Woods agencies for assistance. Through structural adjustment programs, the development banks conditioned loans to countries on the incorporation of

55. *Id*. at 1073–74.

56. *Id.*

57. *Id.* at 1080–81, 1090.

58. *Id.* at 1083.

59. *Id.* at 1089–93.

60. *See generally id.*

61. Trubek & Santos, *supra* note 50, at 2.

62. *Id.* at 5.

63. *See* Gordon & Sylvester, *supra* note 48, at 44–48.

64. Trubek & Santos, *supra* note 50, at 5–6.

65. *See, e.g.*, Chantal Thomas, *Law and Neoclassical Economic Development in Theory and Practice: Toward and Institutionalist Critique of Institutionalism*, 96 CORNELL L. REV. 967, 1018 (2011) (noting failures of law reform projects due to "repeated, mechanistic and cookie-cutter approaches that fail either because they are resisted by or incompatible with the local context, or because they are manipulated by powerful interests at the expense of the larger population whose social welfare is the nominal goal").

Western property and contract right regimes into their legal systems.[66] The loan programs aimed, in theory, to attract private foreign investors to developing countries based on new, predictable systems of law.[67] The loans proliferated with complex consequences. This development approach also failed to deliver the economic growth promised by neoliberalism. Therefore, many developmental states emerged from the 1990s saddled with debt and with unequal trade and other relationships due to structural adjustment programs.[68]

As described by Trubek and Santos, in the Third Moment, beginning in the early 2000s and extending through the present, neoliberals are chastened; there is a return to state-led projects and a retrenchment of the private; and the development community is engaged in critique.[69] Other, non-Western, critiques have also begun to emerge in the discourse. Scholars from the global South have emerged with "Third World Approaches to International Law," which question the foundations of international law and thus prior approaches to development.[70] Neoliberalism, though still dominant, is largely recognized as a failed approach to development.[71] The voices in this Third Moment also challenge the idea of a linear model of development largely based on a set of assumptions that presupposes limitless growth, a stable environment and resource base, and the advantages of privately led development.[72]

These three development moments are frequently cited to explain the chronology of development since World War II. The approach to development in each moment responds to the particular needs of the moment. For example, in the First Moment, developmental states were thought to be weak. Those engaged in development activity thus focused their efforts on strengthening the state and building institutional capacity. When this approach failed, in the Second Moment, the developmental state receded into the background to make way for private actors. Despite the presence of critique in the Third Moment, private actors are still a dominant presence in the realm of international development. From this broader international framing of Western-led approaches to international development, we turn to the United States.

66. *See* Gordon & Sylvester, *supra* note 48, at 40–41.

67. Trubek & Santos, *supra* note 50, at 6.

68. *See* Gordon & Sylvester, *supra* note 48, at 40–43.

69. Trubek & Santos, *supra* note 50, at 13.

70. *See* Makau Mutua, *What Is TWAIL?*, 94 AM. SOC'Y INT'L L. PROC. 31, 31 (2000) ("The regime of international law is illegitimate. It is a predatory system that legitimizes, reproduces and sustains the plunder and subordination of the Third World by the West.") (footnote omitted).

71. *See, e.g.*, Trubek & Santos, *supra* note 50, at 4–7 (suggesting that new approaches to development emerged after the Second Moment as a reaction to the failures of neoliberal policies).

72. *See, e.g.*, Mutua, *supra* note 70, at 37 (noting that "TWAIL embraces the project of subalternity, in which those who do not fit the frames of Eurocentrism and modernity can be heard and become full participants in their governance"); *see also* Usha Natarajan, *TWAIL and the Environment: The State of Nature, the Nature of State, and the Arab Spring*, 14 OR. REV. INT'L L. 177, 195 (2012) (noting the movement of the Group of 77, a political coalition formed by the seventy-seven states from the global South who demanded "permanent sovereignty over natural resources as part of its effort to break away from colonial patterns of resource exploitation").

B. The U.S. Development Moment

In large part, the United States is excluded from the foregoing development discourse as a *subject* of development. However, just as it is for "developing" countries, economic growth is a critical theme in U.S. policy. The country is arguably now engaged in its own development moment.

New economic, governance, and development issues have converged to create a new paradigm of risk and development.[73] Features of this moment include a destabilized middle class, socioeconomic inequality, challenges with respect to sustained and equitable economic growth, and extreme weather events that have the potential to disrupt and displace entire communities. The economic challenges are often traced to 2008, when the Western development gaze turned inward.

Much of the scholarship and popular media coverage of the 2008 financial crisis focuses on its aftereffects. Although the financial crisis created a shock and prompted a soul-searching regarding regulatory failures, for many years the question of America's decline had lurked in the background.[74] The middle class has long suffered from a number of policies that have raised concern regarding the long-term security of families; for those at the bottom, avenues to ascend the socioeconomic ladder are rapidly disappearing. This instability in the bottom 99% of the country is in stark contrast to the extraordinary gains in wealth at the top.[75] Indeed, as economist Robert J. Gordon argues with respect to the country at large, it has become increasingly difficult to generate wealth given that much of America's wealth resulted from one-time events, such as the discovery of fossil fuels.[76] This limitation on potential economic growth is a feature of the current development moment.

In addition to the economic difficulties of this U.S. development moment, the United States is also grappling with unique climatic challenges. Recent years have revealed troubling climate trends. These trends include unprecedented and record-breaking weather patterns, including drought, flooding, and powerful tornadoes. Such trends may affect the country's ability to feed itself or keep

73. Trubek & Santos, *supra* note 50, at 4.

74. Robert J. Gordon, *Is U.S. Economic Growth Over? Faltering Innovation Confronts the Six Headwinds* 1 (Nat'l Bureau of Econ. Research, Working Paper No. 18315, 2012) (commenting that "[t]he prospects for future long-run U.S. economic growth were already dismal in 2007 but were little noticed in the continuing euphoria over the invention of the Internet and the related developments in information technology and communications").

75. Chrystia Freeland, *Looking for Capitalism's Tipping Point*, N.Y. TIMES (May 17, 2013), http://www.nytimes.com/2013/05/17/us/17iht-letter17.html?_r=0 (noting that "one of the big economic facts of our time is the surge of income disparity, particularly between those at the very top and everyone else").

76. *See* Gordon, *supra* note 74, at 1–2 (arguing that economic growth since 1750 was the result of three industrial revolutions: (1) the inventions between 1750 and 1830 of the steam engine, cotton spinning, and railroad; (2) the inventions between 1870 and 1900 of electricity, the internal combustion engine, and running water with indoor plumbing; and (3) the computer and Internet revolution that began around 1960 and reached its apex in the late 1990s).

citizens safe.[77] They also add to the already unstable development backdrop of extremes, which renders choices about best approaches to economic development increasingly difficult.

Deepening social and economic inequality, a declining middle class, limitations to economic growth, and uncertainty with respect to ecology are features of the current U.S. development moment. These features create the background against which development approaches are formulated. The foregoing background features are also arguably immutable; without substantial and aggressive policy innovations directed at their root causes, we cannot easily change them. In this new landscape, the field of development is more complex, more layered. The primary development actors are less easily classified as public or private, and the narratives associated with the First, Second, and Third Moments of development are not easy fits; the United States appears to be in unchartered waters of development.

Moreover, in this development moment the risks associated with development appear exacerbated, more global, and systemic. For example, economic shocks in one part of the globe ripple through markets worldwide. Damaging environmental activities affect peoples on the opposite end of the planet. Yet, current methods of development appear to be happening haphazardly, disconnectedly, and in isolation. Fracking is one such method. These seemingly isolated development efforts share common threads. They fall within an approach to development in this moment that this Article calls "hybridity."

III. HYBRIDITY: AN APPROACH TO DEVELOPMENT

This Article introduces a new term into the development lexicon: hybridity. If the context of the current development moment is characterized by extremes, hybridity is the extreme approach to development utilized with frequency in this moment. Like developmental state capacity building in the first development moment and neoliberalism in the second, hybridity is the dominant approach to development in the current moment.[78] Under a hybrid approach, private actors are engaged in economic development activity with little to no oversight or regulation. Many of the transactions engaged in during this development moment also entail a great amount of systemic financial, social, and environmental risk, while yielding ever fewer benefits.[79] In sum, risky, unregulated, and complex technologies are deployed by private actors utilizing

77. *See, e.g.*, Carmen G. Gonzalez, *Climate Change, Food Security, and Agrobiodiversity: Toward A Just, Resilient, and Sustainable Food System*, 22 FORDHAM ENVTL. L. REV. 493, 511 (2011) (discussing food security and how extreme weather patterns can affect global food supplies).

78. See *supra* Part II.A for a discussion of the policies associated with the three development moments.

79. *See* Gordon, *supra* note 74, at 16–18 (noting that among the six "daunting headwinds that will limit future potential growth" are rising inequality and efforts to cope with carbon emissions in the face of a declining environment).

public goods, transacting within opaque or nonexistent regulatory frameworks, and creating systemic risk. This is hybridity.

Hybridity has long been used as a critical and disruptive term to describe complex phenomena that are not easily explained, or to pull together disparate ideologies.[80] In this Article, hybridity is introduced as a part of the development lexicon to describe a prevalent approach to development during the current U.S. development moment. This approach pulls together aspects of private autonomy and public power, and involves a complexity that breeds systemic risk.

Parts III.A and III.B explain the key features of hybridity—(1) private activity within a regulatory vacuum, (2) private activity that pervasively touches upon public goods, and (3) systemic risk—as reflected through two recent events, the financial crisis of 2008 and the BP oil spill. Part III.C then turns to fracking specifically and argues that it also reflects a hybrid approach to development.

A. Hybridity: Private, Poorly Regulated Activity

With hybridity, the regulatory structure is often thin, if it even exists at all. Development subject to a hybridity approach often involves novel technology. Indeed, the technology of the activity makes it appear *prone* to a lack of regulation. Industry insiders supply regulators to regulate the industry, provide regulators with a regulatory framework, or the industry is expected to regulate itself. The financial crisis and the BP oil spill provide apt examples. Each industry eluded regulation due to the complexity and sophistication of the technologies deployed therein.

1. The Financial Crisis – A Regulatory Crisis

The financial crisis involved the use of novel financial technology that had developed beyond the capacity of the U.S. financial regulatory system. In the lead up to the financial crisis of 2008, mortgage originators—banks—made loans to borrowers whose credentials normally would not suggest creditworthiness.

80. The term "hybridity" has also recently emerged within several streams of legal scholarship. Within the global pluralism literature, hybridity is used to locate the governed in a frame of overlapping legal orders. Paul Schiff Berman, *Global Legal Pluralism*, 80 S. CAL. L. REV. 1155, 1164 (2007) (using "hybridity" to describe the multiple legal regimes to which an individual may be subject); Brian Z. Tamanaha, *Understanding Legal Pluralism: Past to Present, Local to Global*, 30 SYDNEY L. REV. 375, 403 (2008) (using "hybridity" to describe the complexity of individuals within a governance framework). New governance scholars have also utilized the term to describe a marriage of competing ideologies, how individuals and institutions experience governance, and how governance methodologies (both international and domestic) operate. David M. Trubek, Patrick Cottrell & Mark Nance, *"Soft Law," "Hard Law," and European Integration: Toward a Theory of Hybridity* 4 (University of Wisconsin Law School Legal Studies Research Paper Series Paper No. 1002, Nov. 2005), *available at* http://ssrn.com/abstract=855447 (describing the mix of hard and soft law as hybridity). Within the area of energy law, hybridity both describes and prescribes mechanisms for governance and innovation surrounding the country's most pressing energy issues. *See* Hari M. Osofsky & Hannah J. Wiseman, *Dynamic Energy Federalism*, 72 MD. L. REV. 773, 840–43 (2013) [hereinafter Osofsky & Wiseman, *Dynamic Energy Federalism*] (defining hybrid institutions as those "that combine authority from more than one source, whether as a formal or informal part of their structure or governance process").

The banks overcame these credit limitations by providing so-called liar loans to individuals with high-risk profiles.[81] With "liar loans," documentation that might provide information about a borrower's risk profile was simply not provided. The information required was inadequate or simply nonexistent.[82] What is well known now is that this limited documentation process led to the proliferation of risky loans, known as subprime mortgages.[83]

The interest rates on subprime mortgages were also problematic. Borrowers were initially enticed into mortgages by low, but adjustable, mortgage rates. These rates would eventually balloon, making the borrower's ability to pay difficult, if not impossible. Given that many of the borrowers provided with liar loans were low-income individuals, once the mortgage interest rate on the loan was adjusted to the market, borrowers were unable to meet their monthly mortgage obligations, and eventually defaulted. The potential for this occurrence was widely known and understood *within* the industry, and the banking industry developed a mechanism to avoid carrying the risk.

The mechanism involved a complex set of players and multiple processes. Mortgage originators that initiated the loans to high-risk borrowers immediately sold the loans to other banks.[84] The receiving bank then securitized the mortgage by slicing the income stream from the mortgage into multiple income streams and combining these individuated income streams with other income streams. The process, known in the industry as securitization,[85] was designed to minimize the risk associated with any particular loan by combining it with other

81. *See* Skip Kaltenheuser, *A Letter from Washington*, IBA GLOBAL INSIGHT, no. 3, 2011, at 12, 12 (noting that "in 2006 between a quarter and a half of home loans were 'liars' loans,' for which the great majority involved fraud" and, moreover, banks "supplied the overwhelming number of lies"); Richard E. Mendales, *Collateralized Explosive Devices: Why Securities Regulation Failed to Prevent the CDO Meltdown, and How to Fix It*, 2009 U. ILL. L. REV. 1359, 1394 (2009) (defining liar loans as those in which "mortgage originators did not ask for, or did not review, their borrowers' documentation and winked at incredible representations of ability to pay"); David A. Super, *A New New Property*, 113 COLUM. L. REV. 1773, 1845 (2013) (describing "liar mortgages" as one of the key factors exacerbating the financial crisis of 2008).

82. JOSEPH E. STIGLITZ, FREEFALL: AMERICA, FREE MARKETS, AND THE SINKING OF THE WORLD ECONOMY 78 (2010) (discussing "no-doc" mortgages that required little to no reporting of income or assets prior to approval).

83. *See* Daniel Lindsey, *Prevent People from Wrongfully Losing Their Homes*, CBA REC., Oct. 2007, at 38 (describing subprime mortgage loans as "high-cost loans marketed to homeowners with impaired credit" and that the "expansion of these products has been equally aggressive as lenders have pushed into ever more exotic territory: stated income loans, interest-only mortgages, option ARMs. . . . [which] invite[s] fraud"). Lindsey further notes that "subprime lending rose from a modest $35 billion in 1994 to over $600 billion in 2006." *Id.*

84. STIGLITZ, *supra* note 82, at 79 (describing the way in which mortgage originators had incentives to originate as many mortgages as they could, and that "[t]he securitization process supported never-ending fees, the never-ending fees supported unprecedented profits, and the unprecedented profits generated unheard-of bonuses, . . . [which] blinded the bankers").

85. *See* FINANCIAL CRISIS INQUIRY COMM'N, THE FINANCIAL CRISIS INQUIRY REPORT: FINAL REPORT OF THE NATIONAL COMMISSION ON THE CAUSES OF THE FINANCIAL AND ECONOMIC CRISIS IN THE UNITED STATES, 543 (2011) (defining "securitization" as the "[p]rocess of pooling debt assets such as mortgages, car loans, and credit card debt into a separate legal entity that then issues a new financial instrument or security for sale to investors").

loan products and into mortgage pools and so-called collateralized debt instruments.[86] Unfortunately, the banks did not properly track the risks contained in the combined instruments.[87] Even more unfortunate, the Federal Reserve, the agency in charge of regulating mortgage-lending standards, did not properly set lending standards.[88] Further, the securities ratings agencies, charged with the public mandate of informing the trading public of risks with securities instruments, failed to identify the risks associated with the securitized mortgages.[89] Finally, the banking industry spent billions to secure its position as an unregulated industry heavily embedded within the American political system.[90]

The foregoing lending activity was conducted in the name of development. In the current widespread efforts to bring to account the private actors who took extraordinary risks within the public sphere, this perspective is sometimes lost. Indeed, some narratives describing the lead up to the financial crisis point to specific efforts by the George W. Bush administration to bring more low- and middle-income Americans into the so-called ownership society.[91] These Americans suffered immensely under the Bush administration's economic policies, and providing a promise of home ownership—made possible by increasing the liquidity in markets—would presumably placate a restive population, generate increased overall wealth, and lead to economic growth.[92] Unfortunately, rather than force the banks to privatize their risks by deploying regulatory mechanisms that increased the transaction costs of their activities, the banks were permitted to socialize their risk. The consequences of this policy choice were far-reaching.

2. Deep-Sea Drilling – Regulatory Capture

The deep-sea drilling regulatory narrative mirrors the financial crisis. Prior to the April 20, 2010, explosion aboard the *Deepwater Horizon* oil rig that resulted in the deaths of eleven people and untold environmental and social harm to the fragile Gulf of Mexico region, regulation of offshore drilling had not

86. *See id.* at 539 (defining "collateralized debt obligations" as a "[t]ype of security often composed of the riskier portions of *mortgage-backed securities*").

87. As the National Commission on the Causes of the Financial and Economic Crisis in the United States notes, the risky mortgages were everywhere. "Trillions of dollars in risky mortgages had become embedded throughout the financial system, as mortgage-related securities were packaged, repackaged, and sold to investors around the world," which led to global exposure to financial risk. *Id.* at xvi.

88. *Id.* at xvii.

89. *See id.* at 43–44, 118 (discussing the difficulty ratings agencies had with rating bundled securities, and that investment banks paid the ratings agencies to obtain favorable ratings).

90. *See id.* at xviii (noting that between 1999 and 2008, the financial industry spent $2.7 billion to lobby politicians, and individuals within the industry spent more than $1 billion in political campaign contributions).

91. *See* RAGHURAM G. RAJAN, FAULT LINES: HOW HIDDEN FRACTURES STILL THREATEN THE WORLD ECONOMY 37 (2010).

92. *See id.* at 43 (noting that providing access to credit was a way to mitigate perceived inequality).

kept apace with the technology.[93] The technology utilized in *Deepwater Horizon* was largely untested at the depths deployed in the rig; the regulation and enforcement of such technology was also lacking.[94] Moreover, as subsequent government-sponsored analyses of the spill reveal, the industry had also fallen prey to regulatory capture.[95]

Many of these failings were structural. As described in the 2011 report to the President—issued by the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling—the Minerals Management Service, the federal agency charged with overseeing oceanic drilling, was also created to expand the industry, an inherent conflict of interest.[96] Moreover, deepwater drilling technology and the changing nature of the drilling industry outpaced regulations.[97] Thus, the agency could not properly oversee, manage, and enforce the risks of the industry. As documented by the task force that reported on the *Deepwater Horizon* explosion and subsequent spill, this inability to regulate proved fatal.[98]

B. Hybridity: Engagement with Public Goods

In the field of economic development, engagement with public goods is not a new phenomenon. Indeed, many extractive industries require water and other natural resources for their operations. With respect to hybridity, however, actors are not merely utilizing a public good, they are relying on public goods in a pervasive manner. Hybridity is not isolated to a particular region, it is ubiquitous. The riskiness of the enterprise makes this ubiquity particularly problematic.[99] Moreover, the lack of regulation and sophisticated attenuation of risk deployed by such actors exacerbates the potential harm that may arise from

93. NAT'L COMM'N ON THE BP DEEPWATER HORIZON OIL SPILL AND OFFSHORE DRILLING, DEEP WATER: THE GULF OIL DISASTER AND THE FUTURE OF OFFSHORE DRILLING, REPORT TO THE PRESIDENT vii (2011) [hereinafter BP COMM'N].

94. Heidi Gorovitz Robertson, *Applying Some Lessons from the Gulf Oil Spill to Hydraulic Fracturing*, 63 CASE W. RES. L. REV. 1279, 1280 (2013) (noting that "regulation and enforcement had not kept pace with the advances in technology" in the field of deep-sea drilling).

95. BP COMM'N, *supra* note 93, at 28 (noting that federal oversight of the oil drilling industry "followed the philosophy of 'minimum regulation, maximum cooperation,'" and that close relationships between government and industry led to a lack of accountability); *see also* Robertson, *supra*, note 94, at 1281 (noting conflict between the Minerals Management Service and the industry "that made it virtually impossible for the agency to function rationally to prevent the disaster").

96. BP COMM'N, *supra* note 93, at 56.

97. *Id.* at 73.

98. *Id.* (discussing how the inherent tension between the environmental protection mandate and drive for energy independence led to a regulatory lapse); *see also* Robertson, *supra* note 94, at 1286 (discussing the conflict among the Minerals Management Service's leasing, revenue collection, and permitting functions and noting that "the agency . . . would not have the incentive to make sound leasing or enforcement decisions that might be in conflict with its revenue-raising goals").

99. *See* Hannah Wiseman, *Fracturing Regulation Applied*, 22 DUKE ENVTL. L. & POL'Y F. 361, 365 (2012) (noting that fracturing expands the familiar risks associated with drilling, such as the risk that "fluids and muds may spill on the surface of well pads, produced water may spill during transfer or leak from a surface pit," and "[i]mproperly cased wells may also leak methane at the drilling stage, causing methane to migrate into soil and water sources" because it "enable[es] more development").

reliance on a public good. With hybridity, private actors become free riders in this tragedy of the commons scenario, whereby none of the actors is incentivized to mind the greater commons even as it diminishes.[100]

With hybrid development, private actors *go big* in order to increase a return.[101] This requires more engagement with public resources, which ultimately creates more risk.[102] This analogy appears no more apt than in the context of our two hybrid development examples.

1. Undermining the Financial Market

The second feature of hybridity, routine engagement with public goods, features prominently in the financial crisis example. The economic theory literature treats public goods as goods that are (1) nonrival and (2) nonexcludable.[103] Nonrival means that the enjoyment of the good by one party does not infringe on another person's ability to enjoy it (national defense is often cited as an example).[104] Nonexcludable means that one party's enjoyment of the good does not infringe on another party's enjoyment (again, national defense provides a good example).[105] From an environmental perspective, air, water, and space fall within the definition of public goods. Arguably, the term applies to the financial market. The financial market is nonrival, in that persons may freely participate in the market without infringing on another party's right to enjoy it. Moreover, it is nonexcludable, meaning that one person's engagement with the market does not limit another person's ability to engage in market activity. The financial crisis devastated the financial market, one of the most precious public goods in the global economy.

The risky, unregulated activity that led to the financial crisis greatly diminished the financial markets by reducing confidence in the integrity of the markets.[106] Individuals could no longer trust that the companies, markets, and industries in which they were investing were not infected by the toxic mortgage

100. Finance scholar Steven L. Schwarcz has explored this phenomenon in the context of financial regulation. *See* Steven L. Schwarcz, *Systemic Risk*, 97 GEO. L.J. 193, 197–98 (2008) (arguing that systemic risk should be regulated because within the context of the financial market, none of the market participants has an incentive to limit risk taking to decrease the systemic dangers to other market participants and third parties).

101. Iman Anabtawi & Steven L. Schwarcz, *Regulating Systemic Risk*: *Towards an Analytical Framework*, 86 NOTRE DAME L. REV. 1349, 1378–79 (2011) (noting that, "[n]ot surprisingly, then, when past financial crises recede in memory, investors always 'go for the gold,' in the sense of seeking higher rates of return in lieu of protection from risk").

102. *See* Sara Gosman, *Reflecting Risk: Chemical Disclosure and Hydraulic Fracturing*, 48 GA. L. REV. 83, 88 (2013) (noting that the scale of chemical activity accompanying the modern fracking boom raises questions regarding long-term environmental and health effects).

103. *See, e.g.*, Justin M. Ross, *What Should Policy Makers Know When Economists Say "Market Failure?"*, 14 GEO. PUB. POL'Y REV. 27, 30 (2009) (discussing classic economic definition of public goods).

104. *See* Arunan Arulampalam, Note, *Obamacare's Co-ops: The "Charter Schools" of Healthcare*, 17 QUINNIPIAC HEALTH L.J. 105, 114–15 (2013).

105. *Id*.

106. See *supra* Part III.A.1 for a discussion of the 2008 financial crisis.

instruments of the subprime mortgage industry. In a sense, the market seemed damaged beyond repair.

Hundreds of pension and retirement funds had invested heavily in the financial markets, leading to the disappearance of the nest eggs of millions of Americans literally overnight.[107] Also, given that private parties—in this case managers within the banking industry—have no duty to remedy public harms, the government emerged to stop the bleeding. In its efforts to restabilize the financial markets and to reassure consumers that the markets were once again safe, the government—the taxpayers writ large—bailed out the banking industry. The bailout led to the greatest transfer of wealth ever witnessed in the history of the United States[108] and incalculable damage to the public.

2. BP: Utilizing the World's Most Ubiquitous Public Good

For three months, the world watched via live streaming video nearly five million gallons of oil gush into the Gulf of Mexico, an already fragile ecosystem damaged by decades of drilling.[109] The Gulf's waters serve as a planetary resource and provide a key foundation to the livelihoods of millions of people living along the Gulf Coast. The effects of the spill reverberated through the oceans, affecting marine life, water quality, and the public's access to clean water; but perhaps even more devastatingly, the spill altered the cultural and economic life within the region—both of which rely on the health of the Gulf—for the foreseeable future.[110]

One year after the disaster, Louisiana shrimpers reported significant dips in the volume of shrimp. Some shrimpers even ventured that the season immediately following the spill might have been the worst in memory.[111] Two years after the disaster, scientists indicated that most of the oil in the Gulf had evaporated, had been consumed by bacteria, or had dispersed in the deep Gulf water.[112] The Gulf's resiliency notwithstanding, real concerns remain, and

107. Danny Hakim, *Cities Borrow from Pensions to Pay for Them*, N.Y. TIMES, Feb. 28, 2012, at A1 (noting losses to pension funds in the 2008 financial crisis); *see also* Gretchen Morgenson, *New York Looks into Banks' Role in Fiscal Crisis*, N.Y. TIMES, May 17, 2011, at A1.

108. Joseph Stiglitz makes this point in *Freefall: America, Free Markets, and the Sinking of the World Economy*, "As I anticipated when the bailouts began, *this has turned out to be one of the largest redistributions of wealth in such a short period of time in history*." STIGLITZ, *supra* note 82, at 200; *see also* Gretchen Morgenson, *Enriching the Few at the Expense of Many*, N.Y. TIMES, Apr. 10, 2011, at B1.

109. BP COMM'N, *supra* note 93, at x.

110. *See* Leslie Kaufman, *Gulf Studies Yield More than Damage*, N.Y. TIMES, Apr. 12, 2011, at D1 (stating that while scientists are examining data to understand the impact of the spill, the complexity of the Gulf ecosystem makes exact calculations difficult); David Segal, *Should the Money Go Where the Oil Didn't?*, N.Y. TIMES, Oct. 24, 2010, at BU1 (noting the spill affected areas even where oil did not make landfall); Stephen Teague, *Shirking Responsibility in the Gulf*, N.Y. TIMES, July 31, 2013, at A21 (noting that thousands of low-wage workers have struggled to make ends meet after the spill).

111. Campbell Robertson, *Gulf Shrimp Are Scarce This Season; Answers, Too*, N.Y. TIMES, Oct. 10, 2011, at A16.

112. Editorial, *The Big Spill, Two Years Later*, N.Y. TIMES, Apr. 18, 2012, at A26.

scientists recognize that "oil has poisoned Louisiana's salt marshes and wetlands, which are vital fish nurseries, and visibly damaged deep-sea coral."[113]

Moreover, the true toll on the Gulf and its complex marine environment may not be known for many years.[114] At the three-year mark, the Gulf was still suffering the effects of the spill. Although BP had already paid $14 billion in cleanup costs and $6.3 billion in damages to various individuals and businesses (with $7.8 billion pledged and foreseeable damages under the Oil Pollution Act and Clean Water Act),[115] environmental groups, including the Environmental Defense Fund, the National Audubon Society, the Lake Pontchartrain Basin Foundation, the Gulf Restoration Network, and the Sierra Club said, in a statement, "Three years later, the oil spill is still a living disaster with ongoing effects, many of which will remain unknown for decades to come."[116]

C. Hybridity: Systemic Risk

As hinted at above, hybridity also entails a great deal of unchecked risk. These created risks routinely flow through to third parties, including the public. With the financial crisis, firms' individually risky behavior led to a cumulative systemic risk. As Professor Schwarcz describes economic systemic risk, it is

> the risk that (i) an economic shock such as market or institutional failure triggers (through a panic or otherwise) either (X) the failure of a chain of markets or institutions or (Y) a chain of significant losses to financial institutions, (ii) resulting in increases in the cost of capital or decreases in its availability, often evidenced by substantial financial-market price volatility.[117]

In other words, one failure within a connected web of institutions or a system can lead to a chain reaction.

1. The Financial Crisis: Systemic Risk in the Financial System

In *Regulating Systemic Risk*, Professors Anabtawi and Schwarcz go beyond the definitional question of systemic risk to the issue of regulating it, and argue that the underlying causes of systemic risk must be addressed in order to regulate it. They theorize that the causes of systemic risk relate to two correlations: (1) a low-probability event, and (2) a failure to recognize the interconnectedness of the financial system.[118] This systemic risk was certainly realized through the

113. *Id.*

114. *Id.*

115. *Id.*; *see also* Kevin McGill, *BP Is Liable for Clean Water Act Damages from Gulf Oil Spill, Appeals Court Reaffirms,* HUFFINGTON POST (Jan. 6, 2015, 5:59 AM), http://www.huffingtonpost.com/2014/11/06/bp-liable-gulf-spill_n_6115430.html (discussing the Fifth Circuit's opinion in *In re Deepwater Horizon*, 739 F.3d 790 (5th Cir. 2014), which upheld the certification of a class of plaintiffs suing BP for its involvement in the *Deepwater Horizon* oil spill).

116. Richard Thompson, *BP Oil Spill Trial Continues as Demonstrators Note Upcoming 3-Year Anniversary of Disaster*, NOLA.COM (Apr. 16, 2013, 7:03 PM), http://www.nola.com/news/gulf-oil-spill/index.ssf/2013/04/bp_oil_spill_draws_demonstrato.html.

117. Schwarcz, *supra* note 100, at 204.

118. Anabtawi & Schwarcz, *supra* note 101, at 1353.

domino effect of the crisis, but Anabtawi and Schwarcz suggest that unsuspecting financial institutions laid the foundation of the financial crisis by engaging in incrementally risky behavior. These institutions inadequately accounted for the impact of low-probability events, such as widespread defaults on risky mortgages; moreover, the institutions were unaware of the linkages among firms who were engaged in risky lending activity or doing business with such lenders. As Anabtawi and Schwarcz describe, "In under-appreciating their interconnections to other institutions, financial market participants take on socially excessive risk levels that increase the fragility of the financial system."[119]

A second, less-obvious, and perhaps under-recognized, risk created by the transactions was the risk that entire communities would become blighted and devastated by a cascade of foreclosures. The blight that resulted from the foreclosures rocked communities, leading to a diminishment of the tax base and losses to public services. The destabilization of the financial markets also made it difficult for small businesses to stay afloat. The markets were skittish, and the biggest of the bailed-out banks became squeamish about lending. Thus, communities across the United States were doubly affected by the financial crisis. First, the foreclosures created by subprime mortgage defaults led to blight; and second, the disinvestment by businesses unable to obtain capital to meet business needs, including hiring employees, deepened unemployment. The fabric within the interconnected web of community and capital began to fray.[120]

2. BP: Systemic Risk in a Complex System

In the words of the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling (Commission), the entire enterprise that led to the *Deepwater Horizon* explosion was "dazzling"; at the time of the explosion, the *Deepwater Horizon* was already drilling the Macondo oil well beneath five thousand feet of Gulf of Mexico water and from there, over thirteen thousand feet under the sea floor to the oil reservoir below.[121] The mile of seawater separating the ocean floor from the *Deepwater Horizon* exists as part of the most ubiquitous public good known to man—the ocean. Although the seas have always been a resource for private parties, deep-sea drilling marks a change: the depth and complexity of deep-sea drilling increase the overall risk of failure of the operation. Indeed, the Commission made several important conclusions regarding risk and complexity.

The study concludes: "Deepwater energy exploration and production, particularly at the frontiers of experience, involve risks for which neither industry nor government has been adequately prepared, but for which they can

119. *Id.* at 1355.

120. Indeed, as the Financial Crisis Inquiry Report notes, the home is the cornerstone of stability in America. It is a "building block of community and social life . . . . Homes are the foundation upon which many of our social, personal, governmental, and economic structures rest. . . . [From schools to public services,] [d]ownturns in the housing industry can cause ripple effects almost everywhere." FINANCIAL CRISIS INQUIRY COMM'N, *supra* note 85, at 4.

121. BP COMM'N, *supra* note 93, at viii.

and must be prepared in the future."[122] Moreover, citing the investigation of the *Columbia* space shuttle disaster of the 1980s, the Commission notes, "complex systems almost always fail in complex ways."[123]

In March of 2008, BP purchased rights to drill the Mississippi Canyon Block 252, a nine-square-mile plot in the Gulf of Mexico.[124] The Macondo was to be its first well under the new lease with the Minerals Management Service, for which BP paid a little bit over $34 million.[125] The structure of the operation was complex. Although BP was the operator for activities on Block 252, it neither owned nor operated the rigs responsible for the drilling enterprise. A group of specialized contractors would do the work of drilling the well, following the design specifications of BP's Houston-based engineering team.[126] The web of complexity became even denser, as BP used the *Deepwater Horizon* rig, which was owned by a separate company, Transocean, to drill the Macondo well.[127] Yet another company, Halliburton, was responsible for ensuring proper casing of the well. As the Commission concludes, the cumulative risk resulting from errors across the public and private actors responsible for the rig became so great that the risk of catastrophic blowout was realized.[128] The root cause of the explosion was systemic, "rooted in systemic failures by industry management," namely, poor communication and coordination among the multiple actors responsible for the well.[129]

According to the Commission, the accident was avoidable. The ripple effects of the disaster were immediate. Local businesses immediately suffered from cancelled reservations and decreased business.[130] Dead birds and other marine wildlife washed ashore covered in oil.[131] And, perhaps the most painful domino to fall, a culture reliant on the health of the fragile Gulf ruptured.[132]

D. Fracking in the Gray Zone

Fracking presents a classic example of the development approach of hybridity in the current U.S. development moment. Fracking is not simply a method of extracting gas; it is economic development activity. It is undertaken

122. *Id.* at vii.

123. *Id.* at viii (internal quotation marks omitted).

124. *Id.* at 89.

125. *Id.*

126. *Id.* at 92.

127. *Id.*

128. *Id.* at 115.

129. *Id.* at 122.

130. *See id.* at 155 (explaining the impact of the BP oil spill on a business that coordinated weddings on the Gulf Coast).

131. *Id.* at 173–75 (noting that President Obama referred to the BP oil spill as the "worst environmental disaster America has ever faced"; effects on animals and marine life throughout the water column and entire ecosystem are still being measured).

132. *See id.* at 163 (noting the demise of an oyster distributor that had been continuously operating for 134 years after the oil spill—one of many businesses impacted by the oil spill according to the Commission).

by private entities, subject to a patchwork regulatory framework, and it contains many of the unwieldy features of both the financial crisis and the BP oil spill that give rise to systemic risk. Fracking should be located within a larger theoretical framework of increasingly risky development that incorporates the features of hybridity. This Part explores this assertion beginning with an overview of the fracking methodology.

1. A Fracking Primer

Hydraulic fracturing, or fracking, involves the injection of a combination of water, chemicals, and sand into the earth to release natural gas. The natural gas subject to this state-of-the-art drilling process is also sometimes referred to as "unconventional" or "tight." The gas is found "in geologically complex, nonconventional reservoirs such as tight (low-permeability) sands, gas-bearing shales and coalbeds."[133] Extracting this unconventional gas requires an unconventional means, such as hydraulic fracturing.[134]

Fracking drills can run vertically for thousands of feet, and horizontally for several thousand feet. Multiple wells can also be drilled from a single well pad. Once the drilling of a well is complete, a proprietary cocktail of chemicals and sand is pumped into the well at high pressures, "which pushes through perforations in the horizontal well bore, fracturing the shale and releasing the natural gas for recovery."[135] After the fracking process, the fracking fluid, known as "flowback" or "produced water," returns to the surface.[136]

For some communities, the fracking process has produced a set of particularly problematic environmental, social, and economic outcomes, and the harmful potential effects of fracking have already been realized.[137] The trillions

133. Kathryn J. Brasier et al., *Residents' Perceptions of Community and Environmental Impacts from Development of Natural Gas in the Marcellus Shale: A Comparison of Pennsylvania and New York Cases*, J. RURAL SOC. SCI., no. 1, 2011, at 33 n.1, *available at* http://www.ag.auburn.edu/auxiliary/srsa/pages/Articles/JRSS%202011%2026/1/JRSS%202011%2026%201%2032-61.pdf

134. *Id.* at 32–33.

135. Nancy D. Perkins, *The Fracturing of Place: The Regulation of Marcellus Shale Development and the Subordination of Local Experience*, 23 FORDHAM ENVTL. L. REV. 44, 48–49 (2012).

136. *Id.*

137. *See* Daniel Gilbert, *Exxon Chief Joins Lawsuit Raising Ruckus Over Fracking*, WALL ST. J., Feb. 21, 2014, at B1 (stating that even Exxon CEO does not want fracking-related water towers near his home); *see also* TONY DUTZIK, ELIZABETH RIDLINGTON & JOHN RUMPLER, ENVIRONMENT NORTH CAROLINA RESEARCH & POLICY CENTER, THE COSTS OF FRACKING: THE PRICE TAG OF DIRTY DRILLING'S ENVIRONMENTAL DAMAGE 1, 25 (2012), *available at* http://www.wral.com/asset/news/state/nccapitol/2012/09/20/11571598/The_Costs_of_Fracking_vNC.pdf (examining costs to clean up air and water pollution and road damage in Pennsylvania, Arkansas, and Colorado, ranging from $109,000 to $265 million per instance evaluated); Kevin Begos, *4 States Confirm Water Pollution from Drilling*, USA TODAY (Jan. 5, 2014, 5:20 PM), http://www.usatoday.com/story/money/business/2014/01/05/some-states-confirm-water-pollution-from-drilling/4328859/ (concluding after an examination of complaints concerning drilling-related water pollution that "hundreds of complaints have been made about well-water contamination from oil or gas drilling, and pollution was confirmed in a number of them"); Dan Boyce, *Booming Oil Fields May Be Giving Sex Trafficking a Boost*, NPR (Feb. 1, 2014, 4:55 AM), http://www.npr.org/2014/02/01/265698046/booming-oil-fields-may-be-giving-sex-trafficking-a-boost (quoting a Montana law enforcement official on the way the oil field boom

of cubic feet of natural gas stored in the various shale deposits around the country make fracking more than a blip on the development screen. [138] Indeed, fracking is already proving to be game changing.[139]

2. Fracking as Hybridity: Opacity Within a Regulatory Vacuum

Of the legal critiques of fracking that have emerged, the dearth of a proper regulatory mechanism is perhaps the most common.[140] Currently, no comprehensive regulatory regime exists.[141] The private aspects of fracking allow fracking developers to avail themselves of the trade secret protections of private law, even as their activities routinely affect the public.[142] This opacity induces anxiety in communities debating whether to permit or ban fracking. This Part explores the origins of these regulatory challenges, and concludes that the nature of fracking, like deep-sea oil drilling and the suite of technologies deployed before the 2008 financial crisis, makes it difficult to regulate.

With respect to location, fracking occurs on all types of land. It occurs on federal, Native American, state, and private lands.[143] To get access to these

boosts sex trafficking: "[Montana Department of Justice, Division of Criminal Investigation Administrator Bryan] Lockerby knows the oil boom in his state and in neighboring North Dakota means economic opportunities for organized crime. 'Guns, drugs, prostitution—all of that goes hand in hand,' he says."); Cathy Dyson, *Activists Shine Light on Fracking*, FREDERICKSBURG.COM (Nov. 27, 2014, 4:19 PM), http://www.fredericksburg.com/news/activists-shine-light-on-fracking/article_91e95d1d-f527-58de-98a6-79bb72c3e845.html (discussing impact of fracking on a West Virginia town and the efforts of activist groups to expose the deterioration in the town's quality of life); Paul Thares, *Oil & Gas Development: The Effects on Community Development (Part 3),* IGROW (June 19, 2013), http://igrow.org/community-development/communities/oil-gas-development-the-effects-on-community-development-part-3/ (discussing loss of available pool of workers, housing shortages, damage to roads, increased traffic).

138. U.S. ENERGY INFO. ADMIN., NO. 03883, ANNUAL ENERGY OUTLOOK 2014 WITH PROJECTIONS TO 2040, at 23 (2014), available at http://www.eia.gov/forecasts/aeo/pdf/0383(2014).pdf (estimating that there was 9.7 trillion cubic feet of shale gas produced in 2012).

139. Timothy Fitzgerald, *Frackonomics: Some Economics of Hydraulic Fracturing*, 63 CASE W. RES. L. REV. 1337, 1346 (2013) (noting that the increase in the domestic natural gas reserve base has sometimes been referred to as the "natural gas revolution") (internal quotation marks omitted).

140. *See* David B. Spence, *Federalism, Regulatory Lags, and the Political Economy of Energy Production*, 161 U. PA. L. REV. 431, 434–35 (2013) (discussing current regulatory debate).

141. This may be exacerbated by the fact that fracking is permitted on state, federal, Native American, and private land. In fact, one fracking operation may encompass a combination of public and private lands. See *infra* note 143.

142. *See* Powder River Basin Res. Council v. Wyoming Oil & Gas Conservation Comm'n, 320 P.3d 222, 225–28 (Wyo. 2014) (providing an example in which a fracking company opposed regulations that required disclosure of fracking compounds by invoking trade secret protections).

143. *See* James William Gibson, *Fracking Boom in North Dakota Has Heavy Impact on Native Americans*, ECOWATCH (Dec. 6, 2012 12:12 pm), http://ecowatch.com/2012/12/06/fracking-impacts-native-americans/ (noting the presence of fracking on Native American land); *see also* Katharine Q. Seelye, *Gas Drillers Invade Hunters' Pennsylvania Paradise*, N.Y. TIMES, Nov. 12, 2011, at A12 (noting the presence of fracking on state land); Mark Drajem, *Scaled-Back U.S. Fracking Rule Draws Qualified Praise*, BLOOMBERG (May 17, 2013, 12:00 AM), http://www.bloomberg.com/news/2013-05-16/fracking-on-federal-lands-said-to-get-scaled-back-rule-proposal.html (noting the presence of fracking on federal lands); Dyson, *supra* note 137 (noting the presence of drilling on private land).

lands, private gas companies contract with public entities, such as state or federal agencies, or private individuals,[144] to obtain access to land for drilling. In addition to the standard drilling permit required to commence drilling operations, some municipal and state governments have added an additional step, requiring developers to obtain permits or to go through a public hearing process prior to drilling activity.[145] Other states and localities permit developers to approach landowners directly and initiate the fracking process purely through a private contractual process.[146] In yet another variation, developers desiring to drill on federal, state, or Native American land are subject to specific requirements based on the type of land on which drilling activity is proposed.[147] Given that fracking can occur virtually anywhere, absent an explicit restriction, comprehensive regulation is challenging at best. A veritable patchwork quilt of regulation thus emerges.[148]

Fracking benefits from what is commonly referred to as the Halliburton Loophole.[149] Oil and gas are typically regulated at the state level, but the oil and gas industry lobbied hard for exemptions from several key federal laws, including: (1) the Safe Drinking Water Act, which mandates federal regulation of underground injection activities to protect ground water; (2) the Resource Conservation and Recovery Act, a comprehensive regulatory framework for managing hazardous waste; and (3) the Emergency Planning and Community Right-to-Know Act, which was enacted to regulate the storage, release, and

144. Fracking may also involve a split lease, wherein a private owner leases access to a developer to extract federally owned minerals. Fracking companies typically enter into lease arrangements and agree to provide either a flat payment or royalty payments to the lessor in connection with the lease. During the lease term, the companies engage in the process of natural gas extraction. *See* ANDREWS ET AL., *supra* note 27, at 27–30 (discussing fee and leasing arrangements between landowners and drillers).

145. *See* 58 PA. CONS. STAT. § 3211(b) (2014) (requiring drillers in Pennsylvania to provide notice to surrounding municipalities, landowners, and lessees, who have fifteen days to contest the well, and include proof of that notice in their permit application); Eleanor Black, *Fracking Makes Its Debut in Illinois Under Strictest Regulatory Laws in the US*, DAILY ILLINI (Oct. 24, 2013), http://m.dailyillini.com/news/local/article_ccff98ce-3c55-11e3-8440-001a4bcf6878.html?mode=jqm (noting that Illinois requires pre- and post-drilling water testing to qualify for permits).

146. *See* Ian Urbina, Jeremy Ashkenas & Jo Craven McGinty, *Drilling Down: Oil and Gas Leases*, N.Y. TIMES, http://www.nytimes.com/interactive/2011/12/02/us/oil-and-gas-leases.html (last visited Mar. 6, 2015) (providing a collection of 111,000 private oil and gas contracts in Texas, New York, Pennsylvania, Ohio, and West Virginia).

147. *See* NAT'L PARKS CONSERVATION ASS'N CTR. FOR PARKS RESEARCH, NATIONAL PARKS AND HYDRAULIC FRACTURING: BALANCING ENERGY NEEDS, NATURE, AND AMERICA'S NATIONAL HERITAGE 27 (2013), *available at* http://www.npca.org/assets/pdf/Fracking_Report.pdf (explaining that Bureau of Land Management must consult with National Park Service if drilling is near national parks); *see also Qs&As About Oil and Gas Leasing*, U.S. DEP'T OF THE INTERIOR BUREAU OF LAND MGMT., http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/questions_and_answers.html (last updated July 10, 2012) (outlining the Bureau of Land Management process for obtaining leases on federal land).

148. NATHAN RICHARDSON, MADELINE GOTTLIEB, ALAN KRUPNICK & HANNAH WISEMAN, RESOURCES FOR THE FUTURE, THE STATE OF STATE SHALE GAS REGULATION 87–88 (2013) (noting regulatory heterogeneity among the thirty-one states examined in study).

149. *See* Editorial, *The Halliburton Loophole*, N.Y. TIMES, Nov. 3, 2009, at A28.

transfer of hazardous and toxic chemicals.[150] Moreover, the sheer scope and complexity of fracking activity, where each operator uses a different combination of chemicals in small amounts,[151] make it an uneasy fit within any number of existing chemical disclosure regimes.[152] Although fracking is subject to the discharge provisions of the Clean Water Act (CWA),[153] which govern the discharge of fracking water to surface waters,[154] the oil and gas industry is exempted from the CWA's provisions concerning storm runoff.[155] Thus, an operator of an oil or gas construction, exploration, processing, and treatment facility is under no obligation to minimize contamination of soil or sediment washed away by storm water collected or conveyed within its operations.[156] The substantial regulatory gaps and opacity concerning the chemicals used in the fracking process raise concerns. The nation's environmental watchdog, the Environmental Protection Agency (EPA), is currently in the process of conducting a comprehensive study of fracking's potential impacts on drinking water.[157] The EPA has compiled several reports on its findings, the latest of which was released in July 2014, but more reports and articles based on the study's findings are expected.[158] While awaiting more findings, the states are attempting to regulate, with mixed results.

Fracking states have taken markedly different approaches to fracking, resulting in a mash-up of inconsistent regulatory regimes. Approaches vary widely. For example, North Dakota and West Virginia view fracking as an

150. *See generally* ADAM VANN, BRANDON J. MURRILL & MARY TIEMANN, CONG. RESEARCH SERV., R43152, HYDRAULIC FRACTURING: SELECTED LEGAL ISSUES 1, 5–8, 9–13, 20–22, 24 (2014), *available at* http://fas.org/sgp/crs/misc/R43152.pdf (discussing fracking and the Safe Drinking Water Act; Clean Water Act; Resource Conservation and Recovery Act; Comprehensive Environmental Response, Compensation, and Liability Act; Emergency Planning and Community Right-to-Know Act; and Toxic Substances Control Act).

151. *See* Gosman, *supra*, note 102, at 140 n.388 (citing *Chemical Use in Hydraulic Fracturing*, FRACFOCUS, http://fracfocus.org/water-protection/drilling-usage (last visited Mar. 6, 2015), which states that "[a] typical fracture treatment will use very low concentrations of between 3 and 12 additive chemicals").

152. *Id*. at 112–13 (noting that the "nature of the chemical activity" associated with fracking "poses a fundamental challenge to" the Emergency Planning and Community Right-to-Know Act (enacted to inform the public about chemical risk); the Toxic Substances Control Act (enacted to govern the production and use of toxic chemicals); and the Safe Drinking Water Act (concerning the injection of fluids underground)).

153. 33 U.S.C. §§ 1251–1387 (2012).

154. ANDREWS ET AL., *supra* note 27, at 34.

155. *Id*. at 36.

156. *Id*.

157. *See EPA's Study of Hydraulic Fracturing for Oil and Gas and Its Potential Impact on Drinking Water*, U.S. ENVTL. PROTECTION AGENCY, http://www2.epa.gov/hfstudy (last updated Feb. 5, 2015).

158. *EPA's Study of Hydraulic Fracturing and Its Potential Impact on Drinking Water Resources: Published Scientific Papers*, U.S. ENVTL. PROTECTION AGENCY, http://www2.epa.gov/hfstudy/published-scientific-papers (last updated Feb. 5, 2015) (listing all of the scientific reports published by the EPA since 2013).

opportunity and have thus taken a permissive view of fracking.[159] North Dakota has even set aside $1 million in a fund to fight against EPA efforts to regulate fracking.[160] Pennsylvania has also taken a particularly permissive view of fracking.[161] In 2010, drilling companies were issued roughly 3,300 Marcellus gas-well permits in Pennsylvania, an astronomical increase from the 117 permits issued in 2007.[162] In New York and Vermont, however, the approach has been more cautious. In 2010, New York's then-Governor David Patterson placed a moratorium on fracking to study its impacts.[163] Four years later, Governor Andrew Cuomo announced a state-wide ban on fracking.[164] Vermont has banned the practice outright as well.[165]

The local is also implicated. At the local level, cities and towns with shale deposits beneath them have faced both community and industry pressure to make way for fracking. The interests at play create a complex picture. Fracking cannot happen unless local zoning laws permit it, and some states have taken steps to preempt local authority. Pennsylvania provides one example of the tensions playing out between local and state authorities. In a bold move, in 2011 the Pennsylvania state legislature passed legislation that preempts local ordinances that regulate gas well operations.[166] A portion of the Pennsylvania legislation provided that local land-use ordinances "shall allow for the reasonable development" of the Marcellus Shale.[167] In the winter of 2013, the Supreme Court of Pennsylvania overturned this provision,[168] but there appears to be a wider trend developing.[169] In another pro-fracking state, West Virginia, efforts by the City of Morgantown to prohibit fracking were thwarted by the

159. Joshua P. Fershee, *The Oil and Gas Evolution: Learning from the Hydraulic Fracturing Experiences in North Dakota and West Virginia*, 19 TEX. WESLEYAN L. REV. 23 (2012).

160. *Id.* at 32.

161. Newly elected Governor of Pennsylvania, Tom Wolf, recently proposed a five-percent tax on all natural gas drilling in the Marcellus Shale to fund Pennsylvania schools. Joel Mathis, *Wolf Proposes Gas-Drilling Tax*, PHILA. MAG. (Feb. 11, 2015, 12:41 PM), http://www.phillymag.com/news/2015/02/11/wolf-proposes-gas-drilling-tax/?utm_source=iContact&utm_medium=email&utm_campaign=EDIT:%20News&utm_content=P.M.+News+2%2F11%2F15.

162. Ian Urbina, *Regulation Lax as Gas Wells' Tainted Water Hits Rivers*, N.Y. TIMES, Feb. 27, 2011, at A1.

163. Mary Esch, *NY "Fracking" Ban: Governor David Paterson Orders Natural Gas Hydraulic Fracturing Moratorium for Seven Months in New York*, HUFFINGTON POST (May 25, 2011, 6:20 PM), http://www.huffingtonpost.com/2010/12/13/ny-fracking-ban-david-paterson_n_795730.html.

164. Kaplan, *supra* note 26 (discussing the recently passed ban on fracking in New York State).

165. VT. STAT. ANN. tit. 29, § 571 (2015) ("(a) No person may engage in hydraulic fracturing in the State. (b) No person within the State may collect, store, or treat wastewater from hydraulic fracturing.").

166. *See* Perkins, *supra* note 135, at 45–46 (citing to challenged provision of Act 13 of 2012, a statute amending the Pennsylvania Oil and Gas Act).

167. *See id*. at 46.

168. *See* Robinson Twp. v. Commonwealth, 83 A.3d 901, 982 (Pa. 2013) (overturning the preemption provision based on the public trust doctrine).

169. *See, e.g.*, Fershee, *supra* note 159, at 31 (explaining how state legislatures in New York and North Dakota have recently battled with municipalities over regulatory control of hydraulic fracturing).

Monongalia County Circuit Court, which stated that the state "[l]egislature explicitly set forth a comprehensive framework for the application for oil well permits" and thus the City of Morgantown lacked the ability to "impose a complete ban on fracking or to regulate oil and gas development and production."[170] The New York Court of Appeals recently held that localities could amend zoning laws to prohibit fracking.[171] These efforts highlight the extraordinarily disparate approaches states have taken in an effort to fill in, or simply leave open, the regulatory gaps.

Capitalizing on these regulatory absences, the industry has moved quickly to involve local communities in the permitting process, to engage state officials in the law-making process, and to argue that no federal oversight is needed. The result is clear. Fracking resides in the gray zone of development. Despite recent local, state, and federal efforts, fracking remains lightly regulated and fragmented at best.[172]

Another regulatory challenge arises with respect to the nature of fracking developers. They are private entities. This private label inures the developers with certain characteristics and privileges. Of course, as an initial matter, these entities are chartered for profit. Whether publicly held or privately held, fracking companies exist for the benefit of shareholders, which makes profit maximization paramount.[173] This shareholder primacy can also lead to risk taking that harms the greater public.[174]

Second, this private characterization allows developers to avoid disclosure of the chemicals utilized in the fracking process. The disclosure issue presents one of the key gaps in regulatory oversight. The chemicals, called "proppants," keep the shale fissures propped open while gas is released.[175] There is currently

170. Northeast Natural Energy, LLC v. City of Morgantown, No. 11-C-411, 2011 WL 3584376, *8–9 (W. Va. Cir. Ct. Aug. 12, 2011); *see also* David Giller, Comment, *Implied Preemption and Its Effect on Local Hydrofracking Bans in New York*, 21 J.L. & POL'Y 631, 651 (2013) (noting that the West Virginia Oil and Gas Act was held by West Virginia's Monongalia County Circuit Court to preempt local action).

171. Wallach v. Town of Dryden, 16 N.E.3d 1188 (N.Y. 2014); *see* Kate Taylor & Thomas Kaplan, *New York Towns Can Use Zoning to Prohibit Fracking, State's Top Court Rules*, N.Y. TIMES, July 1, 2014, at A16 (analyzing the court's decision and the impact it has on the ability of localities to regulate fracking); *see also* Kaplan, *supra* note 26 (discussing Governor Cuomo's December 2014 decision to impose a statewide fracking ban in New York).

172. *See* Elizabeth Burleson, *Cooperative Federalism and Hydraulic Fracturing: A Human Right to a Clean Environment*, 22 CORNELL J.L. & PUB. POL'Y 289, 308 (2012) (noting that "[f]ragmented federal provisions still address limited unconventional gas development").

173. *Cf.* Lynn A. Stout, *Why We Should Stop Teaching* Dodge v. Ford, 3 VA. L. & BUS. REV. 163 (2008) (bringing into question the commonly held view that corporations exist to maximize shareholder value).

174. *See, e.g.*, Dan Awrey, William Blair & David Kershaw, *Between Law and Markets: Is There a Role for Culture and Ethics in Financial Regulation?*, 38 DEL. J. CORP. L. 191, 195 (2013) (noting that "the existing governance arrangements within financial institutions in many jurisdictions directly or indirectly (to differing degrees) give primacy to the financial interests of shareholders and, thereby, create incentive structures which reward opportunistic behavior and socially excessive risk-taking").

175. *Oilfield Glossary: Proppant*, SCHLUMBERGER, http://www.glossary.oilfield.slb.com/en/Terms.aspx?LookIn=term%20name&filter=proppant (last visited Mar. 6, 2015).

no federal requirement that companies disclose the contents of the chemical mixture injected into the ground, and fracking companies have fought to maintain the secrecy of the chemicals utilized in the fracking process.[176] As private entities, fracking companies have the right to argue for trade secret protection, and have found great success utilizing this strategy. In some states, some limited disclosure is required,[177] but this is generally ex post facto, after the damage has been done or healthcare services are required.[178] Companies argue that the ex ante disclosure of the composition would amount to disclosure of proprietary information and thus undermine their market advantage.[179] Thus, the engagement in fracking by private actors creates an unintended regulatory gap.

Finally, the fracking industry contains a small cast of repeat players.[180] The specialization of these five or six companies has increased barriers to entry for

176. VANN ET AL., *supra* note 150, at 20.

177. For example, the Wyoming Oil and Gas Conservation Commission requires disclosure of "the chemical additives, compounds and concentrations or rates *proposed* to be mixed and injected." 3 WYO. CODE. R. § 45(d) (LexisNexis 2014). This disclosure requirement notwithstanding, the owner or operator may assert that the information is proprietary, limiting the right of the public to access the information. *See* Keith B. Hall, *Hydraulic Fracturing: Trade Secrets and the Mandatory Disclosure of Fracturing Water Composition,* 49 IDAHO L. REV. 399, 412 (2013) (noting that companies have frequently sought such protection).

178. A sampling of the nine early adopters of disclosure requirements reveals a trend of limited disclosure: Arkansas (list of proposed products and chemicals due before fracking, updated list due after; limited disclosure of proprietary information to healthcare professionals and regulators); Colorado (list due within sixty days of fracking activity; limited disclosure of proprietary information to healthcare professionals and regulators); Louisiana (list due within twenty days of well completion; disclosure of chemical family required, but not specific chemical names); Michigan (list of Material Safety Data Sheets containing limited information on hazardous chemicals due within sixty days of drilling completion; no disclosure of proprietary information to regulators or public); Montana (list due before and after fracking; disclosure of chemical family required, and proprietary chemicals to healthcare providers in emergency); Ohio (Material Safety Data Sheet listing products' chemical components due sixty days after drilling is complete; not disclosed to regulators or public); Pennsylvania (list due within thirty days of well completion; disclosed to regulators and available to public on request to Department of Environmental Protection); Texas (disclosure within thirty days after well completion, with some variation on deadlines; no disclosure of trade secret information unless required by the attorney general or court); and Wyoming (list due before and after fracking; disclosed to the supervisor of the Wyoming Oil and Gas Conservation Commission, but not to the public). *Fracking Chemical Disclosure Rules*, PROPUBLICA (Feb. 16, 2012, 2:44 PM), http://www.propublica.org/special/fracking-chemical-disclosure-rules; *see also* Hall, *supra* note 177, at 408 (discussing seventeen states that have adopted rules regarding disclosure).

179. *See* Hall, *supra* note 177, at 406.

180. *See* Fitzgerald, *supra*, note 139, at 1354 (noting that Halliburton, Schlumberger, BJ, and Sanjel enjoy "prominent positions," and that Halliburton, Schlumberger, and BJ have a seventy-five percent market share for the high-pressure pumps used in fracking); *see also* Laurel Brubaker Calkins, *Halliburton, Schlumberger Accused in Fracking Price Suit*, BLOOMBERG (Aug. 2, 2013, 12:01 AM), http://www.bloomberg.com/news/2013-08-01/halliburton-schlumberger-accused-in-fracking-price-suit.html (discussing an investigation of Halliburton, Co., Shlumberger Ltd., and Baker Hughes Inc. by the U.S. Department of Justice for anticompetitive practices, and stating that the "three companies are the largest publicly trading fracking service providers and jointly control about 60 percent of the U.S. market"). Given the diversity of services involved in the fracking process, determining exact market share of the various players is difficult; however, the top developers are well known.

other players, meaning that the cost of beginning a fracking company—obtaining the proper know-how, experts, and technology—is now so high that new developers may resist entry into the field. The result is well documented throughout highly specialized industries that utilize a small group of expert players (deep-sea drilling and the financial industry come to mind). Although there are certainly benefits and efficiencies built into organizational structures that use a close network of key, repeat players, as the technology of the field advances,[181] regulation becomes increasingly difficult because only a few expert players possess industry-specific knowledge. Those charged with regulating the industry thus call upon the industry to regulate itself, resulting in regulatory capture.[182]

3. Fracking as Hybridity: Reliance on a Public Good

Fracking involves one of the most precious of public resources—water. Fracking both requires significant amounts of water and poses significant danger to the water table. A single fracking treatment may consume more than 500,000 gallons of water,[183] and a well undergoing several fracking treatments can consume millions of gallons of water.[184] The water is either trucked or piped to the site. To give an idea of scale, an Olympic-size swimming pool can hold approximately 660,000 gallons of water, and the average annual per capita consumption of water in the United States is 522,000 gallons.[185] By any measure, this consumption level outpaces the rate of replenishment, which is troubling given the climatic instability facing many regions.

The water resource issue is of particular concern in Texas, the location of the Barnett and Eagle Ford shale plays. Over the past two years, the Ogallala Aquifer has faced extraordinary strain under the weight of the third worst

181. *See, e.g.*, Tyler Welti, CBD v. BLM*, BLM's Revised Proposed Regulations, and the Thorny Way Forward for Fracking*, 43 ENVTL. L. REP. NEWS & ANALYSIS 10550, 10551 (2013) (discussing *Center for Biological Diversity v. Bureau of Land Management*, 937 F. Supp. 2d 1140, 1144 (N.D. Cal. 2013), where the court held that the Bureau of Land Management's environmental impact statement failed to consider properly the impact of fracking "when used in combination with technologies such as horizontal drilling" and noting that the pace and density of fracking were at issue in the case and similar fracking challenges).

182. *See* Evan Bush, *U.S. Advisory Group on Fracking Has Abundant Ties to Energy Industry*, CTR. FOR PUB. INTEGRITY (May 19, 2014, 12:19 PM), http://www.publicintegrity.org/2011/08/10/5683/us-advisory-group-fracking-has-abundant-ties-energy-industry (explaining that scientists sought to oust former CIA chief and director of energy companies from energy panel); *see also* Brian Grow, Joshua Schneyer & Anna Driver, *Energy Firm Uses 'Land Grabs' to Secure Fracking Rights from Reluctant Landowners*, NBC NEWS (Oct. 2, 2012, 8:36 AM), http://investigations.nbcnews.com/_news/2012/10/02/14183177-energy-firm-uses-land-grabs-to-secure-fracking-rights-from-reluctant-landowners ("Energy companies and their executives are the dominant contributors to the election campaigns of railroad commission members and candidates, according to a Reuters review of Texas Ethics Commission data.").

183. ANDREWS ET AL., *supra* note 27, at 24.

184. *Id.*

185. *Id.*

drought in Texas since 1895.[186] The region is undergoing a transformation from a semiarid climate to a desert.[187] This rapid desertification raises serious questions about the sustainability of fracking, particularly in light of the needs of the local population.

Communities in the Delaware River Basin, home to New York City and other cities in the eastern United States, have also raised alarm bells regarding the use and potential contamination of their water supply.[188] The fracking process destabilizes the geologic environment where shale deposits exist, which increases risks to groundwater. For example, in the Marcellus Shale region, the same process that led to the layers of deposit of rock and shale has kept gas confined beneath the surface and prevented the natural seepage of gas to the surface.[189] The fracking process intentionally brings gas to the surface by drilling wells through overlying aquifers, which poses danger to groundwater. An adequately designed and cased well properly prevents fracking fluids from leaking into the groundwater supply, but as recognized by researchers at the Congressional Research Service, an improperly constructed and cased well could "allow contaminated water to flow from the ground surface and enter the water well, possibly compromising the quality of drinking water in the well and even the drinking water aquifer itself."[190] In addition, fluids spilled on the ground

186. The Ogallala Aquifer, also known as the High Plains Aquifer, is "one of the world's largest underground sources of freshwater," underlying the states in the middle of the country from South Dakota to the northwestern edge of Texas. Jim Malewitz, *In Drought Ravaged Plains, Efforts to Save a Vital Aquifer*, PEW CHARITABLE TRUSTS (Mar. 18, 2013), http://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2013/03/18/in-drought-ravaged-plains-efforts-to-save-a-vital-aquifer. For many decades, the aquifer has faced decline due to farming activities overlying the aquifer. In some parts of Kansas and Texas, the aquifer has "declined as much as 200 feet." *Id.* Although the ongoing drought in the region has certainly contributed to the decline, the emergence of fracking has raised fears within the farming community about the longevity of the resource. *Id.; see also* Manny Fernandez, *Drought Takes Its Toll on a Texas Business, a Town and Its Families*, N.Y. TIMES, Feb. 28, 2013, at A12 (describing how drought "has dried up pastures and increased the costs of hay and feed, forcing some ranchers to sell off their herds to reduce expenses"); Bob Port, *Fracking's Thirst for Water: Investors Warned of the Hidden Financial Risks*, BLOOMBERG (Feb. 6, 2014), http://www.bloomberg.com/news/2014-02-06/fracking-s-thirst-for-water-investors-warned-of-the-hidden-financial-risks.html (noting that "fracking becomes a big factor locally when it competes in a dry landscape, because the process tends to foul and remove water from the earth's natural cycle of replenishment").

187. *See, e.g.*, Joe Romm, *James Hansen Is Correct About Catastrophic Projections for U.S. Drought if We Don't Act Now*, THINKPROGRESS (May 13, 2012, 3:50 PM), http://thinkprogress.org/climate/2012/05/13/483247/james-hansen-is-correct-about-catastrophic-projections-for-us-drought-if-we-dont-act-now/ (defending assertions that the semiarid region from North Dakota to Texas could be permanently altered by drought).

188. *See Delaware River Basin Commission: Battleground for Gas Drilling*, STATEIMPACT, http://stateimpact.npr.org/pennsylvania/tag/drbc/ (last visited Mar. 6, 2015); Eliza Griswold, *Situation Normal All Fracked Up*, N.Y. TIMES, Nov. 20, 2011, at MM44 (noting animal deaths, black faucet water, corrosion of home appliances that use water, and the smell of rotten eggs and diarrhea in tap water in the Amwell Township of Pennsylvania).

189. ANDREWS ET AL., *supra*, note 27, at 26.

190. *Id.*

during the fracking process could seep into the groundwater,[191] which is problematic in Pennsylvania and New York, where superficial and highly permeable aquifers are present.[192]

Frack operators may also discharge flowback to surface waters if such discharge poses no violation to water standards, or alternatively, the produced water may be injected back into the earth.[193] As discussed, these activities are not regulated, and given that little is known about the exact composition of fracking chemicals, these activities may also pose significant risks to groundwater.

Hybrid development methods rely heavily, if not exclusively, on public goods for success. This relationship with public goods, coupled with a lack of comprehensive regulation, leads to risks that are unchecked and often systemic.

4. Fracking as Hybridity: Systemic Risk

The risks of fracking fall into three primary categories: environmental, social, and economic. In reality, these are not distinct categories; they overlap, bleed into and affect each other. For example, environmental risks create economic risks for communities, drillers, and possibly the banks holding the mortgage for leased property. Both environmental and economic risks lead to social risks for entire communities that rely on a stable environment and economy. These linkages are addressed below.

a. Environmental Risk

As to environmental harm, the risks of diminishing the water table and affecting soil are of central concern. The rate of water consumption required to sustain fracking operations outpaces the natural rate of replenishment.[194] As discussed, this raises particular concern in Texas and other water-poor regions. Once the water leaves the water table, it is lost forever.[195] The risk is not limited to the environment; it is also economic.

The potential loss of a reliable water source poses significant risks to the communities where fracking takes place. Such communities are largely rural and depend on water not just for daily life, but also to sustain and maintain economic activity that predated shale development. In this way, these communities face

191. *See* David A. Dana & Hannah J. Wiseman, *A Market Approach to Regulating the Energy Revolution: Assurance Bonds, Insurance, and the Certain and Uncertain Risks of Hydraulic Fracturing*, 99 IOWA L. REV. 1523, 1543 (2014) (citing to the New Mexico Oil Conservation Division's list of "Cases Where Pit Substances Contaminated New Mexico's Ground Water," a list of over 450 cases).

192. ANDREWS ET AL., *supra* note 27, at 26.

193. *Id.* at 34.

194. See *supra* notes and accompanying text 183–85 for a discussion of the amount of water used in a single fracking treatment.

195. Jacques Leslie, *High Noon at the Ogallala Aquifer*, SALON (Feb. 1, 2001, 3:00 PM), http://www.salon.com/2001/02/01/water_texas/ (explaining that the Ogallala Aquifer holds water "sealed underground for hundreds of thousands of years. Once it's used, it's gone forever.").

both the environmental risk of water depletion, and the additional social and economic risks associated therewith, including the loss of the means to farm.[196]

Moreover, a recent study produced by a group of Duke professors at Nicolas School of the Environment indicated "systematic evidence for methane contamination of drinking water associated with shale-gas extraction."[197] The group analyzed the groundwater in sixty-eight private wells and pointed to four risks: (1) gas and water discharge to aquifers due to fracking activities, including high-pressure injection of fracking fluids into wells; (2) toxicity and radioactivity of produced fracking water, which contains a mix of fracking fluid and saline formation waters; (3) explosive and asphyxiation hazard associated with natural gas; and (4) the reliance by rural communities on shallow groundwater.[198] The study ends with a word of caution and raises concerns regarding the "important environmental risks accompanying shale-gas exploration worldwide."[199]

The basic definition of systemic risk in the financial context could be analogized to the systemic risk concerns that relate to fracking. For example, ground water contamination in the Ogallala Aquifer in Texas could cause serious ripple effects throughout the state, and potentially the country. The aquifer is the lifeblood of rural and urban communities in the state and surrounding states.[200] Rural communities rely on the aquifer for drinking needs, farming, and raising livestock. Although Austin and Houston rely on other regional aquifers for water,[201] population growth in the state has placed groundwater resources under strain.[202] These cities, and the people and businesses in them, contribute vital tax dollars to public coffers. Any scenario involving a fresh water scare might lead to an out-migration of communities, or worse: pressure on surrounding communities or states to ensure the needs of a water-deprived community were met.

196. *See* Julia Haggerty, Patricia H. Gude, Mark Delorey & Ray Rasker, *Long-Term Effects of Income Specialization in Oil and Gas Extraction: The U.S. West, 1980–2011*, 45 ENERGY ECON. 186, 193–94 (discussing study on oil and gas and their long-term economic effects); *see also Ask Farm Aid: A Lot of Farmers in My Area Are Leasing Their Land for Hydraulic Fracturing—Is it Good or Bad? What Do Farmers Say?*, FARM AID (June 2011), http://www.farmaid.org/site/apps/nlnet/content2.aspx?c=qlI5IhNVJsE&b=2723877&ct=10863325 (describing the negative effects from fracking noted by farmers, such as cows drinking contaminated water and dying, as well as cattle quarantined after drinking wastewater).

197. Osborn et al., *supra* note 38, at 8172.

198. *Id.*

199. *Id.*

200. Kate Galbraith, *Ogallala Aquifer in Texas Panhandle Suffers Big Drop*, STATEIMPACT (May 22, 2013, 2:52 PM), http://stateimpact.npr.org/texas/2013/05/22/ogallala-aquifer-in-texas-panhandle-suffers-big-drop/. See *supra* note 186 and accompany text for a discussion of the Ogallala Aquifer.

201. PETER G. GEORGE, ROBERT E. MACE & RIMA PERTOSSIAN, REPORT 380, AQUIFERS OF TEXAS, 3–4 (July 2011), *available at* http://www.twdb.state.tx.us/publications/reports/numbered_reports/doc/R380_AquifersofTexas.pdf.

202. Phil Magers, *Analysis: Texas Cities Seek Water Options*, UNITED PRESS INT'L (Aug. 19, 2004, 6:59 PM), http://www.upi.com/Business_News/Security-Industry/2004/08/19/Analysis-Texas-cities-seek-water-options/53841092956358/ (citing population growth as adding to strain on water resources).

For a more concrete example, we can also look to the state of Colorado, a fracking state, where access to fresh water is of increasing concern. The state has already begun to tighten its regulatory approach to water use in light of fracking,[203] and the cost of water in Colorado has also limited farmers' ability to access desperately needed resources.[204] Damage to its groundwater could exacerbate the current strain facing its communities. The groundwater damage scenario has the potential to cause the domino effect common with systemic risk.

Unfortunately, given the low probability of such an occurrence, the risk is minimized and not properly "priced" by fracking developers.[205] This, coupled with the failure to recognize the potential interconnectedness of a potential groundwater shock, makes it politically difficult to regulate in this area, and presents a classic case of systemic risk.

The density of fracking well placement also intensifies the risk associated with the mechanism. Once a drill pad is drilled, several wells are placed at the drill site. This concentration of wells creates a multiplier effect whereby one drill pad requires resources, such as water, that exceed the capacity of the local area.[206] As a result, water from outside the area is trucked in, which not only affects the area from which water is drawn, but also leads to problems in the area surrounding the well. This importation of water may sound minor, but critics of fracking have cited increased trucking traffic as a significant concern for communities dealing with fracking.[207] In addition, once the trucked-in water becomes flowback, or wastewater, it must be stored, injected underground, trucked out, or, in some cases, released into surface waters.[208] The sheer volume of wastewater stored at high-density fracking sites also raises concerns. Density, a strategy for increasing developer return, thus leads to increased risks.

With respect to soil issues, the chemical-laced water leaving fracking wells is stored in large pools. Whether such pools are lined or unlined, they pose a risk to

203. Robin Kundis Craig, *Hydraulic Fracturing (Fracking), Federalism, and the Water-Energy Nexus*, 49 IDAHO L. REV. 241, 251, 254 (2013) (discussing regulations and increasing demand on Colorado water supply due to fracking).

204. *See* Jack Healy, *Option for Drilling Pits Farmers Against Water-Thirsty Oil Wells*, N.Y. TIMES, Sept. 6, 2012, at A1 (noting that prices have gone from $30 per acre foot of water up to $200 for the same amount of treated water in parts of Colorado, which adds to the coffers of local utilities but burdens farmers).

205. Robertson, *supra* note 94, at 1280 (noting that the critiques of fracking center around the "potentially disastrous, albeit unlikely, consequences of groundwater contamination, explosion at wells or drilling sites, depletion of freshwater supply, . . . and disposal of contaminated flowback water").

206. *See* ANDREWS ET AL., *supra* note 27, at 17, 24 (arguing that drilling multiple wells from a single pad cuts costs, and describing how wells subject to multiple treatments may consume millions of gallons of water).

207. Elizabeth Souder, *Exxon May Export Natural Gas*, DALLAS MORNING NEWS, May 31, 2012, at D01.

208. ANDREWS ET AL., *supra* note 27, at 34, 35 n.69 (discussing the problems associated with, and various approaches to, wastewater disposal, such as a West Virginia drilling company that "has its hydraulic fracturing wastewater trucked to an out-of-state commercial facility that treats the water and then injects i[t] into depleted oil and gas reservoirs").

communities where fracking is permitted.[209] These pools carry known carcinogens, and when they leak, they have the potential to wreak havoc on the water table. Once the water table is damaged, the water drawn into the community water supply is unfit for human or animal consumption.[210]

b. Social Risk

The foregoing environmental harms tie into a significant but infrequently discussed social risk: transformation of rural communities.[211] The overall impact of fracking on the rural American landscape cannot be overstated. As an initial matter, the communities subjected to natural gas development are among the poorest in the nation, structurally excluded from economic prosperity.[212] The U.S. Energy Information Agency (EIA) map of current fracking development shows broad swaths of the northeastern, midwestern, and southwestern regions of the country sitting on shale rock.[213] An overlay of the census map upon the EIA natural gas development map reveals a striking situation. The poorest regions of the country are rich in shale, which in some ways has forced communities and individuals into a false choice between economic prosperity and ecological ruin.[214]

The seven largest shale plays—Antrim, Barnett, Devonian, Fayetteville, Woodford, Haynesville, and Marcellus—exist in diverse regions of the country; however the Marcellus Shale play holds the greatest promise.[215] Embedded deep in the hollows that already bear the scars of generations of coal mining, the Marcellus Shale play runs through Appalachia, one of the poorest regions in the United States.[216]

The social tensions arising from fracking operations are familiar. There are winners and losers in the new era of development. Private landowners certainly reap benefits, as do those able to benefit from positive spillover effects of jobs created in the service industry, increases in real estate prices, and those who obtain training on the wells themselves.[217] But these spillover effects are also

209. *See* Griswold, *supra* note 188 (discussing leaks in lining).

210. *Id.*

211. *See* Michael Burger, *Fracking and Federalism Choice*, 161 U. PA. L. REV. ONLINE 150, 159 (2013) (identifying fracking's potentially transformative effects on the rural American landscape and cultural impacts on rural America as matters of national interest).

212. *See* Howard, *supra* note 31, at 116, 153–54.

213. *Lower 48 States Shale Plays*, *supra* note 30.

214. *Id.*; *Poverty Rates by County: 2012*, U.S. CENSUS BUREAU, http://www.census.gov/did/www/saipe/data/highlights/files/2012/F6_MP_2012.pdf (last visited Mar. 6, 2015).

215. *See* ANDREWS ET AL., *supra* note 27, at 4 (noting that, according to a report by Navigant consulting, the Marcellus Shale play appears larger than the plays already developed).

216. The Marcellus play runs beneath a substantial portion of West Virginia, western and northeastern Pennsylvania, southern New York, eastern Ohio, and portions of Virginia and Maryland. *Id.* at 10–11; *see also Poverty Rates by County: 2012*, *supra* note 214.

217. *See* Brasier et al., *supra* note 133, at 35 ("Training local workers can take a substantial amount of time, and assumes that training is available and workers want to receive training and work in this industry. Many jobs generated from energy development focus on providing goods and services to workers. These jobs often have less stability and offer fewer benefits. In addition, although

often referred to as the "boomtown" phenomenon. Just like the coal towns before them, regions where fracking is prevalent experience artificially high prices on nearly everything—food, land, homes, and retail goods.[218] Researchers have found that these rapid changes can strain the social fabric of a community, leading to increased crime and substance abuse.[219] And for those at the margins of society, the boomtown effect—particularly, the increase in commodity prices—can lead to or exacerbate financial stress.[220]

c. Economic Risk

Finally, as has been noted by a handful of observers, hidden financial risks may also exist within fracking.[221] The land leases that serve as the basis for the fracking operation may involve land that is not owned outright by the lessor. The property is subject to a mortgage, which means that banks ultimately hold the risk associated with the mortgage. Although there are typically restrictions on a mortgagee's ability to lease his land for hazardous activity, these restrictions have not prevented mortgagees from doing so.[222] As such, many banks own mortgages on land where fracking is taking place. Given the myriad environmental hazards and liabilities that may arise from the activity, and the subsequent risk of a landowner's default resulting therefrom, the presence of fracking may reflect a latent risk to the financial markets. Although developers may mitigate their own economic risk through investments in derivatives that provide a hedge against the risk of lower production in wells (which inherently produce less gas after the initial spike in production),[223] banks holding mortgages would spread their risk into the financial markets, a potential precursor to another public financial shock.

Further, several industry insiders have referred to the exuberance associated with the fracking boom as a Ponzi scheme.[224] In hundreds of documents uncovered by the New York Times, the profitability of fracking is questioned. One official, a former Enron employee, stated:

businesses catering to industry can see a surge in profits, local businesses may compete with each other and the new extractive industry for skilled workers (e.g., mechanics, heavy equipment operators, truck drivers). This competition leads to a shortage of skilled workers and strains the ability of local businesses to provide commensurate wages and benefits.").

218. *Id.* at 45.

219. *Id.* at 36.

220. *Id.* at 48 ("Those who are already economically disadvantaged or those who do not own sizable acres for leasing may only suffer the negative consequences of development.").

221. Urbina, *supra* note 39, at A12 (noting that, in light of many of the risks associated with fracking, the Department of Agriculture may expand its environmental review before issuing mortgages on land subject to oil and gas drilling).

222. Ian Urbina, *A Rush to Sign Leases for Gas Runs into Mortgage Restriction*, N.Y. TIMES, Oct. 20, 2011, at A1.

223. Fitzgerald, *supra* note 139, at 1343.

224. *Drilling Down, Documents: Leaked Industry E-mails and Reports*, *Shale Gas a "Ponzi Scheme," Says IHS Drilling Data Official*, N.Y. TIMES 1, http://www.nytimes.com/interactive/us/natural-gas-drilling-down-documents-4.html?_r=0#document/p1/a22779 (last visited Mar. 6, 2015) (showing the response to a fracking industry publication critiquing shale gas economics, an official at a

> So why is it that all of us that are investing our own money are choosing not to invest . . . are we all wrong? The education that I got at Enron with these type of people . . . has given me more confidence to go with what I believe once I have the data needed to make the proper decision. I now have the proper data needed to evaluate the Haynesville Shale and I will be sitting it out for the foreseeable future.[225]

On the whole, the current approach to fracking presents all of the features of hybridity: private activity in a regulatory vacuum that regularly touches upon public goods, and a scenario riddled with interconnected, localized, and systemic risks. Yet fracking is treated in the current debate as an isolated occurrence, narrowly confined to a method of natural gas extraction that should be regulated. The next Section explains the current debate and shows its limitations by reviewing and critiquing the three key governance frameworks that have been offered to regulate fracking. In the end, the Section concludes, it is not regulation of fracking alone that needs to be addressed; the aspects of fracking's hybridity must be addressed.

IV. BROADENING THE DEBATE

An active debate regarding regulating the fracking industry is currently underway.[226] Fracking engages multiple levels of governance—local, state, and federal—yet no clear regulatory framework has emerged.[227] Landowners see fracking as an opportunity to utilize their freedom of contract and to obtain substantial personal economic benefits. Local governments may see their community as the next boomtown and view fracking as a way out of economic hardship. These interests are sometimes misaligned with the greater public interest, and localities have struggled to balance the two, often yielding to the interests of private parties. A deeper misalignment occurs at the federal level. The federal government currently lacks a comprehensive mechanism for regulating fracking. In fact, no comprehensive regulatory mechanism exists for

research firm that specializes in energy states that "the word among independent oil and gas producers is that shale gas drilling is a Ponzi scheme and that it will be difficult for companies to make money in the Marcellus and Haynesville shale formations"); *see also* Christopherson & Rightor, *supra* note 37, at 4 (noting that "[i]ndustry investment advisors are cautious about the long-term productivity of all U.S. natural gas plays" given that production rates drop off sharply after initial drilling takes place).

225. *Drilling Down,* supra note 224, at 8.

226. *See, e.g.,* Burger, *supra* note 211, at 151; Burleson, *supra* note 172, at 308; Spence, *supra* note 140, at 434; *see also* David Spence & Jody Freeman, *Should the Federal Government Regulate Fracking?*, WALL ST. J. (Apr. 14, 2013, 4:16 PM), http://online.wsj.com/news/articles/SB10001424127887323495104578314302738867078.

227. On May 16, 2013, the U.S. Department of the Interior updated its proposed safety standards for hydraulic fracturing on public and Native American lands. Press Release, U.S. Dep't of the Interior, Interior Releases Updated Draft Rule for Hydraulic Fracturing on Public and Indian Lands for Public Comment (May 13, 2013), http://www.doi.gov/news/pressreleases/interior-releases-updated-draft-rule-for-hydraulic-fracturing-on-public-and-indian-lands-for-public-comment.cfm. The press release notes, "Domestic production from more than 92,000 oil and gas wells on public lands accounts for about 13 percent of the nation's natural gas production and 5 percent of its oil production." *Id.*

onshore oil and gas development.[228] This has given rise to a veritable patchwork of regulatory responses to the fracking phenomenon, due in part to the extraordinary privileges afforded the fracking industry.

This Section highlights and summarizes the key federalism and new governance arguments, while exploring the ways these approaches, standing alone, are too limited and may even exacerbate the problems of hybridity.

A. A Critique of the Current Debates

In consideration of the problems associated with fracking, scholars, legislators, and communities have turned to the question of governance. How should fracking be governed? The current debate focuses on the federalism binary: Should the state or federal government manage the complex array of questions and unknowns that surround fracking? More recently, this discussion has also broadened to incorporate more flexible alternatives, such as cooperative federalism, as advocated by Professor Elizabeth Burleson;[229] or dynamic federalism, as suggested by Professors Osofsky and Wiseman.[230] The next Part begins with federalism.

1. A State Approach to Regulation

The federalism debate is active. In *Federalism, Regulatory Lags, and the Political Economy of Energy Production*, Professor David Spence recognizes the dearth of comprehensive regulation for fracking operations, but argues that a policy-neutral federalism analysis reveals that there is no need for a comprehensive federal regulatory scheme for fracking.[231] Spence relies on four standard justifications for federal regulation:

> (1) to address spillover effects that cross state boundaries, (2) to prevent economic forces at the state level from initiating a "race to the bottom" in environmental regulation, (3) to promote business efficiencies through uniform national standards, and (4) to respond to national interests in the development of natural resources through a federal licensing system.[232]

He argues that none of these are present with fracking. This view is too myopic, as Spence's lens fails to incorporate a broader developmental perspective that would account for the problematic features of hybridity.

As to the spillover effects question, Spence concludes that the externalities associated with fracking—environmental, health, and safety related—do not regularly cross state lines. With respect to water regulation, Spence explains that

228. Spence, *supra* note 140, at 447.

229. *See* Burleson, *supra* note 172, at 291 (asserting that "filling the regulatory gaps governing unconventional natural gas can best be accomplished through genuinely adaptive and collaborative governance").

230. *See* Osofsky & Wiseman, *Dynamic Energy Federalism*, *supra* note 80, 807–08 (proposing a dynamic federalism model of energy regulation).

231. Spence, *supra* note 140, at 431.

232. *Id.*

federal jurisdiction is limited to surface waters and wetlands; states in the heart of fracking country have various water resources. For example, Texas has limited water supplies, whereas water is abundant in places like New York. Thus, he concludes, because the national interest is not implicated, the states should regulate this aspect of fracking.[233]

Spence similarly dispenses of social externalities concerns, arguing that "the question of how (and how much) to regulate fracking" goes directly to the issue of local impacts.[234] Thus, it should be managed locally. Regarding the increased greenhouse gas emissions that may result from fracking operations, Spence argues that the research regarding emissions from natural gas operations is in its infancy, but that the EPA's ongoing efforts to understand the impacts of fracking could lead to tighter federal rules.[235] He also recognizes many of the concerns with the underground injection of fracking flowback water, but states that this too merits further research. Based on current information, he argues, this process does not warrant federal intervention.[236] Finally, on the groundwater question, Spence cites to conflicting studies and concludes that the conditions in certain states may leave them more susceptible to groundwater contamination than others, and thus, the issue of regulation is a state one.[237]

Spence finds the other rationales for federal intervention similarly unavailing. He argues that the race-to-the-bottom rationale doesn't fit the fracking scenario; fracking operators will be forced to operate locally, given that shale deposits are located in specific areas, there is no "race to the bottom."[238] Thus, in the face of externalities, the public will force regulators to regulate.[239] Because Spence believes that there is no move toward a national regulatory regime to secure the proliferation of natural gas production, he concludes that fracking does not threaten national security.[240]

As should be evident, these arguments fail to capture the systemic risk aspects of hybridity. Even if fracking activities are contained within state borders, the environmental, economic, and social risks of the activities have the

233. *Id.* at 479.

234. *Id.* at 483.

235. See *supra* notes 157–58 and accompanying text for a discussion of current EPA efforts to study fracking.

236. *Id.* at 490. In particular, Spence discusses the increase in seismic activity in areas where fracking wastewater has been injected. Spence notes that areas in Ohio, Oklahoma, and Arkansas have all experienced increases in seismic activity as a result of fracking operations. *Id.*; *see also* Lindsay Abrams, *Frack-happy Oklahoma Is the Reigning Earthquake Capital of the U.S.*, SALON (Feb. 11, 2015, 1:55 PM), http://www.salon.com/2015/02/11/frack_happy_oklahoma_is_the_reigning_earthquake_capital_of_the_u_s/ (observing that, in 2014, "Oklahoma, which pre-2009 averaged one per year, had 562 [earthquakes] – tripling the former record holder's total count"). As discussed at Section III, *supra*, the Safe Drinking Water Act does not cover this type of injection activity.

237. *Id.* at 492 (concluding that states are better positioned to implement fracking regulations because the externalities produced by fracking operations are generally experienced locally).

238. *Id.* at 494–95.

239. *Id.* at 494.

240. *Id.* at 501.

potential to bleed across borders.[241] These arguments ignore the relationship between environmental externalities and economic externalities, both of which are of concern within fracking. As discussed, fracking gives rise to environmental harms, such as damage to the local water table, which could indeed lead to both environmental and economic pressures felt by neighboring states.[242] Although Spence argues that the watershed issues related to fracking are a local matter, this argument avoids consideration of the big picture: the watershed is a vital public resource; it connects communities, and impacts in one part of the watershed affect individuals in concentric circles outside the locus of damage.

The mash-up of state approaches to fracking regulation also all but guarantees that some states will lower barriers to entry for some developers. Given that there are a limited number of players in this arena, this will indeed lead to a veritable "race to the bottom." There is, in fact, already a race to the bottom. We've seen disparate approaches in places like West Virginia and Pennsylvania, when held up against the more restrictive approach of New York and Vermont.[243] This lowering of standards could have consequences beyond borders, particularly in the event of a spill or other unfortunate event that cannot be covered by the fracking operator. For example, a particularly permissive state may allow for greater well density, which increases the potential environmental impact of a negative event and the chances that the impact will be more widely felt.

On an economic level, if a private actor cannot cover its harm, the public pays. In some cases, the buck stops at the state level, but where harm is more far reaching, the federal government (i.e., taxpayers) pays. An example of this dynamic would be the September 2013 floods of Colorado, a fracking state. The floods were epic, as is increasingly common during this development moment, and Coloradans found that fracking oil, gas, and wastewater had entered into their groundwater, waterways, and food supply.[244] A staff report to the Colorado Oil and Gas Conservation Commission confirms that oil and gas materials were spilled in the floods.[245] According to the report, approximately "1150 barrels (48,250 gallons) of oil and condensate spilled," and over "1035 barrels (43,478 gallons) of produced water also spilled."[246] Given that, for practical reasons, most oil and gas equipment in the state is sited near streams and waterways, the

241. See *supra* Part III.D.4 for a discussion of the various risks associated with fracking.

242. See *supra* Part III.D.4.a for a discussion of the environmental risks associated with fracking.

243. See *supra* notes 159–71 and accompanying text for a discussion of disparate state and local approaches to fracking regulation.

244. Jack Healy, *After the Floods in Colorado, a Deluge of Worry About Leaking Oil*, N.Y. TIMES, Sept. 27, 2013, at A12.

245. COLORADO OIL AND GAS CONSERVATION COMM'N, A STAFF REPORT TO THE COMMISSIONERS: "LESSONS LEARNED" IN THE FRONT RANGE FLOOD OF SEPTEMBER 2013, at 5 (2014), *available at* http://cogcc.state.co.us/Announcements/Hot_Topics/Flood2013/FinalStaffReport LessonsLearned20140314.pdf (providing analysis and recommendations by the Commission).

246. *Id.*

leaked material most certainly made its way into water sources.[247] This has interstate implications, which is a federal issue.

Moreover, given the scope of the damage, the federal government likely footed the bill for some oil and gas–related harm anyway. The federal government acted quickly to assist Coloradans with flood-related damage.[248] When the floodwaters receded, the administrator of federal relief funds disaggregated the cost of flood damage.[249] Among the long list of relief categories for the nearly $449 million of aid provided are "grants, reimbursements, low-interest loans and insurance payments to individuals, businesses and communities."[250] The list does not include a category for the oil and gas industry,[251] but the homeowners, ranchers, and farmers affected by the storms who also have fracking operations on their property would be eligible for federal relief funds. In essence, the federal government still likely paid for some harm related to fracking, which lends credence to the argument that it should be able to regulate such activity.

In this development moment the epic floods of September 2013 will become increasingly commonplace. The scope and scale of hybrid development lead to damage that is more far-reaching, more impactful, more *systemic*. A state-led approach to regulation misses, and then exacerbates, the systemic risks of hybridity.

2. A Federal Approach to Regulation

Despite its limitations, the ability of a federal approach to regulate the hybridity features of fracking makes the federal approach more attractive than a state approach. Indeed, a comprehensive, baseline, and uniform approach to regulating the field would do much in the way of stemming systemic risk and acknowledging fracking's pervasive impact on public goods. But even this approach leaves unexpected gaps.

Those in favor of a federal approach, such as Professor Jody Freeman, argue that fracking is too important and vast in its potential impact to leave to the states. State deference, Professor Freeman argues, could lead to a race to the bottom.[252] Similarly, in *Fracking and Federalism Choice*, Professor Michael Burger argues that the scope and scale of fracking give rise to cumulative environmental impacts that are more properly regulated by the federal

247. *Id.* at 4.

248. Within a few days of the flooding, over eighty-two hundred Colorado disaster survivors had applied for federal relief funds, and over $1.8 million in funding had been approved. Early on, almost four hundred FEMA personal were on the ground in Colorado in response to the flooding. Lars Anderson, *Colorado Flooding Update: Sept. 18*, FED. EMERGENCY MGMT. AGENCY (Sept. 18, 2014), http://www.fema.gov/blog/2013-09-18/colorado-flooding-update-sept-18.

249. News Release, Fed. Emergency Mgmt. Agency, Disaster Recovery Going Strong 10 Months After Flooding (July 11, 2014), http://www.fema.gov/news-release/2014/07/11/disaster-recovery-going-strong-10-months-after-flooding.

250. *Id.*

251. *Id.*

252. Spence & Freeman, *supra* note 226.

government.[253] Further, he argues, the potential of fracking to reshape the entire landscape of rural America also gives rise to a national interest that merits federal regulation.[254]

These strong arguments for a comprehensive approach to regulating fracking are quite right to focus on the public goods and systemic risk features of fracking, but they miss a crucial feature of hybridity. These arguments lack a cognizance of the nature of hybridity. Quite simply, such activity is *prone* to a lack of regulation.

As discussed, a small group of expert players makes up the core of fracking operators in the United States.[255] Even under a federal regime, such players would likely be charged with writing their own regulations. Moreover, these actors are private actors—limited liability entities—that are organized to mitigate investment risk. Thus, regulations, even properly drafted, would not reach many of the moral hazard features embedded within the corporate form. Further, the highly specialized nature of the industry would require reliance on the experts, and past experience has shown that this leads to regulatory capture.[256]

If fracking is viewed as hybridity, neither the federal nor the state approach to regulation fully mitigates hybridity's three problematic features: (1) private activity that is prone to a lack of regulation, (2) pervasive use of public goods, and (3) systemic risk. On the whole, while a comprehensive federal approach is certainly more attractive than the state-centric approach, it fails to penetrate all aspects of hybridity. A federal regulatory framework, if it is to work, must not just regulate potential risks to the entire ecosystem; it must disrupt the nature of the actors engaged in hybridity. Indeed, the problem, as should be evident from the foregoing discussion, is not fracking, per se, but the hybridity of fracking.

3. Flexible Models Within Federalism Binary

Perhaps the most promising and creative of the regulatory approaches thus far advanced is a suite of new governance approaches. This group of approaches has emerged primarily in the environmental and energy law scholarly community, and borrows heavily from the new governance, or experimentalist, theoretical approach. Many of the governance approaches incorporate decentralization principles and argue for greater participation, monitoring, and collaboration at multiple levels of governance. Although they appear the most likely to limit the harmful effects of fracking, they also fail to address the larger hybridity picture. This Part begins with a brief discussion of new governance, outlines a few of the frequently cited new governance approaches to fracking, and notes their shortcomings.

253. Burger, *supra* note 211, at 153.

254. *Id.* at 162.

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

256. See *supra* Part III.A.2 for a discussion of regulatory capture in the context of the complex deep-sea drilling activity.

The new governance field devotes a substantial amount of time to explaining and categorizing new phenomena in governance. These phenomena grew out of the perceived excesses of big government. "Experimentalism" offered a response to command and control governance. The seminal work of Columbia Law School professors Michael C. Dorf and Charles F. Sabel provides a frequently cited starting point for the new governance discussion. In *A Constitution of Democratic Experimentalism*, the professors introduce the term "democratic experimentalism" as a critique of the limitations of the current U.S. system of governance.[257] Their article posits that the three branches of government no longer meet the myriad and complex challenges of modern American society. This gap, they argue, calls for a more responsive system of governance. The solution—democratic experimentalism—contains many features, but essentially decentralizes power to "enable citizens and other actors to utilize their local knowledge to fit solutions to their individual circumstances."[258]

Moreover, experimentalism allows "regional and national coordinating bodies . . . to share their knowledge with others facing similar problems."[259] Experimentalism also combines public and private features, allowing "novel kinds of coordination within and among private firms, . . . [which] increases the efficiency of public administration by encouraging mutual learning among its parts," and increases "accountability through participation of citizens in the decisions that affect them."[260] In many ways, the public accountability framework Dorf and Sabel introduce mirrors the private sector: the public performs a monitoring function, and through novel participatory mechanisms is able to affect policy. The fracking governance scholarship is abundant with examples of new governance. Notable are approaches advocated by Professors Elizabeth Burleson, Hari Osofsky, and Hannah Wiseman.

In her recent article regarding cooperative federalism, Elizabeth Burleson stresses that public participation at the outset is the key to sustainable development.[261] She argues for inclusive decision making that "involves the following: gathering stakeholders and information and then brainstorming and analyzing options before implementing any given approach."[262] Further, Burleson argues that the best way to fill the current regulatory gaps within fracking is "through genuinely adaptive and collaborative governance."[263] In Burleson's view, this approach at local, regional, and federal levels will

257. Michael C. Dorf & Charles F. Sabel, *A Constitution of Democratic Experimentalism*, 98 COLUM. L. REV. 267 (1998).

258. *Id.* at 267.

259. *Id.*

260. *Id.*

261. Burleson, *supra* note 172, at 327.

262. *Id.*

263. *Id.* at 290.

ameliorate much of the social risk associated with fracking development because it is responsive to the needs of the community.[264]

Professors Osofsky and Wiseman's approach sounds similar themes. In a series of articles, Professors Osofsky and Wiseman describe a fragmented energy system.[265] This fragmentation results in inefficiencies across the sector, leads to gaps in regulation, and inadequately responds to risk. "Hybrid governance," they argue, might remedy these problems in energy regulation.[266] Hybrid governance (not to be confused with the "hybridity" discussed in this Article) is described as the integration and interaction among multiple public and private actors along vertical and horizontal axes, which allows for the incorporation of diverse voices at every stage of governance.[267] In this way their approach builds on the experimentalist literature, which recognizes that our existing governance system is ill suited to address modern problems.[268]

Osofsky and Wiseman's approach also discusses the transitional nature of our current energy system based on "emerging technology, more unpredictable and extreme weather events, and public pressure for cleaner energy."[269] Their approach also tracks recent developments in fracking governance, and the articles attempt to fill a gap in federalism and energy scholarship by arguing that a hybrid governance approach may be more effective than federalism in addressing substantive gaps in energy law.[270] To illustrate hybrid governance, the pair explains how the Delaware River Basin Commission (DRBC), a federal-interstate governmental agency that was formed in 1961 to regionally protect and manage the Delaware River Basin, recently exceeded its mandate as a regional decision-making authority to propose regulations regarding fracking.[271]

Approximately thirty percent of the Delaware River Basin sits above the Marcellus Shale formation.[272] The agency thus has a particular interest in regulating fracking. All of its meetings, hearings, and advisory committees are open to the public. While Burleson points to the DRBC as an example of an agency flexible enough to engage in adaptive management, Osofsky and Wiseman use it as an exemplar of hybrid governance: it incorporates multiple

264. *Id.* at 300.

265. Osofsky & Wiseman, *Dynamic Energy Federalism, supra* note 80; Hari M. Osofsky & Hannah J. Wiseman, *Hybrid Energy Governance*, 2014 U. ILL. L. REV. 1 (2014) [hereinafter Osofsky & Wiseman, *Hybrid Energy Governance*].

266. Osofsky & Wiseman, *Hybrid Energy Governance*, *supra* note 265, at 1–2.

267. *Id.* at 4.

268. *See generally* Dorf & Sabel, *supra* note 257, at 270 (arguing that the features of American constitutionalism are no longer functioning as intended and do not effectively organize our democracy).

269. Osofsky & Wiseman, *Hybrid Energy Governance*, *supra* note 265, at 1.

270. *Id.* at 4; *see also* Osofsky & Wiseman, *Dynamic Energy Federalism*, *supra* note 80.

271. This approach to regional governance has been advocated as well by Daniel Honberg, who suggests that the gaps in governance common in cooperative federalism, dynamic federalism, and state or federal approaches to governance are remedied when interstate compacts are formed to meet the needs of a region. Daniel Honberg, Note, *Fractured Oversight: A Regional Approach to Hydraulic Fracturing Regulation*, 24 GEO. INT'L ENVTL. L. REV. 591, 591–92 (2012).

272. Burleson, *supra* note 172, at 314.

voices across multiple levels of governance.[273] In both views, the DRBC should be held out as an example of how to manage the fracking morass. It is adaptable, flexible, and permits participation.

Numerous critiques and debates surround new governance. At the heart of the debate is the question of whether new governance or hybrid methods of decision making cede too much authority to private actors, thus providing the opposite effect of accountability and transparency. In this way, the complexity that gave rise to the new governance model could operate to further obstruct democracy.

For example, an underlying assumption of the hybrid governance approach is symmetry with respect to information. As the foregoing analysis reveals, fields deploying hybridity in development are notoriously asymmetric. Industry experts hold the relevant information; however, a collaborative approach to governance requires and assumes equal access to information. Experimentalist approaches to governance rely on actors to share information; it is unclear whether the incentives to share information would be great enough to avoid the problem of information asymmetry. Michael Burger makes a similar argument, suggesting that decentralized approaches to governance presume information sharing among key actors and that actual learning is taking place.[274] He argues that there is no evidence that this is the case, and that a federal approach to fracking regulation would provide a better opportunity for "resource pooling, technical and regulatory information sharing, and knowledge generation than what is currently taking place under the decentralized approach."[275]

In sum, the focus on decentralization could exacerbate the market failure that currently plagues hybridity.[276] Recalling the financial crisis buttresses this argument.[277] In the lead-up to the crisis, the financial industry was quite decentralized and self-regulated. This regulatory approach led to systemic risk because the actors were consistently dispersing risks into the financial markets. This was not due to any malicious intent on the part of the banks. Quite simply, the entities are designed to maximize return and minimize their individual risk. What the financial crisis revealed is that private actors cannot be trusted (or expected) to self-regulate. Fracking developers are no different. As discussed, the nature of the private enterprise is to maximize shareholder value.[278] Fracking developers will, by virtue of their organizational structure, act to maximize profits. Even the most iterative governance model cannot change this characteristic of the firm.

273. Osofsky & Wiseman, *Hybrid Energy Governance*, *supra* note 265, at 21–31.

274. Burger, *supra* note 211, at 160.

275. *Id.*

276. *See* Orly Lobel, *The Renew Deal: The Fall of Regulation and the Rise of Governance in Contemporary Legal Thought*, 89 MINN. L. REV. 342, 444 (2004) (discussing market failures in the context of decentralization).

277. See *supra* Part III.A.1 for a discussion of the haphazard regulatory approach that led to the financial crisis.

278. See *supra* notes 173–74 and accompanying text for an acknowledgment of the widely held belief that the main goal of private enterprise to maximize profits for shareholders.

These critiques notwithstanding, the foregoing innovative efforts to make sense of the fractured, fragmented,[279] and gap-filled fracking governance pictures are noteworthy. They make valuable contributions to both the federalism debate and new governance literature; however, they fail to incorporate the larger story regarding fracking. It is development. To take it a step further, it reflects a particular approach to development—hybridity—that is rife with systemic risk. Any regulatory response to fracking must grapple with all of the complex features of hybridity. Until now, none of the fracking governance approaches directly addresses the whole of fracking's hybridity.

B. Moving Beyond Regulation: Disrupting Hybridity

The best way to mitigate the harm of hybridity is to address its harmful features. Although the current regulatory debates have value, and a comprehensive regulatory scheme is likely one piece of the necessary response to fracking, a more effective response would focus on (1) exposing difficult-to-regulate private actors to the risks of their activities; (2) creating transactions that establish proportionate risk and benefit sharing among public and private actors to mitigate harm to public goods; and (3) reducing project scale to minimize systemic risks. This Part introduces several ways to reduce hybridity's negative impact, and suggests that this approach, coupled with a comprehensive and coherent regulatory approach, might mitigate, ex ante, the potential harms of fracking.

1. Internalizing Developer Risk

One way to facilitate the internalization of developer risk is to increase the cost of doing business. Fracking developers, like many sophisticated private parties, engage in fracking through subsidiaries established solely for the purpose of developing the project.[280] This allows developers to create distance between themselves—the parent entity—and the risky activity. Reducing this distance by allowing for a piercing of the corporate veil of the subsidiary to reach the parent-shareholder may reduce the moral hazard that arises from the current structure of fracking operations.[281] Moreover, although limited liability is a classic (and highly valued) feature of corporate law, localities and other parties to fracking transactions can lessen its impact through creative contract. A simplified

279. *See* Burleson, *supra* note 172, at 289 (describing fracking regulations as fragmented); Osofsky & Wiseman, *Dynamic Energy Federalism*, *supra* note 80, at 777 (describing a fragmented energy regulatory system); Spence, *supra* note 140, at 507 (referring to regulatory framework as fragmented).

280. *See, e.g.*, Daniel Gilbert, *Exxon Fights over Fracking with Pennsylvania Attorney General*, WALL ST. J. (July 10, 2014, 1:06 PM), http://www.wsj.com/articles/exxon-says-it-is-getting-singled-out-over-fracking-1405011974 (discussing the pending criminal action against General XTO Energy, a subsidiary of Exxon Mobil, in a Pennsylvania court over the alleged mishandling of "toxic wastewater" from the fracking operation).

281. Note, *Liability of Parent Corporations for Hazardous Waste Cleanup and Damages*, 99 HARV. L. REV. 986, 999 (1986) (suggesting that parent companies be held liable for activities of subsidiaries who improperly dispose of hazardous waste).

corporate structure can be explicitly required by the contract that dictates the fracking relationship, or constructively, by obtaining parent guarantees that cover harm created by the activities of the subsidiary. Although at the outset changing the culture surrounding fracking may prove challenging, negotiators (landowners and municipalities) may point to other high-risk development industries (including the oil and gas industry) for examples of this type of risk internalization.[282]

There may be other ways to change the structure of such actors that allow for greater internalization of risk, but absent comprehensive regulation, creative contract will have to suffice. This observation is consistent with an emerging trend of private governance in environmental law, as noted by Michael Vandenbergh in *The Emergence of Private Environmental Governance*.[283] The key for those responsible for the permitting process or negotiating the lease agreement is to focus on the layers of complexity within the organizational structure. The greater the complexity, as illustrated by the financial crisis and BP oil spill, the more likely the developer is able to externalize risk.[284] Structuring a transaction to allow easier access to the developer will internalize developer risk, which should incentivize greater care in the fracking operation.

2. Recalibrating Risk and Benefit Sharing

Structuring fracking transactions to allow for greater risk and benefit sharing could minimize impacts on public goods. An example of a shared risk-benefit approach would be a public-private partnership, but other transactional and ownership structures may provide similar benefits.

Within the current transactional structure for fracking transactions, deals are typically between the subsidiary of a fracking company and the federal government or private landowner. Under one version of a shared framework, the private fracking party would form a joint venture with the locality. In a joint venture format, the risk taking of the private entity is more closely monitored but, more importantly, the locality develops much needed industry-specific knowledge. The joint venture would also allow the locality to reap public, monetary benefits that are then spread throughout the community, rather than isolated within a few lucky hands. The money could also go toward training within the industry or, even better, other renewable energy development projects in the area.

282. *See, e.g.*, Julia A. Heintz, *Production Payments and Other Energy Financing Alternatives*, *in* 1995 OIL AND GAS ACQUISITIONS, ch. 10B (Rocky Mountain Mineral Law Found. ed., 1995) (discussing a prepaid gas or oil contract in which the purchaser of the commodity receives collateral, which could include a parent guaranty).

283. Michael P. Vandenbergh, *The Emergence of Private Environmental Governance*, 44 ENVTL. L. REP. NEWS & ANALYSIS 10125, 10125–34 (2014) (noting that private environmental governance is a gap filler that can also complement public governance, and that fracking is one area that is particularly ripe for private environmental governance).

284. See *supra* Parts III.A.1–2 for a discussion of how private entities externalized risk in the 2008 financial crisis and the BP oil spill.

With benefit sharing comes risk sharing. Any joint venture arrangement would require the public entity to bear part of the financial risk of the venture. While this may seem like a significant downside to this type of deal structuring, in reality, it may lead to fewer projects that are held to higher standards. This would have a net positive effect on the water table, and go a long way toward reducing the impact of fracking in a region.

If the government knows that it (or rather, its constituents) is on the hook for half of any fracking-related harm in an area, there may be a race to the regulatory "top," rather than a race to the bottom. The accountability features built into our democratic system of governance ensure these types of incentives. In reality, given the limited liability structure of corporations, the current model for fracking transactions makes the government implicitly liable for fracking-related damage to communities anyway. At least with a mandatory public-private partnership format for each project, the public and private actors must share in the upside. In addition, public involvement could increase overall transparency and accountability of fracking activity.

This type of benefit sharing is analogous to the severance tax currently enforced in fracking states.[285] The severance tax allows the state to collect a tax when natural resources leave the state, and in some cases reliance on such tax may lead to a conflict of interest.[286] For example, states may be more apt to promote risky extractive activities knowing that a monetary benefit will flow back to the state. A joint venture model would provide a different framework. The explicit public risk sharing through contract distinguishes the joint venture from the severance tax; the public may be less tolerant of highly risky activity than an individual government agency that depends on the severance tax for survival. This public aspect provides a check on otherwise captured activity.

3. Reducing Project Scale

Third, reducing the density and scale of fracking projects could reduce systemic risks. This third recommendation is perhaps both the most straightforward, and the most difficult to achieve.

Multiple fracking wells are set up on single drill pads.[287] This density increases the potential profit of the well, and increases the likelihood of failure. Fracking is also dense; it covers broad swaths of land within a region, increasing the impact on the water supply. These two features—density and scale—are prime contributors to systemic risk. To reflect briefly on the financial crisis, the

285. A recent study by the Duke University Energy Initiative notes that severance taxes, typically based on the volume of oil or gas production, have provided a significant amount of revenue in counties that do not collect property taxes on oil and gas production. DANIEL RAIMI & RICHARD G. NEWELL, SHALE PUBLIC FINANCE: LOCAL GOVERNMENT REVENUES AND COSTS ASSOCIATED WITH OIL AND GAS DEVELOPMENT, DUKE UNIV. ENERGY INITIATIVE 2 (2014).

286. *See* Robertson, *supra* note 94, at 1294–96 (discussing the collection of Ohio severance taxes by the Ohio Tax Commissioner, which then pays the tax into an oil and gas fund, as a potential conflict of interest that may limit the ability of the Ohio Department of Natural Resources Division of Oil and Gas to remain neutral with respect to regulation).

287. See *supra* Part III.D.1 for a primer on the fracking process.

scale of the activity was quite broad; most banks held risky mortgages on their books.[288] The density of risk distribution was not revealed until the dominoes began to fall; the ratings agencies had failed to identify the risks of these instruments and parties thus found bits and pieces of the infected mortgages littered throughout their assets. In this case, the scope and density are known. When coupled with the concerns related to disclosure of the chemicals used in the business, the impact of the activity is less certain. Reducing the footprint of fracking activities, including the "go big" structure of fracking operations, might mitigate the systemic risks inherent in such activity.

One way local communities and states might reduce the scale and density of fracking operations is by increasing the cost of doing business for those engaged in fracking operations. For example, the production capacity of fracked wells typically levels off or declines after an initial phase of productivity. This, of course, affects the return on investment for parties engaged in fracking. The ubiquity of fracking, however, lessens the impact of this dip and thus incentivizes a fracking operator to drill more wells with the hope of maximizing initial returns. Often wells are left abandoned after this initial productive phase, but the effects of the fracking activity remain long after the private parties have left the well.

Government entities that become parties to fracking transactions can change this dynamic by insisting on a guaranteed return over an extended period of time for each well created. Well developers would be penalized for any shortfalls in the projected return, which could incentivize developers to choose more wisely and engage in less speculation when searching for shale. This private contractual approach to increasing the cost of doing business for fracking operators could lead to less density and safer fracking, thereby reducing the systemic risks associated with the activity. Landowners and other parties to fracking transactions could also engage in this type of scale-reduction activity in order to reduce impacts on private land and reduce the probability of an event that could damage groundwater or soil.

These recommendations comprise just a few of the many tools available for advocates seeking to reduce the risks associated with fracking, including states that are cautiously optimistic about the potential benefits that fracking might yield, by focusing on *hybridity*. Key questions remain, however. Namely, how will the above recommendations be operationalized? And by whom? The following Part offers several suggestions and caveats regarding implementation of the foregoing interventions in hybridity.

C. Operationalizing

The varieties of players that make up the fracking landscape give rise to a variety of possible approaches to implementation. Under any approach,

288. See *supra* Part III.A.1 for a discussion of the financial crisis and how the decentralized financial regulatory scheme contributed to the crisis.

however, the problems of co-opting, capture, and information asymmetry could resurface.

Given the strength of the oil and gas lobby and the concerns with regulatory capture that abound in hybridity, state, federal, or local efforts to implement the changes would likely face serious difficulty. The best approach may be a bottom-up approach, where private parties to contract insist on key contractual provisions that provide the types of protections discussed above. Absent community pressure and know-how, however, such private parties might lack real incentives or expertise to bargain in their neighbors' best interests. To combat this incentive problem, nongovernmental organizations and legal advocates could play a key role. Such actors might develop boilerplate transactional documents that serve the dual purpose of educating communities about the systemic risks of fracking and cutting transaction costs for those entering fracking negotiations. For instance, one website—FracFocus—has already begun to play this role in the realm of chemical disclosure. The website, which is managed by the Ground Water Protection Council and Interstate Oil and Gas Compact Commission, provides a public clearinghouse for states to list chemicals used for fracking.[289]

Taxpayers in fracking regions could also lean on localities to intervene and use their police powers to enact ordinances that provide for certain contractual baselines. Such localities would also have real incentives to engage in joint ventures with fracking developers, which could allow such municipalities to hone their expertise and provide much needed transparency for the transactions. The non-property-owning public would also have an interest in obtaining more concrete economic benefits from the industry, rather than the spillover effects common in "boom" communities.

The key recommendations set forth here—reducing the scope and scale of fracking operations, and developing organizational and transactional structures that internalize risk for repeat players and allow for more equitable benefit sharing across communities—may change the face of fracking. Developers may hesitate to invest knowing that communities will seek to simplify transactional structures to force developers to internalize more of the risk. Developers may also be less likely to invest with the understanding that the locality will be its business partner and the community will share in the upside. Finally, fracking developers may balk at the prospect of scaling down their operations. The industry may collapse. Or, more likely, it may evolve.

In this way, fracking is not only changed, but fracking, as hybridity, is disrupted.

V. CONCLUSION

Fracking is occurring within a unique development moment. This development moment is rife with significant development challenges, including a decreased or negative pace for economic growth, difficulty meeting energy

289. *About Us*, FRACFOCUS, http://www.fracfocus.org/welcome (last visited Mar. 6, 2015).

needs, and a destabilized climate. Hybridity has emerged during this moment as an approach to development that thrives in the gaps of governance, relies on public goods, and creates tremendous amounts of unchecked systemic risk. Fracking fits within this paradigm.

To date, fracking lacks a comprehensive regulatory framework. The attempts to regulate fracking center around regulation of the mechanism through federal, state, or experimental approaches. This Article disrupts and broadens this framing to bring fracking within the lens of development. In an era of development that calls for creativity, understanding an approach to development like hybridity—and when it is being employed—expands our toolkit of solutions and allows us to anticipate, ferret out, and potentially stem systemic risks before they have a deleterious effect on the economy or environment.