Chapter 4: Social Processes Underlying Venting and Flaring

"The ultimate goal is to reduce flaring as much as possible and capture the gas in our wells."

– Russel Rankin, Statoil

Although extracted non-associated gas and casinghead gas (i.e., different forms of natural gas) have economic value, operating companies vent or flare this gas for several reasons. First, in order to test the pressure and composition of extracted natural resources, operators flare gas the first few days after a gas well is completed. While this practice is common, some other companies choose to forgo this unnecessary waste and instead use portable green completion equipment (IPIECA 2013). Second, since wells must go through a costly process to be shut-in[1], operators flare gas to maintain a safe pressure during emergencies and repairs. Third, equipment failure can result in leaks at the production site. Finally, out of perceived economic interests, in areas where infrastructure and technology is not already established some operating companies choose to immediately vent and flare most (or all) extracted natural gas, rather than invest in the infrastructure and technology necessary to effectively capture, store, and transport the gas to be sold on the market. For example, some industry representatives most venting and flaring is the result of delays in building pipelines due to burdensome EPA regulations (Tedesco and Hiller 2014a).

However, venting and flaring extracted natural gas is not usually necessary. There are technical solutions available to eliminate routine venting and flaring. Companies sell and rent small-scale gas to liquids technologies to bring extracted gas to the market regardless of the location, but only some companies choose to minimize venting and flaring by investing in these green technologies. For example, to minimize venting and flaring in remote areas in North Dakota, Statoil has invested in technologies to store and use natural gas. Many other companies have committed to investing in these green technologies to eliminate routine flaring by 2030, regardless of facility remoteness (World Bank 2016). However, not all companies are equally committed to these green investments. This chapter explores how variation in the organizational and political characteristics of the facility and the company that operates the facility (i.e., operators) relate to variations in venting and flaring outcomes.

4.1. The "Double Diversion" Supporting Ecological Inefficiency

Rural sociologists have identified how environmental degradation is supported by a "double diversion" (Freudenburg 2006). The first part of the "double diversion" is how environmental degradation is assumed to be a uniform activity routinely practiced by all. However, in reality, a few outliers are responsible for most industrial pollution emissions. In a quantitative analysis of industrial pollution from 1854-2010, Heede (2014) found that two-thirds of the world's industrial carbon dioxide and methane emissions came from just 90 large companies. Likewise, a small number of facilities and operators are responsible for the Texas oil and gas industry's venting and flaring emissions. In 2012, among the 162,144 producing oil and gas extraction facilities directly controlled by 4,713 different operators, only 1,366 different operators (28.98%) engaged in venting and flaring at 9,154 (5.65%) facilities.

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[1] Shutting in a well is a process by which a well is plugged at a specified level and filled with concrete to prevent natural gas from escaping. Depending on the depth of the well (it costs more for deeper wells), shut in costs can be anywhere from $569 - $527,829 (Joyce 2015).

The second part of the "double diversion" is how environmental degradation is assumed to be necessary for industrial productivity, yet research debunks this myth (Freudenburg 2006). Even when controlling for productivity, some types of facilities are disproportionately responsible for heavy pollution (Grant et. al. 2002; Grant and Jones 2003; Grant and Jones 2004: Grant et. al. 2010). Likewise, venting and flaring practices are not necessary for industrial productivity. Even when controlling for productivity, some types of facilities and operators are disproportionately responsible for venting and flaring.

Prior research on disproportionality examines which types of organizations are disproportionately responsible for heavy pollution in urban areas. Facilities disproportionately responsible for environmental degradation tend to be large (Grant et. al. 2002), subsidiary organizations, meaning they are organizations with more than 50% of the stock owned by a legally separate corporation (Grant and Jones 2003), and are primarily located in poor, minority neighborhoods (Grant et.al. 2004; Grant et.al. 2010, Collins, Munoz and JaJa 2016). Furthermore, heavy polluting organizations are affected by resource dependence (Prechel and Zheng 2012; Prechel and Touche 2014), corporate structure (Prechel and Istvan 2016; Prechel and Touche 2014; Prechel and Zheng 2012), and firm political embeddedness (Prechel and Zheng 2012; Prechel and Touche 2014; Prechel and Istvan 2016). By revealing the types of facilities that pollute at a higher rate than others, disproportionality research identifies the specific social structural factors related to high industrial pollution levels. However, disproportionality research primarily focuses on industrial pollution in urban areas. This analysis expands disproportionality research by focusing on a specific form of pollution that occurs in rural areas-venting and flaring. In line with research on disproportionality, this chapter identifies the types of facilities and operators most responsible for venting and flaring in Texas.

4.2. Explaining Industrial Pollution Practices as a Two-Part Process

Prior disproportionality research primarily explains variation in pollution magnitude among large industrial facilities that reports to the Environmental Protection Agency. As explained in detail in Appendix B, research on point emission sources in the United States primarily relies upon Environmental Protection Agency data, which omits small organizations from reporting. However, there are a significant number of small organizations within the population (Granovetter 1984). By ignoring small facilities and those that pollute little, researchers have yet to have a comprehensive understanding of the factors contributing to the environmental performance of organizations.

The environmental practices of an organization are not just about the magnitude of a polluting behavior; it is also about decisions on whether or not to engage in a polluting behavior in the first place. Furthermore, the factors contributing to decisions to engage in a polluting behavior may differ from the factors relating to pollution magnitudes. For this reason, I examine oil and gas extraction facility venting and flaring practices as a distinct two-part process. First, I examine the factors related to whether a facility engaged in venting and flaring. Then, among the facilities that vented or flared, I examine the factors related to venting and flaring rates. Both analysis involve accounting for similarities of facilities controlled by the same operator. A detailed description of my methodological approach can be found in Appendix C: Analytical Strategy for Quantifying the Effect of Facility and Operator Characteristics on Venting and Flaring Practices. Facility and operator summary statistics are presented in Figure 4.1: Facility Summary Statistics, and Figure 4.2: Operator Summary Statistics. Regression results for my cross-sectional analysis are presented below in Figure 4.3: Venting and Flaring Participation and Magnitude Regression Model Results.

Figure 4.1: Facility Summary Statistics

	N	Mean	Standard Deviation	Minimum	Maximum
VENTING AND FLARING PRACTICES					
Venting and Flaring Facilities	126,862	0.05	0.22	0	1
Venting and Flaring Rate (log)	6,651	-3.62	2.96	-13.929	0
COMMUNITY DEMOGRAPHICS					
Median Household Income	126,862	9.65	1.94	1	15
Median Housing Value	126,862	12.81	2.73	1	21
Portion in Poverty	126,862	13.99	9.43	0	100
Portion of without HS Diploma	126,862	19.74	10.84	0	78.553
Portion not English Fluent	126,861	4.91439	7.470736	0	44.85981
Population Density	126,862	38.905	156.712	0.007	6,707.434
Registered Nonprofit Organizations	126,862	283.443	845.645	0	14,502
Portion black	126,862	4.211	7.436	0	88.075
Portion Hispanic	126,862	25.703	23.534	0	100
STATE REGULATION					
Permitted to Vent or Flare	126,862	0.004	0.066	0	1
Venting or Flaring Violations	126,862	0.002	0.068	0	9
Lease Inspections	126,862	.2970866	1.177388	0	95
FACILITY SIZE					
Oil and Condensate Produced (square)	126,862	3.98E+09	4.66E+11	0	1.12E+14
Gas and Casinghead Produced (square)	126,862	4.5E+10	4.1E+12	0	9.84E+14
FACILITY COMPLEXITY					
Facility Wellbores	126,862	4.816	41.446	1	5,413
ECONOMIC COSTS					
New Wellbores Established	126,862	0.043	0.203	0	1
Gas Well	126,862	.6078495	.4882319	0	1
Other Wellbores within One Mile	126,862	43.567	5527.855	0	1,968,882
Nearest Distance to Gas Pipeline	126,862	9,398.80	17,562.53	0	176,658.40
OPERATOR SIZE					
Operator Volume of Gas and Casinghead Produced	126,862	1.12e+08	2.27e+08	0	7.61e+08
Operator Volume of Oil and Condensate Produced	126,862	2766057	5893063	0	4.27e+07
OPERATOR COMPLEXITY					
Wellbores Controlled by Facility Operator (log)	126,862	6.158	2.157	0	10.296
OPERATOR GAS DEPENDENCE					
Gas Ratio	126,862	.8029547	.2939673	0	1
ORGANIZATIONAL STRUCTURE					
Subsidiary	126,862	0.291	0.454	0	1
SIZE INTERACTION TERM					
Facility gas/cond production x Operator gas/cond production	126,862	9.85e+12	4.71e+13	0	2.34e+15

Figure 4.2: Operator Summary Statistics

	N	Mean	Standard Deviation	Minimum	Maximum
VENTING AND FLARING PRACTICES					
Venting and Flaring Operator	6,135	0.11	0.32	0	1
Venting and Flaring Rate (ln)	6,135	0.05	0.58	-13.929	37.96377
COMMUNITY DEMOGRAPHICS					
Median Household Income (op. mean)	6,135	8.99	1.86	1.15709	14
Median House Value (op. mean)	6,135	12.00	2.68	1	20.18182
Portion in Poverty Line (operator mean)	6,135	13.74	7.08	0	58.36614
Portion without HS diploma (op. mean)	6,135	19.07	8.27	0	56.972
Portion not English Fluent (op. mean)	6,135	4.465024	5.613945	0	44.85981
Population Density (op. mean)	6,135	35.391	145.222	0.007	4612.576
Registered NGOs (op. mean)	6,135	289.822	1051.664	0	14,502
Portion black (op. mean)	6,135	3.771	6.220	0	88.075
Portion Hispanic (op. mean)	6,135	24.813	21.138	0	98.74068
STATE REGULATION					
Portion facilities permitted to vent/flare	6,135	0.001	0.021	0	1
Violations (operator mean per lease)	6,135	0.003	0.085	0	4.5
Lease Inspections (op. mean)	6,135	22.94442	124.2467	0	3490
FACILITY SIZE					
Oil/Cond. Produced (op. square mean)	6,135	1.30E+09	6.46E+10	0	3.57E+12
Gas/Csgd Produced (op. square mean)	6,135	1.56E+10	7.33E+11	0	4.05E+13
FACILITY COMPLEXITY					
Facility Wellbores (operator log mean)	6,135	6.265916	19.13736	1	707
ECONOMIC COSTS					
New Wellbores (operator mean)	6,135	0.031	0.124	0	1
Gas wells (operator mean)	6,135	.3180042	.3615361	0	1
Other Wellbores within a Mile (op. mean)	6,135	17.413	37.31328	0	2,179
Nearest Distance to Pipeline (op. mean)	6,135	13,558.99	20,400.24	0	175,789.10
OPERATOR COMPLEXITY					
Wellbores Controlled by Facility Operator (log)	6,135	2.759	1.721	0	10.3
OPERATOR GAS DEPENDENCE					
Gas Ratio	6,135	.5302668	.4331749	0	1
ORGANIZATIONAL STRUCTURE					
Subsidiary	6,135	.0176039	.1315174	0	1

Figure 4.3: Venting and Flaring Participation and Magnitude Regression Model Results

	Participation Model	Magnitude Model
Number of Facilities Analyzed	126,861	6,651
Number of Operators Analyzed	4,608	455
* Significant at P < 0.05 ** Significant at P < 0.01 *** Significant at P < 0.001	Predictors of Facility Engagement in Venting/Flaring	Predictors of Facility Venting/Flaring Rates
COMMUNITY DEMOGRAPHICS		
median income		.0639128
median owner occupied housing value		-.0223744
percent living in poverty	-.0329121*	-.0028852
percent without high school diploma		.0041144
percent with limited English fluency		.007259
population density	-.0014907	-.0000622
number of NGOs	.000021	-.0000401
percent black	-.0022434	.0081067
percent Hispanic	.0279328 ***	.0005596
STATE REGULATION		
permit	2.932431 ***	1.222023 ***
violation	.7417835 ***	.2685558 **
FACILITY SIZE		
oil/cond produced	-1.86e-15	1.01e-14 ***
csgd/gas produced	-1.24e-14	-8.89e-14 **
FACILITY COMPLEXITY		
facility wellbores	.0001769	.0008783 **
ECONOMIC COSTS		
new	1.416542 ***	.4877963
gas well	-.5219759	-2.96381 ***
wellbores within one mile	-.0041267	-.0027909 *
nearest distance to pipeline	-6.39e-06 *	6.06e-06
OPERATOR SIZE		
oil/cond produced	6.71e-08 **	6.65e-09
csgd/gas produced	-3.21e-09 **	2.52e-09 *
OPERATOR COMPLEXITY		
operator wellbores		-.3677986 ***
OPERATOR GAS DEPENDENCE		
gas portion		-2.971782 ***
ORGANIZATIONAL STRUCTURE		
subsidiary	.0982878	.6126543
SIZE INTERACTION		
facility gas production volume x operator gas production volume	2.39e-15 **	-7.79e-15 *

4.3. The Structural Factors Related to Venting and Flaring

4.3.3. Empirical Findings- Effect of Organizational Embeddedness on Venting and Flaring Practices

4.3.3.1. Organizational Structure

Natural gas is extracted using a drilling rig on top of one or more wells[2] within a lease[3] controlled by an operating company whose headquarters is typically at a separate physical location than the producing facility. Using business language, the natural gas production industry is organized as a set of branch plants[4] (i.e. extraction facilities, which are drilling rigs within a lease of land) controlled by central headquarters[5] (i.e. the operating company). Operating companies and extraction facilities can exist within a more complex organizational network (See Figure 4.4: Proto-typical Multilayer Subsidiary Form in Natural Gas Production Industry). When structured as a multilayer subsidiary organization, an operating company can be either a subsidiary or an ultimate parent company. A subsidiary, which can also be a parent company of another subsidiary, is a legally independent corporation with more than 50% of its stock owned by another company. The ultimate parent company is the top company within a corporate hierarchy, which owns one or more subsidiaries.

Prior research finds that because there is a legal buffer between subsidiary companies and ultimate parents, subsidiaries are more prone to pollution (Grant and Jones 2003; Prechel and Istvan 2016; Prechel and Touche 2014; Prechel and Zheng 2012). However, findings show there is no significant effect of subsidiary status on venting and flaring practices. This suggests that because information about facility venting and flaring practices is not widely available to stockholders and there are few legal repercussions to venting and flaring, companies do not minimize liability by organizing heavy polluting facilities under subsidiary organizations.

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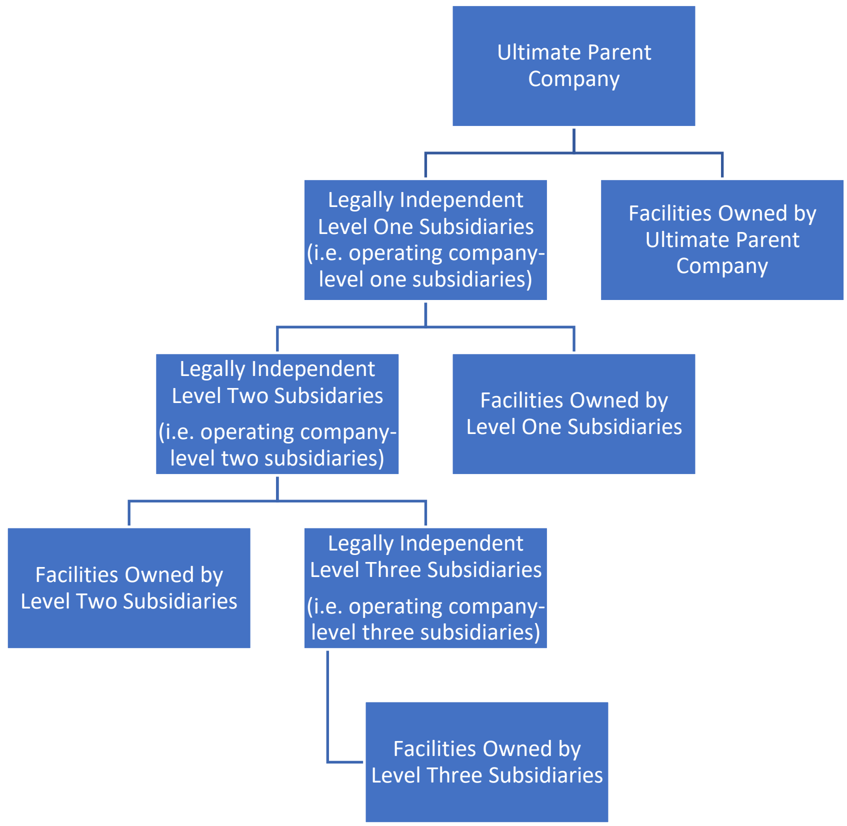
[2] A well is a surface area drilled for the purpose of extracting petroleum crude oil and/or natural gas. The difference between a gas well and an oil well is the amount of raw gas that is produced in comparison to crude oil. Texas Natural Resources Code Sec 86.002 sets the ratio at 100,000 or more cubic feet of natural gas per every barrel of crude oil (Wilson 1977).

[3] A lease is a legal a deed which authorizes exploration and production of minerals for a specific tract of land, which is made up of one or more Census block groups. Texas gas leases consist of only one active well, whereas Texas oil leases consist of one or more active wells. According to Texas Railroad Commission records (See Appendix C for more details on how this information was obtained), in 2012, the median oil lease was 1 well. However, on average, leases consist of 4.36 wells with a standard deviation of 21.7. The number of active wells on oil leases ranged from 1 to 1765. In 2012, on average, Texas oil leases make up 1.1 Census block groups with a standard deviation of 0.8 and they span from 1 to 90 Census block groups.

[4] According to Dun & Bradstreet (2015): "A branch is a secondary location of a business. It has no legal responsibility for its debts, even though bills may be paid from the branch location."

[5] According to Dun & Bradstreet (2015): "A headquarters is a business location that has branches or divisions reporting to it, and is legally responsible for those branches or divisions."

Figure 4.4: Proto-typical Multilayer Subsidiary Form in Natural Gas Production Industry



4.3.1.2. Size

Size has a significant, but inconsistent, effect on venting and flaring. Facilities that produce more oil vent and flare more extensively than those that produce less oil, and operators that produce more oil are more likely to engage in venting and flaring. In short, oil production has a significant positive correlation with venting and flaring. On the other hand, facilities that produce more gas vent and flare less extensively than those that produce less gas. However, the effect of facility gas production size on venting and flaring magnitude is smaller for larger gas producers and the effect of facility gas production size on venting and flaring engagement is larger for larger producers. Furthermore, while operators that produce more gas are less likely to engage in venting and flaring, operators that produce more gas vent and flare more extensively. The significant positive effect of size on venting and flaring magnitude suggests that because larger operators have more political and economic power, they are more likely to engage in disproportionate venting and flaring practices.

4.3.1.3. Complexity

While more complex facilities are related to more extensive venting and flaring, more complex operators are related to less extensive venting and flaring. Among venting and flaring facilities, for each number of wellbores located on the facility, the venting and flaring rate increases by 0.0879%, regardless of other facility and operator factors, and this relationship is statistically significant. On the other hand, among venting and flaring facilities, for each number of wellbores controlled by the facility operator, the venting and flaring rate decreases by 30.74%, regardless of other facility and operator factors, and this relationship is statistically significant. This suggests that while facilities with more complex parts are more prone to extensive venting and flaring, more complex operators vent and flare less.

4.3.1.4. Economic Costs

Various economic costs come to play when operators decide whether or not to flare and to what extent. (1) Because there are few incentives for the company to build pipeline and invest in technology until after a well has been drilled and the productivity and potential of the well has been established, facilities with newly established wellbores are expected to be positively associated with venting and flaring practices. (2) Since the primary purpose of natural gas extraction facilities is to extract natural gas, no oil, it is expected that , in comparison to oil facilities, natural gas extraction facilities have a negative association with venting and flaring practices. (3) Because there are greater opportunities to pool group resources to build pipeline infrastructures in densely developed areas, dense oil and gas extraction development areas are expected to be negatively correlated with venting and flaring practices. (4) Since it is costlier to establish infrastructure and pipeline in areas that are far from already established pipeline, it I expected that the distance between the facility and established pipeline infrastructures are positively associated with venting and flaring practices.

While facilities with newly drilled wells are more likely to vent or flare, there is no correlation between new drilled wells and venting and flaring rates. The estimated odds that a facility with newly drilled wells vents or flares is 4.12 greater than the corresponding odds for a facility that did not receive a permit, regardless of other facility and operator factors and this relationship is statistically significant. This suggests that because it is more economical to flare the first few days upon completion rather than invest in green technologies, facilities with newly established wells are more likely to engage in venting and flaring. However, over the course of the year, operators are just as likely to invest in technology and equipment to minimize flaring at facilities with newly drilled wells in comparison to facilities without new drilling.

While gas extraction facilities are just as likely to vent or flare as oil extraction facilities, gas extraction facilities vent or flare at a significantly lower rate than oil well sites. Among venting and flaring facilities, the venting and flaring rates of primarily gas well sites are about 0.05 smaller than the corresponding venting and flaring rates of oil well sites. This suggests that while venting and flaring is just as likely to occur at gas well sites in comparison to oil well sites, because the primary purpose of gas wells is to collect extracted natural gas, gas extraction facilities vent and flare at a significantly lower rate than oil extraction facilities.

The density of oil and gas extraction facility development has no effect on whether a facility vents or flares, yet areas in densely developed areas vent or flare at a significantly lower rate than those located in areas with few other oil and gas extraction facilities. Venting and flaring is just as likely to occur at oil and gas extraction facilities in dense oil and gas extraction facility areas. However, among venting and flaring facilities, for each number of other facilities within one mile, the venting and flaring rate decreases by 0.003%, regardless of other facility and operator factors, and this relationship is statistically significant. This suggests that venting and flaring is minimized in densely developed areas because in densely developed areas there are more economic incentives and opportunities to pool resources to invest in green technologies and build necessary infrastructures.

The distance between the facility and the nearest pipeline is a significant predictor of whether or not a facility vents or flares, but not as one would expect. Operators claim venting and flaring practices are primarily due to lack of available pipeline and the cost and time it takes to build pipeline in undeveloped areas. However, facilities nearer to established natural gas pipeline are significantly more likely to vent or flare than those further away and there is no significant correlation between venting and flaring rates and the distance to the nearest established natural gas pipeline. For each mile increase in distance between the facility location and nearest established natural gas pipeline, the estimated odds that the facility vented or flared decreases by .00000339, regardless of other facility and operator factors, and this relationship is statistically significant. This suggests that because there are few incentives to build natural gas pipeline, an operator will choose to vent or flare, even though established pipeline is nearby.

4.3.1.5. Gas Dependence

Operators more dependent upon natural gas production in comparison to the petroleum oil production vent and flare at a significantly lower rate. Among venting and flaring facilities, for each percent increase in the portion of the operator's production volume that comes from natural gas, the venting and flaring rate increases by 2% regardless of other facility factors, and this relationship is statistically significant. This suggests that because operators primarily involved in the natural production industry are more dependent upon the long-term sustainability of the natural gas industry, they are less prone to waste a significant amount of natural gas from venting or flaring.

4.3.2. Empirical Findings- Effect of Community Embeddedness on Venting and Flaring Practices

Results show while community embeddedness is related to whether or not the facility vents or flares, there is no relationship between community embeddedness and venting and flaring rates. The characteristics of communities significantly associated with venting and flaring include poverty rates and portion of Hispanic residents.

Facilities surrounded by communities with a lower portion of residents living at or below the poverty line are significantly more likely to vent or flare. For each percent decrease in the portion of residents surrounding the facility living in at or below the poverty line, the estimated odds that the facility vented or flared decreases by 0.0329121, regardless of other facility and operator factors, and this relationship is statistically significant. There is no significant relationship between surrounding poverty rates and venting and flaring rates.

Additionally, facilities surrounded by more Hispanic communities are significantly more likely to vent or flare. For each percent increase in the portion of Hispanics surrounding the facility, the estimated odds that the facility vented or flared increases by 0.0279328 regardless of other facility and operator factors, and this relationship is statistically significant. However, there is no significant relationship between the portion of the surrounding community that is Hispanic and venting and flaring rates.

In short, community embeddedness has a significant effect on facility participation in venting and flaring practices, but it does not influence the extent to which the facility vents or flares. Facilities surrounded by communities with less poverty and a higher portion of Hispanic residents are more likely to vent and flare. This suggests environmental racism and economic tradeoffs are associated with whether or not the surrounding community is exposed to venting and flaring, but not the extent to which the community is exposed.

4.3.3. Empirical Findings- Effect of Regulatory Embeddedness on Venting and Flaring Practices

Results consistently show that regulatory embedded is a key factor associated with facility venting and flaring practices. Permitting and violations are associated with both facility participation in venting and flaring practices and the extent to which the facility vents or flares.

State permitting of venting and flaring is related to the venting and flaring practices of facilities. Facilities who received a permit to legally vent or flare were significantly more likely to engage in venting and flare. The estimated odds that a facility that received a permit to legally vent or flare vents or flares is 18.174 greater than the corresponding odds for a facility that did not receive a permit, regardless of other facility and operator factors and this relationship is statistically significant. Similarly, among venting and flaring facilities, the venting and flaring rates of facilities that received a permit to legally vent or flare are about 3.32 greater than the corresponding logged venting and flaring rates of facilities that did not receive a permit to legally vent or flare.

The Texas Railroad Commission are also more likely to find more venting and flaring violations among venting and flaring facilities and those that vent and flare at a higher rate. Facilities who received more violations for illegally venting and flaring were significantly more likely to have vented or flared. For each increase in the number of venting and flaring violations the facility received, the estimated odds that the facility vented or flared increases by 2.1 regardless of other facility and operator factors, and this relationship is statistically significant. Likewise, among venting and flaring facilities, for each number of violations the facility received, the venting and flaring rate increases by 31%, regardless of other facility and operator factors, and this relationship is statistically significant.

In sum, state regulatory embeddedness is a significant factor predicting both whether a facility engaged in venting and flaring, and to what extent. Facilities with permits and those that have received violations are more likely to vent and flare and vent and flare at a greater rate than those that did not receive violations or legal permits.

4.4. Summary of the Structural Factors Underlying Venting and Flaring

Organizational structures and the political and economic structures surrounding the organization effect venting and flaring. Large oil production facilities and large natural gas producers vent and flare more extensively. While more complex facilities vent and flare more extensively, more complex operators vent and flare less extensively. Furthermore, operators less involved in the natural gas market (in comparison to crude oil) vent and flare more extensively. Economic costs are also key factors associated with venting and flaring. Facilities where there are newly drilled wells are more likely to engage in venting and flaring. Facilities classified as gas wells vent and flare less extensively than those classified as oil leases. Facilities with more other production facilities within a mile vent and flare less extensively than those in more remote production areas. Facilities with permits and violations are both more likely to vent and flare and vent and flare more extensively. Facilities surrounded by more Hispanic communities and communities with lower poverty levels are more likely to vent and flare.

These findings lead to five key conclusions:

(1) There is a “double disproportionality” associated with facility engagement in venting and flaring, but it is not associated with facility venting and flaring magnitude. While examining variation in whether or not a facility engages in venting and flaring and the characteristics of communities surrounding facilities, communities in low poverty, high Hispanic communities are disproportionately exposed to venting and flaring. However, community embeddedness does not have a significant impact on venting and flaring rates. This suggests economic

tradeoffs and environmental racism are associated with whether or not the facility engages in venting and flaring, but it has little effect on venting and flaring magnitudes- state regulation, size, economic incentives, and operator gas dependence are more significant factors.

(2) Venting and flaring is associated with state regulation. The state permits high venting and flaring facilities, and it targets high venting and flaring facilities with violations. However, as noted in Chapter 2, violators are rarely issued fines and instead are encouraged to file for permits. So, while state regulation effects venting and flaring, it does not produce adequate incentives to minimize venting and flaring.

(3) Large producers with more political and economic clout vent and flare more extensively.

(4) Economic incentives associated with dense oil and gas extraction development are related to less extensive venting and flaring.

(5) Operators less involved in the natural gas industry vent and flare more extensively. Because companies reliant upon natural gas sales have more long-term incentives to invest in the infrastructure and technology necessary to minimize venting and flaring, there is a negative correlation between operator gas dependence and venting and flaring practices.

4.5. References

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