The Emperor Has No Clothes:
The Limits of OPEC in the Global Oil Market

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1. Introduction

Scholars have long debated the causal impact of international institutions. Existing research considers the impact of the WTO on trade,[1] the IMF on fiscal and monetary policies,[2] and human rights treaties on state behavior.[3] Notable mostly for its absence within political science is the Organization of Petroleum Exporting Countries (OPEC), an institution that many people believe can and does manipulate the global price of oil. This is surprising. Oil is the world's most important commodity,[4] and changes in its price are commonly believed to have powerful economic and political consequences. Moreover, OPEC represents an intriguing test case for theories of international cooperation: like the WTO but unlike human rights treaties, there is a direct material reward for collective action in OPEC's case, so we might expect deep cooperation. Popular wisdom also holds that OPEC is influential, but economic studies investigating OPEC's market impact have had difficulty finding conclusive evidence. This generates two questions. First, does OPEC operate as a cartel, meaning that it significantly restricts its members' oil production in order to affect prices? Second, if OPEC is not actually a cartel, why do so many people believe that it is?

The first step is to investigate whether OPEC actually acts as a cartel.[5] Using some of the same tests used to evaluate the impact of the WTO and other organizations, I find that OPEC rarely if ever constrains or influences the oil production rate of its member states. This paper is not the first to question OPEC's effectiveness in restricting the oil supply.[6] However, there is sufficient ambiguity and debate to sustain OPEC's image, even among scholars, as a cartel that manipulates the price of oil by restricting supply. Therefore I conduct four empirical tests in search of OPEC's effect on oil production, at least two of which are entirely novel. I show that OPEC membership is not significantly correlated with lower oil production once other relevant factors are controlled for. I make no claim about whether OPEC could restrict oil supply in principle; I simply argue that it does not do so in practice. This is due in part, but not principally, to endemic cheating by OPEC members (*i.e.,*

[1] Rose 2004, 2007; Goldstein *et al*., 2007
[2] Simmons and Hopkins 2005; von Stein 2005
[3] Sikkink, 2011; Hafner-Burton and Ron, 2009
[4] By "most important commodity market," I mean oil is the most valuable commodity traded internationally, measured by total market. Other commodities are clearly more valuable on a per-unit basis.
[5] A cartel is defined as a group of firms (or states, in this case) that creates agreements about quantities to produce or prices to charge. "A cartel must not only agree on the total level of production but also on the amount produced by each member." (Mankiw, 2011: 351) Technical characteristics are given below.
[6] As I show below, the debate thus far has been principally among economists; the paucity of attention given to OPEC noted earlier describes political science. This disciplinary divergence has consequences: economic analyses of OPEC typically omit important political variables, potentially biasing the results.

oil production in excess of their quotas). A cartel needs to set tough goals and meet them; OPEC sets easy goals and fails to meet even those.

There was one occasion on which OPEC did have a significant impact on the world oil market, namely the 1973 oil crisis, but OPEC's role in the crisis has been greatly misunderstood. This paper explores the reasons for that misunderstanding, and how it endowed OPEC with a reputation as a manipulator of world oil markets.

If OPEC does not operate as a cartel, why do so many people believe that it does? I argue that the idea of OPEC as a cartel is a "rational myth" that supports the organization's true principal function, which is to generate political benefits for its members. Scholars have found that various organizations adopt rational myths[7] and OPEC would not be the first international institution to outlive its original mandate.[8] OPEC's current role is obscured in part by the complexity of the world oil market, in part by the fact that one of its members, Saudi Arabia, probably does have some market power on its own (distinct from the organization to which it belongs), and in part by misdirection by OPEC itself. The perceived market power of OPEC is a useful fiction that generates political benefits for its members with domestic and international audiences. I test this argument using a cross-national dataset on diplomatic recognition, and show that OPEC membership is significantly correlated with increased ambassadorial representation from other countries. Consequently, policymakers within OPEC have no incentive to undermine the idea that OPEC influences the world oil market. This does not necessarily mean that they are actively lying, but rather that they have an incentive to behave in ways that are consistent with the cartel idea so long as that behavior is not too costly. Other knowledgeable actors outside of OPEC, including oil executives, commodities traders, and scholars, fail to dispel the myth for various reasons described later. In sum, I argue that the story of OPEC is mostly about politics, not economics.

Beyond the intrinsic importance of OPEC and the world oil market, this inquiry offers three important lessons about international politics. First, the fact that such a widespread belief could be wrong sheds light on the process of ideational change and the failure to update beliefs. This contributes to a growing literature suggesting that actors' knowledge of causation, especially in economic affairs, is imperfect.[9] Second, the case of OPEC offers a complement to understanding international organizations as a product of rational design.[10] Most accounts assume that there is a good fit between an organization's original mandate and its enduring function, but OPEC's history suggests that at least some organizations are designed long before their eventual function is fully understood. Third, the paper fills a gap in the research assessing the impact of institutions,[11] moving beyond the oft-studied WTO and IMF/Bank. It contributes to recent work on oil-producing states' participation in

[7] McNamara, 2002; Boiral, 2007; Meyer and Rowan, 1977
[8] Barnett and Finnemore, 1999; Gray, 2011
[9] Darden, 2009; Legro, 2005; Blyth, 2002; McNamara, 2002
[10] Koremenos *et al*., 2001
[11] Martin and Simmons 1998; Botcheva and Martin, 2001

international organizations.[12] Finally, the evidence that OPEC is not a cartel calls into question research in political science that is based on that premise.[13]

The paper proceeds as follows. The next section reviews and critiques the existing literature on the role of OPEC. The third section tests for OPEC's role as a cartel. I find no evidence that OPEC has systematically suppressed its members' oil production since 1980. The fourth section then considers how OPEC influenced the oil market in 1973, thereby shaping beliefs about the organization. The fifth section shows how OPEC operates as a political club that generates significant diplomatic benefits for its members. A final section concludes.

2. Existing ideas about OPEC

OPEC was established in 1960. Modeled after the Texas Railroad Commission, the founders hoped that it would act as a cartel.[14] Initially this proved impossible because OPEC member countries did not gain control of their own oil production decisions until the 1970s. Thus OPEC began to assign formal production quotas in 1982. The organization meets regularly and makes decisions by consensus, which effectively gives each state a veto.[15] OPEC currently has twelve member states: Algeria, Angola, Ecuador, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the UAE, and Venezuela.[16] Collectively, OPEC produced 41 percent of the world total in 2009, though individually even its largest producer has a relatively small market share (Saudi Arabia, 12 percent).[17] If OPEC were able to cooperate flawlessly, it might exert significant market influence.

The significant oil price increases of the 1970s convinced many observers that OPEC had become the cartel that its founders envisioned.[18] Stephen Krasner even argued in a 1974 article entitled "Oil is the exception" that the characteristics of oil made it especially susceptible to an international cartel compared to other commodities.

Yet over time scholars debated whether OPEC is a cartel. Many studies cast significant doubt on the idea.[19] Some scholars suggested a 'dominant producer' model, namely that Saudi Arabia alone exerted market power, as it seems to be the only state with sizeable surplus production capacity.[20] Others simply argued that OPEC had little market impact and

[12] Ross and Voeten, 2011; Rudra and Jensen, 2011

[13] Blaydes, 2004; Alt *et al.*, 1988

[14] Parra, 2004; Yergin, 2008

[15] OPEC can set or change its members' quotas for oil production at any of its regular meetings, or it can do so in an 'extraordinary session.' Each member state appoints a delegate to represent it at OPEC meetings, typically the Minister of Oil or its equivalent.

[16] Indonesia and Gabon were previously members.

[17] *BP Statistical Review of World Energy*

[18] Osborne, 1976; Seymour, 1980; Doran, 1980; Adelman, 1982, 1995; see also internal US government reactions during the 1970s in Qaimmaqami and Keefer, 2011

[19] Griffin, 1985; Dahl and Yucel, 1991; Alhajji and Huettner, 2000; Reynolds and Pippenger, 2010; Cairns and Calfucura, 2012

[20] Moran, 1982. Adelman (1982) suggests that OPEC wobbles between acting as a dominant firm and as part of a cartel depending on market conditions.

that oil prices were the product of other market factors.[21] More recently, scholars have noted a series of limitations on OPEC's effectiveness.[22] For instance, Bremond *et al.* found that OPEC is a price taker, not a price setter, in the majority of sub-periods that they consider.[23] Still, none of the critics of the OPEC-as-cartel hypothesis offered a compelling alternative account of the organization's role.

Even as scholars cast doubts on its effectiveness, there was sufficient ambiguity to sustain OPEC's image as a cartel. Kaufman *et al.* answer the question "Does OPEC matter?" [for oil prices and production] in the affirmative, as do others.[24] Smith finds that "OPEC is much more than a non-cooperative oligopoly, but less than a frictionless cartel (*i.e.,* multi-plant monopoly)."[25] Despite pointing to OPEC's limitations, Bremond *et al.* conclude that "OPEC influence has evolved through time" rather than rejecting it as a cartel, and they support the idea that a membership subset sustains OPEC's ability to influence markets, as earlier research argued.[26]

This ambiguity leads many scholars to continue to believe that OPEC is a cartel, albeit imperfect. Hyndman asserts "OPEC is obviously a cartel that restricts output in order to obtain super-competitive profits …", an assertion shared by other economists.[27] This is true also among many political scientists.[28] For instance, Blaydes argues that there is an intra-OPEC bargaining game to divide the cartel's profits, in which oil-rich states allow oil-poor states to cheat on their OPEC quotas to a greater extent than the oil-rich ones do.[29] Yet Blaydes provides no evidence of cartel profits. Empirically, she studies only the behavior of the OPEC members, and does not compare them to non-OPEC members, so it is not possible to assess how either the oil-rich or oil-poor OPEC states' production behavior differs from other states.

Given the extent of scholarly debate, it is perhaps not surprising that many journalists and policymakers continue to view OPEC as a cartel. Yet international relations theory offers some important reasons to doubt that view. As Downs *et al* argue, even states that appear to be cooperating might be acting as they would have done even without the agreement, because states design international agreements to avoid requirements for costly adjustments to their behavior.[30] Thus OPEC quotas, even if strictly obeyed, might not actually require states to deviate significantly from their counterfactual behavior in which no quotas existed.

Consequently, there is a need to have a fresh look at the evidence. None of the existing studies provide any direct evidence that OPEC members produce less oil than they would in

[21] Johany, 1980; MacAvoy, 1982
[22] Gülen, 1996; Kohl, 2002; Kaufman *et al.,* 2004, 2008; Smith, 2005; Hyndman, 2008
[23] Bremond *et al.,* 2012
[24] Kaufman *et al.* 2004, 2008; Demirer and Kutan, 2006; Bentzen, 2007
[25] Smith, 2005: 74
[26] Bremond *et al.,* 2012; Teece, 1982; Crémer and Salehi-Isfahani, 1980, 1991
[27] Hyndman, 2008: 812; Smith, 2005, 2009; Simpson, 2008
[28] Ikenberry, 1988; Alt *et al.,* 1988; Lieber, 1992; Shaffer, 2009; Sovacool, 2011
[29] Blaydes, 2004
[30] Downs *et al.,* 1996

the counterfactual world in which OPEC did not exist. They typically focus instead on measuring the degree to which production changes in one OPEC member are correlated with production changes in the rest of OPEC, a correlation that could be explained in a variety of other ways, such as common reactions to market conditions.[31] Moreover, many models do not incorporate relevant political variables, such as the regime type and investment risk of a state, creating the potential for omitted variable bias.

3. OPEC as market manipulator?

In this section I test whether OPEC has had significant impact on its members' production since OPEC first began to assign quotas ("market allocations") to its member countries in 1982. Many observers have noted that cheating on OPEC quotas is widespread, but there are additional problems which are probably even more important. I consider four major tests of OPEC's market impact.

The tests focus exclusively on OPEC's impact on oil production, rather than oil prices, for two reasons. The first reason is practical: the relationship between OPEC quotas and world oil prices is fraught with potential endogeneity. High oil prices might cause OPEC to lower its production quotas, but if OPEC actually has market power, lower OPEC quotas would cause high oil prices. Thus on its own the (lack of) correlation between OPEC quotas and oil prices does not give us enough information to make valid inferences about its status as a cartel.[32] Some sophisticated statistical techniques might be used to try to get around this problem, but they are not satisfying.[33] The second reason is perhaps even more important: production constraints are a necessary element of cartel behavior. If OPEC is not constraining its members' production, then it is not a cartel, by definition.[34] This would be a substantial research finding on its own. Even if OPEC was somehow affecting market prices without constraining its members' production, it would be doing so in some other way, and not as a cartel.

What evidence should we expect if OPEC is a cartel? Mankiw defines a cartel as a group of firms (or states, in this case) that creates agreements about quantities to produce or prices to charge, and further it "must not only agree on the total level of production but also on the amount produced by each member."[35] This definition implies that a gap between market price and marginal cost of production is not by itself evidence of a cartel.[36] Instead, we should see signs that the organization is cooperating to restrict production (to drive prices up). We should see the following kinds of evidence: new members of the cartel have

[31] Griffin, 1985; Kaufman *et al*., 2008; Bremond *et al,* 2012

[32] A simple bivariate OLS regression between world oil prices and OPEC's aggregate production target 1982-2009 yields an R-squared value of just 0.15.

[33] To date, no one has identified a plausible instrumental variable or natural experiment. Other approaches exist but have not produced a widely-accepted conclusion on the cartel question: Dahl and Yucel, 1991; Gülen, 1996; Alhajji and Huettner, 2000; Reynolds and Pippenger, 2010; Bremond *et al.,* 2012

[34] Mankiw, 2011: 351

[35] Mankiw, 2011: 351

[36] Producers who stop producing before marginal costs equal market price (like some OPEC producers, possibly) are not behaving perfectly competitively, but that does not necessarily imply cartelization.

a decreasing or decelerating production rate (test #1); members should generally produce quantities at or below their assigned quota (test #2); changes in quotas should lead to changes in production, creating a correlation (test #3); and members of the cartel should generally produce lower quantities (*i.e.*, deplete their oil at a lower rate) on average than non-members of the cartel (test #4). Failure to observe any of these phenomena would cast doubt about OPEC's status as a cartel, though none is totally determinative. The fourth test is perhaps the strongest, as it is difficult to imagine how an organization that does not restrict output compared to non-members could be called a cartel – how else could it increase average prices?[37] To preview the results, OPEC fails all four of the tests.

3.1 First test: Does joining OPEC affect oil production?

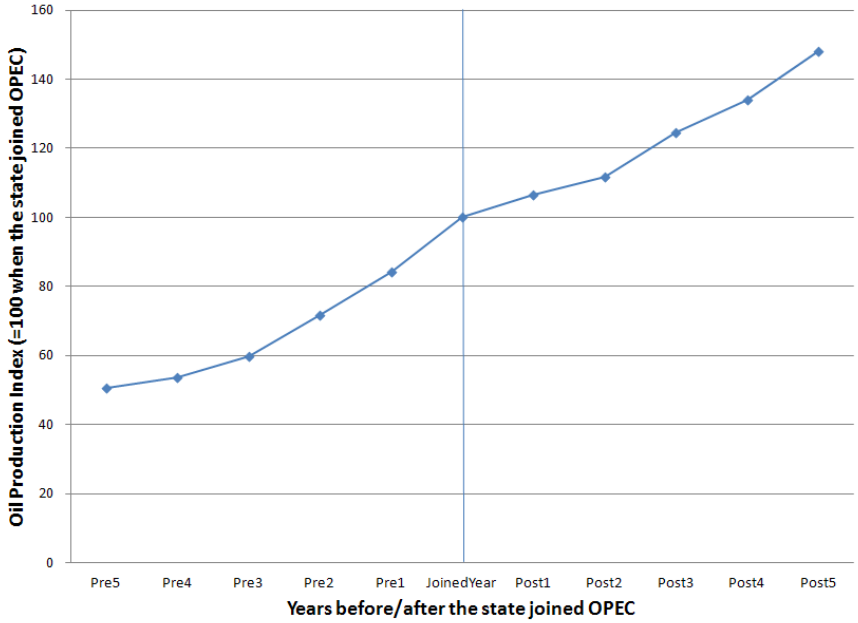
The first test of OPEC as a cartel is the impact that the organization has on the oil production rates of new members. I adopt a before-and-after methodology, following the event history approach used by Rose in his evaluation of the WTO on its members' trade levels.[38] If OPEC is having a constraining influence on oil production, states that join OPEC should have a decreasing or decelerating oil production rate. Conversely, states that leave OPEC should have an increasing oil production rate.

There is very little evidence that OPEC is having such an effect. Figure 1 shows the average oil production rate of all states in the five years before they join OPEC and the five years after they join OPEC. Each state's oil production is standardized to a value of 100 in the year that it joined OPEC, so that the relative increase or decrease can be compared. As the graph shows, the average production rate is increasing at almost an identical rate before and after the state joins OPEC – thereby providing no indication that OPEC constrains oil production.

[37] One of OPEC's stated goals is to stabilize prices. It is possible that an organization could seek to stabilize prices without affecting the long-run average price or production levels of its members. Yet such an organization could not be considered a classic cartel, as it would not be profit-maximizing. It seems unlikely that OPEC is simply trying to stabilize prices without increasing their own profits; even its members do not make that claim.

[38] Rose, 2004, 2007; Goldstein *et al.*, 2007

Figure 1: Impact of Joining OPEC on Oil Production

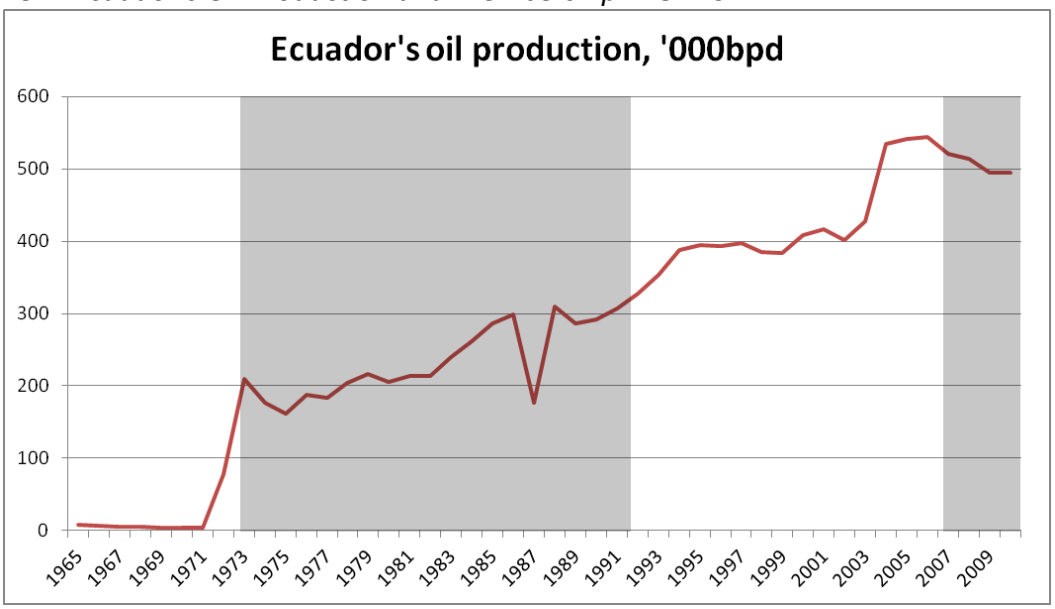


One state that is especially note-worthy is Ecuador, which joined OPEC in 1973, suspended its membership in 1992, and then re-joined in 2007. No other state has this kind of fluctuation in OPEC membership. Ecuador's stated reason for leaving OPEC in 1992 was that it was unable to pay the $2 million membership fee and it wanted a higher oil production quota; it is hard to know how much this statement (or which part of it) accurately reflects its true reasons for leaving.[39] Figure 2 shows Ecuador's oil production rate over time. Consistent with the pattern observed in Figure 1, there is little to suggest that OPEC membership constrained Ecuador's oil production rate. Ecuador's oil production began in earnest at the same time that it first joined OPEC in 1973. Its production rate increased fairly steadily for the next three decades. Ecuador's departure from OPEC in 1992 made no discernible difference in the trajectory of its oil production rate. Its production peaked in 2006 and modestly declined thereafter. An optimistic interpretation of this latter trend might be that Ecuador lowered its production rate in anticipation of rejoining OPEC, which it did in 2007. A more plausible alternative explanation has to do with Rafael Correa as President of Ecuador, whose election in 2006 on a populist platform made the business environment considerably less welcoming for international oil companies. The latter interpretation is much more compatible with the government's expressed desire to increase, rather than decrease, Ecuador's oil production.[40]

[39] "Ecuador Set to Leave OPEC", September 18, 1992. *New York Times*. http://www.nytimes.com/1992/09/18/business/ecuador-set-to-leave-opec.html

[40] Latin American Herald Tribune, July 7 2011: http://www.laht.com/article.asp?ArticleId=405112&CategoryId=14089

Figure 2: Ecuador's Oil Production and Membership in OPEC



Note: Shaded areas=years of Ecuador's membership in OPEC.

Other OPEC membership changes since 1982 have been rare. Only one state (Angola) has joined since then, while two others have left (Gabon, 1994; Indonesia, 2009). Angolan oil production rose significantly after joining OPEC. For Indonesia and Gabon, leaving OPEC had little effect on the trajectory of the state's oil production rate: basically flat in Indonesia's case, and steadily increasing for Gabon. Of all the states that have ever joined or left OPEC, Gabon is the only case in which one could plausibly argue that OPEC membership significantly lowered the trajectory of its oil production rate, based on a significant production decline after it joined OPEC in 1975. Yet it could also be coincidence. Regardless, it is implausible that such a small producer as Gabon is the driving force behind OPEC.

3.2 Two tests on the impact of OPEC quotas

The second test focuses on cheating. A strong cartel would have little cheating, but in OPEC cheating is endemic. Over the period 1982-2009, the organization as a whole over-produced a staggering 96 percent of the time. I use monthly production data, drawing on data from the US Energy Information Agency.[41] Table 1 shows the variation among OPEC members. All but two members over-produced in more than 80 percent of the time. Moreover, some OPEC countries manage to avoid having quotas for significant periods of time.[42] The magnitude of over-production varies over time and across states, but it is not

[41] EIA estimates can differ from OPEC's reported production data. The latter are not fully credible, as they are self-reported by member countries which have an incentive to dissimulate when they are overproducing.

[42] Iraq has not had a quota since 1998. Iran, Angola, and Ecuador have also had periods without a quota. "OPEC Production Allocations," at: http://www.opec.org/opec_web/static_files_project/media/downloads/data_graphs/ProductionLevels.pdf

trivial: on average, the nine principal members of OPEC produced 10 percent more oil than their quotas allowed.[43] This is equivalent to 1.8 million barrels per day, on average, which is more than the total daily output of Libya in 2009. Even on the relatively rare occasions when member countries are not over-producing, the root cause is often involuntary production constraints such as a strike or accident, rather than a conscious decision by the government to obey to its OPEC quota.

Table 1: Relationship between OPEC quotas and production, 1982-2009

OPEC Member	% Months Production Exceeds Quota	Correlation between Production and Quota*		
		beta coeff.	p-value	R-sqr
Algeria	100%	0.105	0.035	0.014
Iran	72%	0.002	0.981	0.000
Iraq**	82%	0.065	0.819	0.000
Kuwait	90%	0.106	0.450	0.002
Libya	83%	0.183	0.038	0.014
Nigeria	88%	0.138	0.383	0.002
Qatar	90%	0.118	0.245	0.004
Saudi Arabia	82%	0.138	0.130	0.007
U.A.E.	96%	-0.140	0.170	0.006
Venezuala	77%	0.095	0.472	0.002
OPEC-9 (excl Iraq)	**96%**	**0.153**	**0.017**	**0.018**

* Values displayed are from bivariate OLS regression of first-differences, where DV = changes in production

** Up to March 1998 only. Iraq was not assigned an OPEC quota after March 1998.

One might wonder how much this level of cheating actually undermines the cartel's operation. One possibility is that the OPEC anticipates a certain amount of cheating and sets the quotas accordingly. The real questions are whether OPEC production rates are affected by quotas, and whether they are lower than the counterfactual in which no quotas were set. The remaining tests investigate those questions.

The third test reveals that OPEC quotas do a poor job of accounting for variation in production levels. Returning to Table 1, it shows the R-squared value of a linear bivariate time-series regression between changes in an OPEC member's production and changes in its quota.[44] For all but two of the states (Libya and Algeria), changes in the OPEC quota are not found to be correlated with production at standard thresholds of statistical significance. The R-squared for the nine major OPEC producers as a group was just 0.018, meaning that at most 1.8 percent of the variation in the month-to-month changes in this group's oil

[43] The nine members are: Algeria, Iran, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, UAE, and Venezuela. Calculated using data from the U.S. EIA for actual production, and from OPEC for market allocations, 1982-2009. Note that Smith (2008) estimates that overproduction averages just 4 percent using ostensibly the same data (though for a different time period).

[44] Formally, the dependent variable is the first difference in oil production, and the independent variable is the first difference in oil quota. The observations are monthly, although the values are measured in barrels per day.

production can be explained by changes in their OPEC quotas. In other words, at least 98 percent of the variation is explained by factors other than changes in their OPEC quotas.

Even in the face of this evidence, one could still argue that OPEC acts as a cartel in one of two ways. First, one could argue that anticipation by various actors in the oil market obscure OPEC's constraining effect. For instance perhaps OPEC members change production levels between OPEC meetings because they anticipate forthcoming changes in the quotas.[45] Second, one could argue that even if OPEC's quota system is entirely meaningless, OPEC still affects oil production over the long-term because it encourages the adoption of a slow depletion policy and under-investment in production capacity.[46] Both of these propositions have a clear empirical implication: the oil production or depletion rate of OPEC member states ought to be significantly less than the production/depletion rate of comparable non-OPEC members. This leads to my fourth test.

3.3 Final test: Do OPEC members have slow production rates?

Depletion rates vary widely around the world. (A country's depletion rate is equal to its oil production divided by its proven oil reserves.) Broadly speaking, depletion rates will vary according to three supply-side factors (in addition to global demand for oil): the business climate of the producing country (e.g., technical skills of companies, investment climate, the incidence of war or sanctions, etc.); the "lift costs" of oil production (costs of getting oil to the ground, including exploration); and the government's depletion policy. OPEC membership could affect depletion policy, but so could other factors, such as the state's fiscal needs, the incentives generated by its position in the global market (e.g., as a 'dominant firm'), and the time horizons of the political leadership.

I investigate the cross-national variation in depletion rates over a thirty year period, 1980-2010.[47] The analysis includes all 42 oil-producing states for which data are available.[48] Descriptive statistics are in an appendix. OLS regression is used on the dependent variable, which is the depletion rate in each state-year.[49] The models use Huber-White standard errors clustered by state, on the premise that standard errors for multiple observations within a state cannot be assumed to be independent of each other. All independent variables are lagged by one year to reduce the potential for endogeneity.

Several explanatory variables are used, reflecting the factors just identified. One is the variable *OPEC,* a dichotomous measure indicating whether the state is a member of OPEC in a given year, which is of crucial interest to this inquiry. The second is *world economic growth*, measured by that year's annual global GDP growth, as a proxy for global demand for oil which might create incentives for especially high or low depletion rates in a particular year. The third is *fiscal strength*, measured by the natural log of oil reserves per capita. This

[45] Parra, 2004: 321-322
[46] Smith, 2009
[47] BP *Statistical Review of World Energy* provides data on proven reserves starting only in 1980.
[48] BP *Statistical Review of World Energy* provides data on 47 oil-producing countries, but Brunei, Chad, Equatorial Guinea, Turkmenistan, and Uzbekistan are not included due to data availability for other variables.
[49] To check robustness, the regressions were also conducted using a tobit model; the results were similar.

variable is included because states with large oil reserves per capita can typically meet the fiscal demands of the government without maximizing production.[50] Data on oil production and oil reserves are from the BP *Statistical Review of World Energy*. Fourth, the state's *investment risk* affects the ease with which international businesses can operate and the extent to which they invest in oil production capacity.[51] It is measured using the (inverse) risk score from the International Country Risk Guide. Fifth, the state's regime type (as measured by Polity IV) is included, as it could affect the state's depletion policy in a variety of ways.[52] Sixth, a dichotomous variable, *war*, indicates those state-years in which a state was engaged in a major international war in its own territory, such as the Iran-Iraq or Iraq-Kuwait wars. Seventh, another dichotomous variable, *sanction*, indicates observations in which a state was the target of a major international sanction.[53] *Lift costs* of production (*i.e.,* costs of getting oil to the ground, including exploration) are included only as a robustness check, as discussed below.[54]

Table 2 presents the results of regression analyses. Model 1 shows a simple bivariate model that indicates that OPEC membership is statistically associated with low depletion rates, as expected by the conventional "OPEC-as-cartel" hypothesis. The statistical significance of OPEC membership disappears, however, when other variables are added in the subsequent models. Model 2 shows a baseline model, without taking into account the potential impact of OPEC. As expected, *investment risk* and *fiscal strength* are negatively correlated with the depletion rate, reflecting the fact that poor investment climates inhibits oil production, and oil rich states have low fiscal needs and thus long time horizons for depletion.

[50] Teece, 1982; Cremer and Salehi-Isfahani, 1991. My use of this measure follows the convention in previous research. Other measures of fiscal strength such as government debt or expenditure ratios are possible but less preferable because they do not necessarily indicate surplus oil reserves, i.e., the state's capacity to meet fiscal demands without maximizing production.

[51] Jensen and Johnston, 2011

[52] Jensen, 2006; Li, 2009

[53] Data from Hufbauer *et al.*, 2008

[54] Data from Waghorn *et al.*, 2006

Table 2: Regression analysis on states' oil depletion rates, 1980-2009

	(1)	(2)	(3)	(4)	(5)	(6)
OPEC member - all	-3.9569		-0.733			-0.81
	(-4.08)**		(-0.76)			(-0.84)
Saudi Arabia				-1.625	-1.734	
				(-1.59)	(-1.26)	
OPEC member - non Saudi				-0.683		
				(-0.71)		
OPEC core member					-0.911	
					(-0.6)	
OPEC non-core member					-0.627	
					(-0.62)	
Polity Score		0.039	0.034	0.03	0.028	0.052
		(0.73)	(0.68)	(0.59)	(0.5)	(0.91)
World Economic Growth		0.051	0.044	0.045	0.046	0.047
		(0.76)	(0.67)	(0.68)	(0.68)	(0.71)
Fiscal Strength		-0.992	-0.91	-0.905	-0.892	-0.905
		(-4.42)***	(-3.18)***	(-3.15)***	(-2.68)**	(-3.16)***
Investment Risk		-0.084	-0.079	-0.08	-0.081	-0.079
		(-2.59)**	(-2.33)**	(-2.36)**	(-2.4)**	(-2.37)**
International War		1.097	1.155	1.112	1.043	1.104
		(0.8)	(0.86)	(0.83)	(0.69)	(0.86)
International Sanctions		-0.649	-0.61	-0.654	-0.677	-0.57
		(-1)	(-0.98)	(-1.05)**	(-1.1)	(-0.92)**
Lift Cost						-0.17
						(-1.09)
Observations	1286	993	993	993	993	993
R-squared	0.181	0.373	0.376	0.377	0.377	0.379

t-scores in parentheses (robust standard errors clustered by state)
* significant at 10%; ** significant at 5%; *** significant at 1%

In Model 3, OPEC membership is re-introduced to the regression. The new variable is not statistically significant and does nothing to improve the explanatory power of the model (the R-squared moves from 0.373 to 0.376). The t-statistic is just -0.76, indicating that we cannot reject the null hypothesis that OPEC membership has no impact on a state's depletion rate.

Thus OPEC members produce oil at more or less exactly the same rates that they could be expected to produce in the absence of OPEC. The findings imply that, to the extent that OPEC members under-produce compared to non-OPEC members, they do so because of other factors in the model (e.g., fiscal strength, investment risk) that have nothing to do with their OPEC membership. Some OPEC members might restrict their depletion rate as a conscious act of policy, but they appear to do so out of their own self-interest, without institutional support from OPEC. For instance, Saudi Arabia appears to maintain spare production capacity which it uses strategically to alter the oil supply.[55]

[55] Yergin, 2008; Parra, 2004

Some OPEC members tend to produce oil at rates as fast or faster than comparable non-OPEC members. For instance, Indonesia and Ecuador often had depletion rates higher than the global average despite being members of a "cartel" with the nominal goal of restricting oil production. Other OPEC members, like Saudi Arabia and the other Gulf monarchies, produced more slowly, but this seems adequately explained by their market position, low fiscal needs, and business inefficiencies.[56] Note that several countries outside of the OPEC "cartel" had depletion rates that were as low or lower than most OPEC members, again probably due to the poor business and investment climates in those countries.[57]

What about the 'dominant producer' hypothesis? Model 4 and 5 in Table 2 suggest that it is plausible that Saudi Arabia has a significantly lower depletion rate than one would otherwise expect, implying that its policymakers could be consciously choosing a slow depletion rate to affect the world oil market. Moreover, Saudi Arabia varies its depletion rate considerably over time. Its motives for the changes seem to vary from case to case, as Saudi Arabia sometimes seeks higher oil prices (e.g., 1982-85), greater market share (e.g., 1985-86),[58] or to provide emergency oil supply (e.g., in the wake of Iraq's invasion of Kuwait in 1990). To assess the dominant producer idea, Model 4 is applied. It is the same as Model 3 except that it divides the *OPEC* variable in two: an indicator variable for Saudi Arabia, and one for all other OPEC states. The coefficient for *Saudi Arabia* is more than double the size of the coefficient for the other OPEC states, and while it is still not statistically significant at standard thresholds, it is close (t-score=1.59, $p<0.12$). Some scholars have argued that OPEC is divided between a "core" and "non-core" set of member states, in which the core oil-rich states deplete their oil more slowly.[59] Model 5 tests this possibility by further dividing the OPEC variable into three categories: Saudi Arabia, other OPEC core states (defined as Kuwait, UAE, Qatar, and Libya), and the "non-core" OPEC countries. In Model 5, the coefficient for Saudi Arabia is again the strongest and most negative, followed by the other "core" OPEC countries. However, none of the variables are statistically significant, and only Saudi Arabia's is even close (t-score is 1.26 for Saudi Arabia, compared to 0.60 and 0.62 for the rest of OPEC). Finally, Model 6 controls for *lift costs*; the findings are consistent with Model 3.[60] In sum, these models provide little to no evidence that OPEC has any systematic causal effect on depletion rates, and there is some (weak) evidence of Saudi Arabia as a dominant producer.

[56] Saudi Arabia and the other Gulf monarchies fall into this category. In countries like Iran and Iraq, low depletion rates are also strongly influenced by the poor business climate in those states, which in turn are affected by factors like managerial incompetence, wars, corruption, and political risk for investments.

[57] Examples include Azerbaijan, Mexico, Equatorial Guinea, and Kazakhstan. Equatorial Guinea and Kazakhstan also have relatively high reserves per capita, suggesting low short-term fiscal needs and longer-time horizons.

[58] Yergin, 2008; Parra, 2004

[59] Blaydes, 2004; see also Teece, 1982; Crémer and Salehi-Isfahani, 1980, 1991; Alhajji and Huettner, 2000

[60] Unfortunately, there is a lack of publicly-released, cross-national time-series data for measuring lift costs. As a proxy, the lift cost data for different countries can be estimated using data from a Goldman Sachs report on the largest 125 upstream development projects under development (Waghorn *et al.,* 2006). The issue of data quality is considered further in the discussion of robustness checks.

As in all statistical models, it is impossible to affirm the null hypothesis (i.e., to *prove* that OPEC has no impact) but there is no evidence that OPEC is having a causal impact. One might wonder whether the statistical tests here are too imprecise to identify the effect OPEC is having on its members' depletion rate. To test this idea, let us suppose that the difference between an OPEC member (except Saudi Arabia) and its baseline predicted oil production (from Model 2) is really caused by a difference in depletion policy, not simply statistical noise. On average, OPEC countries (except Saudi Arabia) produce 6.6 percent less oil than predicted.[61] In 2009, 6.6 percent of non-Saudi OPEC oil was 1.6 million barrels per day, or 2.0 percent of the world oil market. This is not a large amount, and it is difficult to believe that such an amount is having a major impact on world oil prices, even assuming (i) that it is a conscious policy of the OPEC states and (ii) that it induces no supply substitution from non-OPEC oil sources.

One might wonder whether selection bias is a threat to the analysis. OPEC membership is not random. Only states with relatively large oil reserves are likely to join OPEC. We might expect such states to have relatively low depletion rates, because states with large oil reserves could meet their fiscal needs even without maximizing oil production. Yet if OPEC "selects for" the states with low depletion rates, that should make it even easier to observe that OPEC states systematically under-produce compared to non-OPEC states in the analyses presented in Table 2. There is no such evidence. The only way that a selection effect could be masking OPEC's impact as a cartel is if the states that join OPEC are systematically likely to have higher depletion rates than non-OPEC members. There is no reason to believe that is true.

One other striking feature of the market for oil is its remarkable resilience to the impact of international events such as wars and economic sanctions. Although there can be little doubt that wars do have impact in some circumstances (e.g., Kuwait in 1990), the evidence suggests that those disruptions occur only in the face of truly catastrophic violence and even then are quite short-lived. International sanctions, such as those placed on Angola, Libya, Syria, Sudan, and Iran, appear to have had very little impact on oil output (although Iraq for some but not all of the 1990s may be an exception to this trend). This does not necessarily indicate the ineffectiveness of economic sanctions, however. Often there were other goals of the sanctions besides restricting oil production, such as limiting the international travel of autocratic leaders or restricting weapons purchases. Additional work is needed to evaluate the true effectiveness of sanctions on oil-exporting states.

The statistical models were subjected to a battery of robustness checks, the full description of which is available in an appendix. Here I briefly summarize them. I controlled for additional variables such as civil wars, low-intensity civil conflicts, and the Cold War. I changed the dependent variable to the state's production rate (rather depletion rate). I used alternative measures of oil reserves, to account for some known flaws in oil reserves estimates. I used alternative specifications for the regression model, such as a tobit model

[61] Calculated by subtracting actual depletion rate minus the post-estimation predicted rate from Model 2

and panel fixed-effects model. None of these changes materially altered the results in Table 2.

I also tested the possibility that OPEC only has an effect on its members' production in certain time periods or under tight market conditions. To do this, I first identified five year periods, starting in 1980, and used period-specific variables for each of the key explanatory variables. I also tested OPEC's significance during times of tight market conditions, using the estimated amount of excess oil production capacity available worldwide in a given year. Again, I found no evidence of OPEC's impact.

A plausible interpretation of the results in Table 2 is that OPEC membership is epiphenomenonal to an underlying relationship between the size of a state's oil reserves and its depletion rate. States with large oil reserves per capita are likely to join OPEC, and they are also likely to adopt a slow depletion rate. Yet OPEC itself is doing no causal work on the rate of depletion; the real causal driver is the size of the state's oil reserves.

In sum, I used four tests to try to identify the market impact of OPEC, and each test returns the same basic result: there is no evidence that OPEC is restricting its members' oil production rate as a cartel would.

4. Formation of Beliefs about OPEC in 1973

If OPEC is not a cartel, why do many believe that it is? The events of 1973 are a major contributing factor. That year's oil crisis was one occasion (perhaps the only one) on which OPEC did have a significant impact on the world oil market. Yet OPEC's role in the crisis has been greatly misunderstood. Many observers incorrectly concluded that OPEC was a cartel.

OPEC took three actions in 1973 that contributed to the increase in prices. First and perhaps most importantly, OPEC members dramatically raised the "posted prices" of their oil, from $2.90 to $11.65 per barrel.[62] Posted prices and market prices were not the same thing. Posted prices set the nominal value of the oil extracted by the international oil companies (IOCs), and formed the basis for tax and royalty payments from the IOCs to the oil-producing states.[63] Market prices were the unit-revenues that the IOCs actually received by selling the crude oil in the downstream market. The change in 1973 increased the tax payments of the IOCs, and thus increased market prices. Today, "posted prices" no longer exist in the same way.

Second, OPEC encouraged a wave of nationalizations in the oil industry, including Libya (1970), Algeria (1971-74), Iraq (1972), Venezuela (1974), Kuwait (1975-77), and Saudi Arabia (1973-1980). The wave of nationalization meant that the production decisions over much of the world's oil reserves were no longer controlled by the 'Seven Sisters,' as the big Western IOCs were known. It is difficult to quantify the effect of nationalizations (and concurrent loss of production control by the international companies) on the price of oil, but it seems

[62] Yergin, 2008: 607. Prices moved from $1.80 in 1970 to $2.90 in mid-1973 to $11.65 in December 1973.

[63] Until October 1973, the IOCs and host governments negotiated the posted price of oil, on the basis of which the IOCs were required to pay royalties and tax payments. In October 1973, OPEC governments unilaterally increased the posted prices, forcing the IOCs to pay higher taxes/royalties if they wished to continue operating on their territories.

clear that it unsettled the market and amplified a market expectation that oil would be costly in the future.[64]

Third, some OPEC members implemented a short-term embargo against the United States and others as part of the 1973 Arab-Israeli War.[65] The embargo started in October 1973 and officially ended five months later. Yet even by the end of 1973, the Arab producers were beginning to relax the production restrictions.[66] Moreover, oil companies responded to the embargo by rerouting petroleum to offset its impact.[67] The companies' behavior reflected the fungibility of the world market: since the Arab producers continued to sell into the world market, their oil shipments to other countries freed up oil supply from non-Arab producers that could be sold to the embargoed countries. This is not to say that the supply shift was seamless, as much of the world oil supply in 1973 was based on long-term contracts and rerouting was not flawless. Still, on a global scale, the actual magnitude of the supply disruption was both temporary (a few months at most) and relatively small (about 4 percent of total OPEC output, or 2-4 percent of total world output).[68]

Perhaps the biggest impact of the embargo was psychological. The embargo solidified OPEC's image as a cartel and exacerbated fears that the world was running out of oil. The US government compounded this effect by imposing domestic price controls on gasoline, leading to shortages and long lines at gasoline stations. These shortages were a consequence of US domestic policy, not the embargo: if prices had been allowed to rise, the market would have cleared on its own.[69]

Much has changed since 1973. Two of the three actions that OPEC took in 1973 cannot be repeated: posted prices no longer exist, and oil nationalization has already happened in most major producers. Only the third action taken by OPEC members, an embargo, could happen in today's oil market, and in terms of affecting oil prices, it might have been the least important of the three actions. Moreover, oil-consuming countries have put in place a number of safeguards to mitigate the effect of such an embargo.[70] Without insisting that it is impossible, OPEC is unlikely to ever again influence the oil market as it did in 1973.

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[64] Johany, 1980; Sampson, 2009

[65] The embargo was declared by the Organization of Arab Petroleum Exporting Countries, and OPEC itself did not participate in the embargo. Several OPEC members continued to sell oil to all customers. See Bronson, 2006 and Yergin, 2008 for a history of the embargo.

[66] Bronson, 2006; Yergin, 2008. In fact, declassified documents show that Saudi Arabia made secret oil shipments to the US military, to ensure that its operations in Vietnam would not be compromised (Brown, 1999).

[67] Stobaugh, 1975

[68] Moran (1987: 598) reports that total OPEC output declined by 7 percent. Even this modest amount seems too large in comparison to other data, *e.g.*, the rates given by BP *Statistical Review of World Energy* (given in annual averages) or the US Energy Information Agency (given in monthly averages). The BP data suggest that the impact of the embargo was too small to affect the annual average; the EIA data suggest that the decline Oct 1973-March 1974 was about 4 percent of the average in the previous year.

[69] Kalt, 1981; Frech and Lee, 1987

[70] Gholz and Press, 2010. All of the major oil-importing states have significant commercial and strategic petroleum reserves, of far greater quantities than existed in 1973. Further, in 1974, the International Energy Agency (IEA) was created with the express purpose of managing oil supply disruptions, and to coordinate

Still, the 1973 oil crisis raised OPEC's perceived power to influence oil markets to an almost mythical status. While in hindsight we can see that the increase in world oil prices and U.S. fuel shortages were not primarily driven by OPEC production controls, the OPEC governments did prove in 1973 that they were capable of cooperation and joint decision-making about production (or at least some of them, as not all of them participated in the oil embargo).[71] Even though the magnitude of the supply disruption was both temporary and relatively small, it sent a powerful signal that OPEC governments could and would cooperate in setting their production levels. As I discuss in the next section, that suited the members of OPEC just fine.

5. Understanding OPEC's persistence

How do we explain OPEC's persistence in world politics, and its image as a cartel? I argue that OPEC can be understood as a political club that generates diplomatic and other political benefits for its members, and its cartel reputation is an integral source of political strength for the organization.

The birth of OPEC and its actions in 1973 created the idea that OPEC is a cartel. In 1960, OPEC was set up as an organization modeled after the Texas Railroad Commission, with the explicit aim of acting as a cartel.[72] The events of 1973 suggested OPEC was exactly that. In 1973, oil prices rose; OPEC cut its oil exports and enforced an embargo on some of its customers; and it explicitly claimed to be a cartel, with its members cooperating with each other. All observable signals, then, suggested that OPEC was indeed a cartel. Scholars, journalists, oil companies, and policymakers agreed.[73] The diplomatic cables of U.S. State Department officials around the time of the 1973 oil crisis provide ample evidence that policymakers viewed OPEC as a cartel.[74]

Since the 1970s, popular beliefs have been slow to change. Still, some knowledgeable actors gradually recognized OPEC as a non-cartel. For analytical purposes, consider the world as divided into four categories of people. Group A consists of OPEC insiders, who have privileged access to information about the organization's behavior and impact. Group B includes oil market participants outside of OPEC who have a significant financial incentive and proprietary data sources to understand oil markets, such as commodities traders and oil companies. Group C consists of those with political or intellectual incentives to understand OPEC, including government analysts and those few academic scholars who have specifically analyzed OPEC's behavior and market impact. Group D is everyone else: journalists,

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releases from the petroleum reserves that all IEA members are required to maintain. Finally, long-term contracts mostly have been replaced, making the market more flexible. This is not to say that an embargo could have no effect on oil prices at all, but that its effect in today's oil market would be mitigated by these innovations. Perhaps not surprisingly, there has not been an international oil embargo by producers since 1973 (as compared to three in the period 1956-1973).

[71] Saudi Arabia, Iran, Iraq, Abu Dhabi, Kuwait, and Qatar announced production cuts and unilateral increases in posted prices on October 16, 1973.

[72] Claes, 2001; Parra, 2004; Yergin, 2008

[73] Krasner, 1974; Osborne, 1976; Seymour, 1980; Doran, 1980

[74] Qaimmaqami and Keefer, 2011: 165, 167, 285, 366, 432, 489, 1019

policymakers, the public, and most scholars, including even scholars who work on oil-related subjects like the resource curse. Senior politicians, such as the US President, probably also fall into Group D, for reasons I discuss below. These groups are designed to be collectively exhaustive, arranged loosely by the type of information each group has available to understand OPEC's true role, roughly from best to worst.

It is impossible to know with certainty what individuals in each of these groups actually believe, because thoughts are not directly observable. In the discussion that follows, I propose a set of conjectures about each group's beliefs. While the beliefs themselves cannot be directly observed, we can consider other information and think logically about the incentives each group has, and then assess the conjectures against the available indirect evidence.

To preview the discussion, I suggest that Groups A, B and C have sufficient information to know that OPEC's cartel image is incorrect, but Group A benefits from the mistake, Group B is primarily interested in a different question, and Group C fails to correct it. Group D quite rationally chooses not to invest time into investigating OPEC's precise causal impact, and instead relies on the other groups for information. Given that no one directly and forcefully contradicts the idea that OPEC is a cartel, the myth persists.

5.1 Group A: OPEC insiders and the rational myth

Group A sustains a "rational myth" about OPEC's influence over the world market for oil. A rational myth is an idea that is illusory or false but persists in part because some actors have incentives to sustain it.[75] This does not necessarily mean that actors who perpetuate a rational myth are actively lying, but rather that they have an incentive to behave in ways that are consistent with the myth so long as that behavior is not too costly. Scholars have found that various organizations adopt or conform to rational myths.[76] Crucially, those most likely to realize OPEC's impotence as a cartel – its own members – are the same actors who are least likely to want to undermine that narrative.

For OPEC members, the belief that OPEC is a cartel generates significant political benefits, both at home and abroad. So long as OPEC is viewed as powerful, its leaders can claim credit at home for their 'economic stewardship' of the global economy. Leaders of OPEC member states have sought to take credit for their rising economic fortunes in exactly this way. For example, supporters of Venezuelan President Hugo Chavez, who was elected in 1998 as oil prices were plunging, argue that Chavez revitalized OPEC and thus almost single-handedly brought about the rise in world oil prices.[77] This narrative gives Chavez a significant political asset in Venezuelan domestic politics. Similarly, Iranian leaders have sought to use OPEC to take credit in the eyes of the Iranian public.[78] OPEC thus serves as a useful tool for state leaders when communicating with their domestic constituency.

[75] Boiral, 2007; Meyer and Rowan, 1977

[76] McNamara, 2002; Boiral, 2007; Meyer and Rowan, 1977

[77] Wilpert, 2007: 93-94; Jones, 2008: 284; Leech, 2001; Fox, 2006

[78] For instance, Iran's delegate to OPEC argued in 2011 that "the global economy has been faced with deep and serious crises and Iran with the cooperation of other OPEC member states, after a careful study of the oil

In addition, the perceived power of OPEC allows its members to reap political rewards in terms of diplomatic influence and the attention paid to OPEC members. Perceived power brings prestige, and prestige is the currency of international diplomacy.[79] One empirical implication of this hypothesis is that OPEC members ought to have greater diplomatic recognition by other countries than comparable non-OPEC countries, all else equal.

To test the idea that OPEC generates diplomatic benefits for its members, I adapted existing models of diplomatic recognition based on Gartzke and Jo's work.[80] The dependent variable is measured by the presence of an ambassador or other official in State A from State B, using diplomatic data from the Correlates of War project.[81] I use the terms "diplomatic recognition" and "diplomatic representation" interchangeably here. In the probit models (columns 1 and 2 in Table 3), the dependent variable is measured dichotomously, coded positively when there is any representative in State A from State B. In other analyses (e.g., column 3), the dependent variable is measured using an ordinal index, which ranges from 0 (no representative) to 3 (ambassador) in State A from State B, with intermediate values for a charge d'affairs or other official. The results are consistent regardless of which measure is used.

Table 3 shows the results. The unit of analysis is a directed dyad, and the time period is 1945-2000. Gartzke and Jo's model uses a number of explanatory factors, including: each state's military capabilities; each state's status as a nuclear power; the political regime type of each state; the geographic distance between the states in the dyad; and whether the dyad contains an alliance and/or a political rivalry. I build on their model by adding variables that indicate whether each state is an OPEC member, plus an additional variable that indicates whether both members of the dyad are OPEC members. I also control for whether the state is an oil producer (regardless of OPEC membership).

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market and through making correct decisions has not allowed crude oil prices to drop under these circumstances." Mohammad Ali Khatibi, Aug 28, 2011, http://www.presstv.ir/detail/196196.html Also see "Iran takes credit for OPEC decisions" (2011) and Krauss, 2011. Iranian officials argue that OPEC has significant economic accomplishments and that Iranian leadership within OPEC plays a major role in those successes; see *OPEC Bulletin*, October 2010: 8-10.

[79] Morgenthau, 1948 [2005]

[80] Gartzke and Jo, 2009

[81] Bayer, 2006

Table 3: Impact of OPEC on Diplomatic Recognition, 1945-2000

	Diplomatic Recognition (DV is dichotomous)		Diplomatic Recognition (DV is dichotomous)		Diplomatic Recognition (DV is 4-point ordinal scale)	
	coeff.	std. error	coeff.	std. error	coeff.	std. error
OPEC member - State A	0.168***	0.024			0.148***	0.020
OPEC member - State B	0.189***	0.024			0.125***	0.019
Saudi Arabia is State A			0.301***	0.066		
Saudi Arabia is State B			0.125*	0.068		
OPEC, excl. Saudi - State A			0.15***	0.025		
OPEC, excl. Saudi - State B			0.188***	0.025		
OPEC member - Both	0.162**	0.076	0.173**	0.076	0.125**	0.054
Oil Producer - State A	0.271***	0.015	0.27***	0.015	0.174***	0.012
Oil Producer - State B	0.259***	0.015	0.26***	0.015	0.184***	0.012
Nuclear State - State A	0.207***	0.034	0.208***	0.034	0.259***	0.028
Nuclear State - State B	0.156***	0.033	0.156***	0.033	0.277***	0.029
Nuclear State - Both	-0.215	0.182	-0.215	0.182	0.081	0.147
Democracy - State A	0.037***	0.002	0.037***	0.002	0.01***	0.002
Democracy - State B	0.045***	0.002	0.045***	0.002	0.013***	0.002
Democracy - Both	0.002***	0.000	0.002***	0.000	0.002***	0.000
Rivalry Status - State A	0.211***	0.010	0.21***	0.010	0.108***	0.009
Rivalry Status - State B	0.224***	0.010	0.224***	0.010	0.109***	0.009
Rivalry Status - Dyadic	-0.833***	0.075	-0.832***	0.075	-0.654***	0.057
Distance (logged)	-0.19***	0.005	-0.19***	0.005	-0.124***	0.004
Alliance	0.595***	0.021	0.595***	0.021	0.113***	0.017
CINC - State A	7.846***	0.471	7.846***	0.471	4.343***	0.360
CINC - State B	10.632***	0.523	10.609***	0.524	5.336***	0.389
CINC A * CINC B	-10.335	53.666	-10.115	53.709	-99.218***	14.704
Lagged DV					0.77***	0.003
Observations (dyad-periods)	213454		213454		187394	

Robust standard errors shown, clustered by dyad

Spline of years since last diplomatic recognition included in first two models but not shown

* significant at 10%; ** significant at 5%; *** significant at 1%

The empirical analysis indicates that OPEC membership is strongly and positively correlated with levels of diplomatic recognition, indicating that OPEC members are more likely to be diplomatically recognized (and conversely, to recognize) than comparable non-OPEC members. The results also indicate (in the second model) that this is true for all OPEC members, not just of Saudi Arabia. (Additional tests, not shown, also indicate that OPEC membership is beneficial even for "non-core" OPEC members.) The results are consistent even when the form of the dependent variable is changed to an ordinal measure (ordered probit model, column 3). As in the depletion analysis, the regression models were subjected to a battery of robustness checks. For instance, I included additional variables such as dyadic fixed-effects, a dummy for the Cold War period, and the flow of international trade; I also tried dropping some variables, such as the one for joint OPEC membership. None of these changes materially changed the statistical significance of the OPEC variables (see the appendix).

One striking result is the magnitude of the impact that OPEC has on diplomatic representation. The size of the coefficient for the OPEC variable is roughly the same

magnitude as for the nuclear weapons status variable, indicating that OPEC membership has roughly the same impact on diplomatic representation (which post-estimation tests confirm). On average, OPEC membership is correlated with an increase in diplomatic representation from nine additional states, compared to an equivalent country that is not an OPEC member.[82]

For instance, Ecuador joined OPEC in 1973, and by 1975 eleven countries had newly sent diplomatic representatives (an ambassador, charge d'affairs, or other representative), whereas only one had withdrawn its representative (Ethiopia).[83] The eleven countries with new representatives – Canada, Haiti, Luxembourg, East Germany, Poland, Hungary, Bulgaria, Romania, Russia, South Korea, and India – represented a broad cross-section of the world, geographically, economically, and politically. It seems plausible, therefore, that Ecuador found this heightened diplomatic status valuable. By contrast, when Ecuador suspended its OPEC membership in 1992, it sustained a net *loss* in diplomatic representation, when not one new country sent a representative and Poland withdrew its representative. When Ecuador re-joined OPEC in 2007, it again enjoyed a net gain in diplomatic representation, this time consisting of eighteen new embassies or consulates over the next five years.[84] Similarly, when Gabon joined OPEC in 1975, it gained diplomatic representation from nineteen new countries and lost representation from four;[85] when Gabon left OPEC in 1992, it gained representation from only one country and lost it from four others.[86]

The value of increased diplomatic representation is hard to gauge, but it is not trivial. For instance, many of the new diplomatic connections were with countries that were relatively rich, and therefore represented opportunities for increased trade, investment, and tourism. Specifically, about 40 percent of the countries that sent diplomatic representatives to a new member of OPEC had income (GDP per capita) higher than the world average. Moreover, during the Cold War, the new diplomatic connections spanned the divide between East and West. Many OPEC members were otherwise rather marginal to global geopolitics, so diplomatic connections to both sides of the Cold War could bring valuable information and perhaps diplomatic leverage. Diplomatic recognition also brings a certain amount of status and prestige which is hard to measure objectively.

[82] This is based on the expected marginal probabilities as calculated from the first model in Table 3, multiplied by the average number of states in the system in the years 1960-2000.

[83] Diplomatic representation is measured only once every five years in COW dataset, so I describe changes in diplomatic representation in the five-year window within which the state joined or left OPEC.

[84] The COW dataset stops in 2005, so the 2012 data on diplomatic representatives in Ecuador were collected by the author's research assistant using Internet searches. The nineteen countries with new representatives in Ecuadoar were: Australia, Austria, Belize, Cyprus, Czech Republic, Denmark, Finland, Greece, India, Indonesia, Ireland, Jamaica, Malta, Nicaragua, Pakistan, Philippines, Poland, Sweden, and Taiwan. Only South Korea withdrew its representative during this period.

[85] By 1980, Gabon had new representatives from Mexico, Venezuela, Brazil, Argentina, Netherlands, Austria, Greece, Ghana, Togo, Burundi, Rwanda, Tunisia, Turkey, Saudi Arabia, Qatar, North Korea, Bangladesh, Philippines; it lost representatives from Cuba, Denmark, Chad, and Iran.

[86] By 1980, Gabon had a new representative from South Africa; it lost representatives from Kenya, Kuwait, Sao Tome, and North Korea.

Furthermore, it appears that the diplomatic value of being an OPEC member increased after the 1973 oil crisis, when OPEC's perceived power and prestige increased dramatically. Prior to 1973, states that joined OPEC gained diplomatic representation from an average of about two countries for each one that it lost (in the aggregate, 60 new representatives to the seven OPEC members, and 35 representatives withdrawn).[87] After 1973, however, states that joined OPEC gained diplomatic representation from an average of eight countries for each one that it lost (in the aggregate, 64 new representatives to three states that joined OPEC, and 8 representatives withdrawn).[88]

In sum, the evidence suggests that OPEC generates political benefits for its members, such as international diplomatic recognition and prestige. With these political benefits riding on the notion that OPEC is a powerful institution, its members gain nothing from exposing OPEC as an ineffective cartel. To the extent that they are aware, they are still willing to go along with the rituals of acting as a cartel. There is also the potential for cognitive dissonance, in which policymakers inside OPEC do not reconcile their understanding of the oil market with their desire to believe in OPEC as a cartel.[89]

5.2 Group B: Oil market participants

Group B consists of informed oil market participants outside of OPEC such as commodity traders and oil companies. They have access to proprietary data sources on the precise shipments of oil and have the analytical skills to assess OPEC's behavior and impact.

The market participants in Group B want to know "does at least one of the members of OPEC have some market influence, at least some of the time?" The answer to that question is probably yes. Saudi Arabia appears to have market power: it claims to have significant spare capacity, which is plausible; it depletes its oil quite slowly and probably far below its marginal cost of production; and it makes major, observable changes to its oil production levels that correlate (imperfectly) with its statements about its desire to loosen or tighten global oil supply. Other states like UAE and Kuwait might also have market power, though the evidence is less clear. The question of whether at least one member of OPEC has market power is important to non-OPEC market participants because it means that the behavior of OPEC (as a group, not as an organization) can affect market prices and production, and thus the strategies of Group B actors.

Note, however, that the question just identified is different than "does OPEC as an organization act as a cartel (in the sense of coordinating production to manipulate prices)?" The answer to the latter question is almost certainly no. Saudi Arabia can (and apparently

[87] The seven states were Iraq, Iran, Saudi Arabia, Venezuela, Libya, Indonesia, and Algeria. Not included are Kuwait, UAE, and Qatar, which joined OPEC before they gained their independence as sovereign states.

[88] The three states were Nigeria, Ecuador, and Gabon. Not included are OPEC membership changes after the COW diplomatic data end in 2005.

[89] For instance, a former Secretary General of OPEC insists that OPEC shapes world oil prices: "The control was, and remains, long-distance, erratic, imprecise, and unpredictable – but in the end, very real. … The system is slow, clumsy, partly dependent on necessarily inaccurate demand forecasts, and bedeviled by indiscipline within OPEC's ranks. But, by and large, it works." (Parra, 2004: 321-322)

does) decide to restrict its production without meaningfully coordinating with anyone, much as a dominant firm might do in a semi-monopolistic market. Some savvy market observers thus label Saudi Arabia a "cartel of one," which is not actually a cartel at all.[90] And as already demonstrated, there is very little actual coordination going on inside OPEC. OPEC is a political club, not a functioning cartel.

Consequently, market participants in Group B probably understand, to varying degrees, that OPEC is not a cartel, but they do not care. They still pay attention to OPEC for signals about the present and future behavior of Saudi behavior. This is comparable to the way observers pay attention to the Whitehouse Press Secretary for clues about the President's thinking, even though the Press Secretary has no real power of his/her own. Thus OPEC's announcements could affect market perceptions, which matter in the short-term for commodity traders.[91] It is rational for market participants to continue to observe OPEC even if they believe that the organization itself does not alter market fundamentals. Instead, they are principally interested in OPEC as shorthand for "the members of OPEC," just as other market analysts are interested in the BRICs as shorthand for "Brazil, Russia, India and China" without implying that these countries are in some way colluding.

Having answered the first question (at least one member has market power), the second question is rather moot for market participants. Market participants have no strong reason to dispute OPEC's status as a cartel. Even if they did, they would have to persuade everyone else, which would probably take time and resources that could be spent elsewhere more profitably. Moreover, there are perhaps some modest benefits to the public's confusion about OPEC. Oil company executives, at least, are happy to have OPEC as a scapegoat for oil prices, which deflects blame away from their own companies. For all these reasons, market participants fail to dispel OPEC's image as a cartel.

5.3 Group C: Government analysts and scholars looking specifically at OPEC

Group C consists of two sub-groups, both of which have incentives to understand OPEC: government analysts and the small set of academic scholars who have directly investigated the extent to which OPEC functions as a cartel. Group C's incentives are principally non-financial. Government analysts have access to proprietary or confidential data sources on the precise shipments of oil, whereas academic scholars generally do not, relying only on public data.

First, consider the government analysts. The failure of government analysts to realize that OPEC does not operate as a cartel and/or to forcefully articulate that point to their political masters is surprising and puzzling. It is not entirely clear whether the problem is one of knowledge or of communication. Government analysts are presumably capable of conducting the same analysis shown in this paper, but to date either that analysis has not been done or it has not been widely accepted. Understanding exactly where the problem lies would require extensive interviews and process-tracing, which lie outside of the scope

[90] Swann and Allison, 2012

[91] Demirer and Kutan, 2006; Hyndman, 2008

of this paper. I speculate that most policy advisors hold the conventional view that OPEC is a cartel.[92] Certainly many publications by the US government, such as on the Department of Energy's website, label OPEC a cartel.[93] It is worth noting that government analysts do not face the same strong financial incentives that market participants have to correctly understand OPEC's causal role.

It might seem surprising that intelligent, sophisticated analysts could hold incorrect causal beliefs even when corrective evidence is available. Yet there is a growing body of research suggesting that actors' knowledge of causation, especially in economic affairs, is imperfect.[94] Keith Darden, for instance, finds that "[a]ctors inherently lack objective knowledge of the relationship between cause and effect in economics and other matters in the world."[95] Actors sometimes continue with an established set of economic ideas for decades before deciding it is wrong. For instance, seventy years elapsed between Adam Smith's free trade theory (1776) and its first real implementation (British Corn Laws, 1846). Other historical examples abound, including classical vs. Keynesian fiscal policy, fixed vs. floating exchange rates, and import-substitution vs. export-oriented trade policies. Thus we should avoid such a strong form of rationalism that we assume government analysts and other actors never make a mistake. Unfortunately, government intelligence failures are not as uncommon as one might hope, due to various bureaucratic and cognitive constraints.[96]

In addition, the mistake by government analysts should be understood in the context of the analytic complexity of the question. For instance, in the first half of 2008, oil prices rose to over $140 per barrel in July, before plunging to below $40 per barrel in January 2009. OPEC's oil production rose significantly as prices increased, and fell when prices were falling. Many argued that this period was evidence of OPEC's cartel behavior, as it tried to stabilize oil prices. There are three problems with this argument. First, OPEC's behavior might be simply a profit-maximizing response to price changes. OPEC production fell in the July-January period as prices fell, but so did non-OPEC production: by more than 1 million barrels per day (bpd) worldwide, including a 258,000 bpd decline in the United States – hardly a cartel country. Several non-OPEC states like Mexico, Norway, and Azerbaijan had production declines that were larger than those in 8 out of 12 OPEC states. Second, even if the OPEC production change was more than just a market-competitive response to prices, it was due primarily to just one country's action, not cartel coordination: Saudi Arabia accounted for 65 percent of the decline in OPEC's output from July to January. And third, most of the production changes came *before* significant changes were made to OPEC quotas; the latter merely ratified earlier production decisions by individual countries. This

[92] Based on personal discussions with officials at various branches of the U.S. government.
[93] http://energy.gov/management/timeline-events-2003, http://energy.gov/management/timeline-events-2007, http://www.fueleconomy.gov/feg/oildep.shtml, http://www.loc.gov/rr/business/BERA/issue5/cartels.html, http://www1.eere.energy.gov/analysis/pdfs/strategic_program_review.pdf
[94] Darden, 2009; Legro, 2005; Blyth, 2002; McNamara, 2002; Boiral, 2007
[95] Darden, 2009: 9
[96] Jervis, 2011

example points to a broader problem with informal attempts to infer OPEC's impact in the face of frequent price volatility. If OPEC production increases as prices are falling, some will infer that OPEC is causing prices to fall; but if instead OPEC production decreases, some will infer that OPEC's impact is delayed, and will cause a price increase that arrives some months later. Frequent price movements (and no clear counterfactual) mean that it is hard to tease out OPEC's true effect. Thus one cannot directly infer OPEC's status as a cartel by examining the raw oil market data. The question demands a sophisticated analysis, and as it turns out, even scholars cannot agree.

Scholars of OPEC are the second sub-group. Like the government analysts, they have incentives to understand OPEC's role, though the incentives are principally intellectual rather than financial. Unfortunately, scholars face at least two obstacles to dispelling the myth of OPEC's cartel status. First, the data available to scholars are not always good. The data used in this paper (especially for tests #3 and #4) were not available in the 1970s and 1980s when the scholarly debate about OPEC's role in the world oil market first occurred. Still, this excuse is weak, because sufficient public data have been available since the 1990s.

A second obstacle is that scholars have difficulty reaching a unanimous or even dominant view on questions that involve complex causality and where experimental testing in laboratory conditions is infeasible. Indeed, scholars face professional incentives to generate debate by providing novel arguments and contrarian empirical findings. The topic of OPEC as a cartel is causally complex. Not surprisingly, consensus has been difficult to achieve, as the literature reviewed earlier indicates. True, recent academic work raises a growing number of doubts about OPEC's causal impact on oil markets.[97] Nonetheless, there are some scholars who insist upon OPEC's role as a cartel even in recent publications.[98] Given the ongoing debate among scholars, and the fact that academics often find it difficult to sway public opinion even on matters where there is considerable scholarly agreement (e.g., on free trade policy), it is not surprising that they have failed to persuade non-academics to change their view about OPEC.

5.4 Group D: Everyone else

Group D consists of everyone else: journalists, policymakers, the public, and most scholars, including most political scientists. The question of whether OPEC is a cartel is not something that deeply affects the day-to-day lives of people in Group D. Quite rationally, they choose not to devote time and effort into investigating this question, as they have other jobs and concerns. Instead, they rely on the other groups (A, B, and C) for information on which to base their beliefs.

Consequently, most people do not realize that OPEC is not a cartel. Their error is facilitated because OPEC itself perpetuates the "rational myth" that it is a cartel, for the reasons given above: they enjoy prestige and political benefits that are based upon that

[97] Reynolds and Pippenger, 2010; Goldthau and Witte, 2011; Cairns and Calfucura, 2012; Bremond *et al.,* 2012; Victor, 2008

[98] Smith, 2005, 2009; Kaufman *et al.,* 2004, 2008; Hyndman, 2008; Demirer and Kutan, 2006; Bentzen, 2007; Simpson, 2008

myth. Moreover, non-specialists (even very smart ones) tend to conflate the question "is OPEC a cartel?" with the question "does at least one of the members of OPEC have some market influence?" As discussed earlier, the answers to those questions are quite different, but they appear sufficiently similar that many people confuse the two. Group A benefits from that confusion; Group B is not interested in correcting it; and Group C continues to debate the issue. So the mistake continues.

Many journalists have a sufficiently deep understanding of oil markets to realize that OPEC is weak as an organization, and that any market power that its members have is driven largely by Saudi Arabia. Some, but certainly not all, of the news coverage of OPEC reflects this understanding.[99] Still, this awareness is not sufficiently widespread to overturn the enduring popular image of OPEC as a cartel.

State leaders and other senior government officials also appear to fall into Group D. State leaders do, of course, have access to the best data and expertise on OPEC and oil markets, at least indirectly. However, the government analysts on whom state leaders rely do not appear to clarify OPEC's role, as discussed earlier. Thus leaders are probably like most other people, believing in OPEC's ability to function as a cartel.

How can we know? We cannot directly observe leaders' beliefs. Still, clues can be obtained from their memoirs. For instance, in one of the few mentions of OPEC in Bill Clinton's autobiography, he writes "Energy was a huge issue [in 1980] because of OPEC's steep increase in the price of oil, which raised prices for everything else, too."[100] Elsewhere he writes, "[In 2000] I wanted to see the price stabilize at between $20 and $22 a barrel and hoped OPEC could increase production enough to do that …"[101] Those statements seem to indicate that Clinton viewed OPEC as a cartel, but are not definitive. Bill Richardson, Clinton's Secretary of Energy, is somewhat clearer in his memoirs, stating that "What we faced was a combination of OPEC power in the marketplace, our dependence on imported oil, and demand pressures …"[102] He also recalls that "Over the course of the year [2000], I made four trips to various OPEC countries, principally the ones in the Middle East, to jawbone for hikes in output that would moderate the increase in prices."[103] Richardson's efforts to persuade multiple OPEC countries (including those outside of the Middle East) to alter their oil production suggests that he believed OPEC to be a cartel with significant market power, though he never says so explicitly. The beliefs of Clinton and Richardson thus appear to be consistent with those of State Department officials around the time of the 1973 oil crisis.[104]

At any rate, state leaders do not publicly contradict OPEC's image as a cartel, which has important consequences, mostly negative. One of those consequences was discussed

[99] *The Economist*, 2012; Krauss (*New York Times*), 2011
[100] Clinton, 2005: 268
[101] Clinton, 2005: 900; on the same page, Clinton writes: "I spoke with King Fahd of Saudi Arabia about the possibility of OPEC increasing its production."
[102] Richardson, 2005: 266
[103] Richardson, 2005: 269
[104] Qaimmaqami and Keefer, 2011; see note 74

earlier: domestic audiences in oil-producing countries tend to give credit to OPEC leaders like Hugo Chavez for raising the price of oil, even though there is no real evidence that he actually caused such a change. A second example is that many people outside of oil-producing countries are psychologically more disposed to pay attention to OPEC members like Iran or Venezuela when prices are high or rising. This might even generate a tendency for diplomats to defer to OPEC members and offer favors in exchange for promises of increased or decreased OPEC oil production.[105] Some studies suggest that, regardless of whether policymakers actually should let oil politics affect their policies, they do in fact behave that way.[106] For instance, policymakers are willing to incur considerable material costs in order to increase oil imports from one country (e.g., a friendly neighbor) or lower them from another (e.g., a potential risky supplier), despite the fact that oil imports are derived from a fungible world market that readjusts the flow of oil to reach equilibrium.[107]

A third example of the negative consequences of misunderstanding OPEC comes from legislative politics. Politicians in the United States and other oil-importing states blame OPEC for manipulating world oil markets, especially during times of high oil and gasoline prices. For instance, the No Oil Producing Exporting Cartels (NOPEC) Act of 2004 introduced in the US Senate served as a rallying point for those who sought to blame OPEC.[108] Other NOPEC bills have introduced at least fifteen times since 1999, though to date none have passed.[109] The continued introduction of these bills distracts Congress and the public, thereby imposing a significant opportunity cost on the political system.[110]

5.5 OPEC as a political club

It appears that some actors recognize that OPEC's image as a cartel is flawed but they do not dispel that image for various reasons. Consequently, the public (Group D) continues to view OPEC as an economic cartel rather than as a political club.

Understanding OPEC as a political club that generates benefits for its members helps explain the organization's persistence in world politics despite its failure as a cartel. It also helps us answer other questions. One such issue is the variation in OPEC's membership. In the 1970s, OPEC enjoyed a certain level of prestige, as developing countries saw it as an organization that "took on" the developed countries and won (by raising oil prices). Several oil-exporting developing countries that were not already members wanted into the club: Ecuador and Gabon joined the organization in 1973 and 1975 respectively, only to leave the organization as its prestige fell in the 1990s. Then in the 2000s, with oil prices on the rise, OPEC membership became fashionable again: Ecuador rejoined, Angola was accepted as a

[105] Richardson, 2005: 266-274

[106] Clayton and Levi, 2012

[107] Arguably there might be war-time benefits to manipulating oil imports in this way, but those benefits are highly dubious; see Gholz and Press, 2010

[108] Reinker, 2004

[109] Verrastro, *et al*. 2011

[110] Scapegoating is probably not limited to the legislative. President Carter's advisors urged him to cast OPEC as a threatening cartel and thereby blame OPEC for American economic problems (Epstein, 1983).

new member in 2007, and Sudan sought membership, though it has not yet been accepted. This variation in OPEC membership is counter-intuitive behavior if OPEC is viewed as a cartel, as membership in the organization would be most costly (in terms of forgone oil sales, to the extent that such exist) at times when oil prices are high. The fluctuations in OPEC's membership, which correlate with oil prices, make more sense when viewed from the perspective of the perceived political clout and prestige of the organization.

Viewing OPEC as a political club is also consistent with some anecdotal evidence about how states perceive OPEC membership as a signal of status and prestige. For instance, when Angola joined the organization in 2007, it took out full-page advertisements in *The Economist* to announce that it had joined OPEC and should be seen as a country of rising importance. Implicitly, the advertisements tied these two claims together: *i.e.,* Angola was rising in importance in part because it had joined OPEC.

In sum, the story of OPEC's continued existence is primarily a political one. It is based largely on the perpetuation of a rational myth. Still, it is not necessarily true that OPEC is useless. OPEC probably facilitates information-sharing and lowers transaction costs between states, like many other international regimes.[111] Information sharing is useful in the oil industry, where precise information is often hard to obtain. For instance, OPEC has long served as a forum where members could share strategies for dealing with the international oil companies, best-practices for writing contracts, and approaches to tax policy.[112] OPEC members also share predictions about the oil market, which are important for investment decisions. Overall, though, OPEC's chief purpose appears to be political.

6. Conclusion

This paper argues that OPEC does not operate as a cartel, and has little if any power to restrict its members' production. OPEC quotas are irregularly applied, frequently ignored by its members, and have at most a modest effect on actual production. Instead, the legacy of 1973 has allowed scholars and policymakers to continue in the mistaken belief that OPEC has great power over oil markets. This is not to suggest that individual members of OPEC have no market power; indeed, probably Saudi Arabia has such power on its own. One might say that OPEC probably has market power because it includes Saudi Arabia, but only in that sense; the findings in this paper undermine the idea that the OPEC as an organization manipulates the world oil supply.

Given that OPEC's false image as a cartel appears to generate political benefits for its members, one might wonder why other commodity producers do not seek to emulate it. We can only speculate, but oil-producers seem to have at least three advantages. First, one of their members (Saudi Arabia) probably does have significant market power, which is not necessarily true of states in other commodity markets. Second, the oil crisis in 1973 had a

[111] Keohane, 1984

[112] For example, a 1962 report commissioned by OPEC revealed to its members the extent of oil company profits and the lack of a logical economic basis for posted prices. Since tax and royalty payments were based on posted prices, the report had major implications for OPEC member governments' revenues. Parra, 2004; Skeet, 1991

powerful demonstration effect; nothing comparable has occurred in other commodity markets. Third, oil is a commodity on which actors place significant strategic weight, which is not necessarily true of bananas or coffee. For all these reasons, a cartel of oil-producers might seem more plausible and worthy of attention than a cartel of other commodities.

My findings carry significant implications for both theory and practice. For theory, the fact that a widespread belief about the world's most important commodity market appears to be wrong should alter how we study international political economy. One implication is that scholars should be careful about how the bargaining dynamics within OPEC are studied and conceptualized, as they do not occur within the context of a classic economic cartel.[113] Second, OPEC appears to be an important case within the category of international regimes that have outlived their original mandates.[114] Third, this paper contributes to the research suggesting that actors' knowledge of causation is imperfect.[115] My research offers a new account of OPEC as a political club, rather than as an economic cartel.

Finally, the case of OPEC offers a complement to understanding international organizations as a product of rational design.[116] Indeed, it suggests that at least some organizations are designed long before their eventual function is fully understood, and that the members' understanding of its purpose probably changes over time. The OPEC case thus reinforces the notion that international organizations often serve purposes other than to solve coordination games.[117] The detailed analysis of OPEC conducted in this paper therefore addresses a number of broader theoretical issues.

In the realm of practical politics, journalists and pundits should stop using the assumption that OPEC's actions are one of the fundamental drivers of world energy markets. They are not. Most of the credit or blame for rising oil prices in recent years rests with the energy demands of new Asian customers, not diabolic moves by OPEC. Moreover, policymakers in oil-importing countries should stop being so fearful and resentful of OPEC. Legislation such as the various "NOPEC" bills in the US Congress may be useful for scoring political points, but they have little bearing on the reality of the global oil markets. With the world price of oil set by market forces almost entirely outside of its control, OPEC is along for the ride like everyone else.

[113] Blades, 2004; Alt *et al.*, 1988
[114] Barnett and Finnemore, 1999; Gray, 2011
[115] Darden, 2009; Legro, 2007; Blyth, 2002; Morrison, 2012
[116] Koremenos *et al*., 2001
[117] Snidal, 1985

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Appendix

Test #4 of OPEC as a cartel – Robustness checks

Table A2 shows some of the robustness checks conducted on the depletion rate analysis. The first column in the table shows the "base" model, which is a duplicate of model 3 from Table 2. The second column includes a measure of civil conflicts, defined as a conflict resulting in at least 25 deaths.[118] The third column includes a measure of civil wars, defined as a conflict resulting in at least 1000 deaths. The fourth column splits OPEC into a "core" group that includes Saudi Arabia (along with Kuwait, UAE, Qatar, and Libya) and a "non-core" group. The last column includes a measure of world oil prices (in constant 2000 U.S. dollars), even though I do not think that such a regression is appropriate, precisely because of the endogeneity concerns discussed in the paper. Nonetheless, none of the results change materially in any of these additional models.

I also conducted a series of additional robustness checks, the results of which are not shown here. First, I control for the *Cold War* – measured using a dichotomous variable that equals 1 until 1990, and 0 afterwards – which could have altered the dynamics of the global oil market. When introduced into the regressions, neither of these variables materially change the results from Table 2.

Second, I change the dependent variable to the state's production rate (rather the depletion rate), and let the state's oil reserves act as an independent variable. Again, the results are consistent with the findings from Table 2. This is not surprising, since depletion rate is simply a country's production divided by its oil reserves. Third, I use a tobit model instead of an OLS regression model to test whether the right- and left- censoring in the dependent variable (which can only vary from 0 to 100 percent) might be biasing the results. Again, the results are consistent with Table 2. I also use a panel OLS regression that includes state fixed-effects. Interestingly, in these models the coefficient for OPEC is positive and statistically significant, just the opposite of what one would expect if OPEC was a cartel. (This positive correlation is probably due to the timing of a state's entry into OPEC, which typically happened when oil production was rising, as shown by the event-history test illustrated in Figure 1.)

Fourth, I test the possibility that OPEC only has an effect on its members' production in certain time periods or under tight market conditions. To do this, I first identified five year periods, starting in 1980. I then created separate period-specific variables for each of the key explanatory variables (OPEC, investment risk, and fiscal need), in which they take on their normal values during a given five year period and are set to zero in all other years. I then re-ran the analysis (as in Model 3), to test whether any of the OPEC variables was statistically significant in a particular time period. None achieved statistical significance, and all but one had a t-score less than 1.0, suggesting very weak correlation. I also tested OPEC's significance during times of tight market conditions. To do this, I introduced a new variable, *excess capacity,* which measures the estimated amount of excess oil production

[118] Gleditsch *et al*., 2002

capacity available worldwide in a given year, and an interaction term (the product of *excess capacity* times *OPEC*). One would expect the interaction term to be statistically significant if OPEC restricted its production only during times of tight market constraints, but the variable is statistically insignificant.

The results in Table 2 are also robust to known problems with the data on oil reserves. OPEC production quotas are linked to a country's declared oil reserves: bigger reserves mean bigger quotas. Thus in the 1980s, it is suspected that some OPEC members began to overstate their reserves.[119] As noted above, there is little evidence that OPEC members actually changed their production behavior, but it may be that members were willing to fabricate some data in order to alleviate the political consequences of their actions. To account for this, OPEC members' oil reserves as stated in 1980 were used for all years in a sensitivity analysis. Thus the changes (increases, in almost all cases) in the stated oil reserves of OPEC members since 1980 are ignored in this robustness check. Again, the results of the analysis do not change materially.

In Model 6, I control for *lift costs* (the cost to lift the oil from the oil field to the surface, including exploration and development). Unfortunately, there is a lack of publicly-released, cross-national time-series data for measuring lift costs. As a proxy, the lift cost data for different countries can be estimated using data from a Goldman Sachs report on the largest 125 upstream development projects under development in 2006.[120] The poor data quality for lift costs is unfortunate, but it is unlikely to introduce a problematic bias into the analysis. To see why, consider the possibility that OPEC membership actually does decrease depletion rates, but this effect is masked because the lift costs are not introduced in some of the models in Table 2. We can safely assume that lift costs in OPEC are considerably lower than in non-OPEC areas, as the Persian Gulf oil is widely considered by the industry to be 'easy oil,' *i.e.,* low cost of extraction. Given this fact, it would have to be true that the underlying correlation between lift costs and depletion rates is positive in order to hide the hypothesized correlation between OPEC membership and low depletion rates. Yet this does not follow economic logic: lift costs should be negatively correlated with depletion rates, all else equal, because producers would make the most profits by extracting the most oil from where its lift costs are lowest. Thus even if perfect data were available for lift costs, there is no reason to expect that it would alter the analysis above.

While the analysis presented here can be criticized on the basis that the quality of the data is poor, one has to apply the same attitude towards any positive claim that OPEC is operating as a cartel. The present analysis uses the best publicly available data. At a minimum, it shifts the burden of proof to the proponents of the OPEC-as-cartel to show how OPEC is having an impact.

[119] Simmons, 2006

[120] Waghorn *et al.*, 2006

Table A1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Depletion rate, %	1286	5.905	4.196	0	30.4775
Year	1418	1995.2	8.972	1980	2010
Production	1353	1457.6	2057.8	0	11114
Reserves	1323	23.2	45.6	0.1	264.6
Polity	1354	0.017	7.657	-10	10
Population	1415	8.43E+07	2.19E+08	189300	1.34E+09
Lift cost estimate	1387	3.748	1.624	1	11.33333
Civil conflict	1134	0.244	0.430	0	1
Civil war	1134	0.100	0.300	0	1
Oil Price, const 2000 USD	1183	32.066	16.039	13.62	75.96
Economic growth	1418	2.922	1.490	-2.33	5.65
Spare capacity	1371	4.805	2.906	1.25	10.8
International War	1418	0.023	0.149	0	1
OECD	1418	0.153	0.360	0	1
Major power	1418	0.083	0.275	0	1
OPEC member	1418	0.265	0.442	0	1
Saudi Arabia	1418	0.022	0.146	0	1
OPEC member - non Saudi	1418	0.243	0.429	0	1
OPEC core member	1418	0.109	0.312	0	1
OPEC non-core member	1418	0.156	0.363	0	1
OPEC core, non-Saudi	1418	0.087	0.283	0	1
Investment Risk	1077	-67.365	13.700	-93.5	-23
International sanctions	1418	0.166	0.372	0	1
Log (reserves per capita)	1320	-1.235	2.314	-6.47	4.22
Reserves per capita	1320	3.369	9.503	0.15	68.03
OPEC oil reserves in 1980	13	33.538	45.389	0.5	168

Table A2: Robustness check for *Regression analysis on states' oil depletion rates* (Table 2)

	(1)	(2)	(3)	(4)	(5)
OPEC member - all	-0.733	-0.738	-0.724		-0.663
	(-0.76)	(-0.73)	(-0.71)		(-0.64)
OPEC core member				-1.082	
				(-0.73)	
OPEC non-core member				-0.636	
				(-0.63)	
Polity Score	0.034	0.013	0.018	0.029	0.027
	(0.68)	(0.29)	(0.38)	(0.54)	(0.58)
World Economic Growth	0.044	-0.029	-0.039	0.046	0.005
	(0.67)	(-0.34)	(-0.45)	(0.68)	(0.05)
Fiscal Strength	-0.91	-0.864	-0.887	-0.887	-0.865
	(-3.18)***	(-3.18)***	(-3.26)***	(-2.68)**	(-3.41)***
Investment Risk	-0.079	-0.092	-0.085	-0.08	-0.084
	(-2.33)**	(-2.57)**	(-2.61)**	(-2.39)**	(-2.41)**
International War	1.155	0.924	1.038	1.037	1.01
	(0.86)	(0.72)	(0.88)	(0.68)	(0.81)
International Sanctions	-0.61	-0.744	-0.641	-0.654	-0.64
	(-0.98)	(-1.24)	(-1.05)	(-1.08)	(-1.08)
Civil Conflict		0.466			
		(0.52)			
Civil War			-0.362		
			(-0.3)		
Global oil price					-0.015
					(-1.18)
Observations	993	811	811	993	829
R-squared	0.376	0.396	0.394	0.376	0.389

t-scores in parentheses (robust standard errors clustered by state)
* significant at 10%; ** significant at 5%; *** significant at 1%

Table A3: Robustness check for *Impact of OPEC on Diplomatic Recognition* (Table 3)

	Diplomatic Recognition (DV is dichotomous)		Diplomatic Recognition (DV is dichotomous)		Diplomatic Recognition (DV is 4-point ordinal scale)	
	coeff.	std. error	coeff.	std. error	coeff.	std. error
OPEC member - State A	0.179***	0.023			0.158***	0.019
OPEC member - State B	0.201***	0.023			0.134***	0.018
Saudi Arabia is State A			0.309***	0.066		
Saudi Arabia is State B			0.135**	0.067		
OPEC, excl. Saudi - State A			0.163***	0.024		
OPEC, excl. Saudi - State B			0.201***	0.024		
OPEC member - Both						
Oil Producer - State A	0.271***	0.015	0.27***	0.015	0.174***	0.012
Oil Producer - State B	0.259***	0.015	0.26***	0.015	0.184***	0.012
Nuclear State - State A	0.207***	0.034	0.208***	0.034	0.259***	0.028
Nuclear State - State B	0.156***	0.033	0.156***	0.033	0.277***	0.029
Nuclear State - Both	-0.215	0.182	-0.215	0.182	0.081	0.147
Democracy - State A	0.037***	0.002	0.037***	0.002	0.01***	0.002
Democracy - State B	0.045***	0.002	0.045***	0.002	0.013***	0.002
Democracy - Both	0.002***	0.000	0.002***	0.000	0.002***	0.000
Rivalry Status - State A	0.211***	0.010	0.21***	0.010	0.108***	0.009
Rivalry Status - State B	0.223***	0.010	0.224***	0.010	0.109***	0.009
Rivalry Status - Dyadic	-0.826***	0.074	-0.824***	0.074	-0.648***	0.057
Distance (logged)	-0.19***	0.005	-0.19***	0.005	-0.124***	0.004
Alliance	0.596***	0.021	0.596***	0.021	0.115***	0.017
CINC - State A	7.853***	0.471	7.853***	0.471	4.347***	0.360
CINC - State B	10.638***	0.523	10.615***	0.525	5.341***	0.389
CINC A * CINC B	-11.012	53.591	-10.822	53.635	-99.673***	14.687
Lagged DV					0.77***	0.003
Observations (dyad-periods)	213454		213454		187394	

Robust standard errors shown, clustered by dyad

Spline of years since last diplomatic recognition included in first two models but not shown

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A4: Further robustness check for *Impact of OPEC on Diplomatic Recognition* (Table 3)

	Diplomatic Recognition (DV is dichotomous)		Diplomatic Recognition (DV is dichotomous)		Diplomatic Recognition (DV is 4-point ordinal scale)	
	coeff.	std. error	coeff.	std. error	coeff.	std. error
OPEC member - State A	0.328***	0.029			0.348***	0.027
OPEC member - State B	0.369***	0.029			0.383***	0.028
Saudi Arabia is State A			0.533***	0.070		
Saudi Arabia is State B			0.342***	0.072		
OPEC, excl. Saudi - State A			0.315***	0.030		
OPEC, excl. Saudi - State B			0.37***	0.030		
OPEC member - Both	0.185**	0.085	0.191**	0.085	0.167**	0.070
Oil Exporter - State A	-0.006	0.024	-0.014	0.025	-0.075***	0.023
Oil Exporter - State B	-0.037	0.024	-0.038	0.024	-0.137***	0.024
Oil Exporter - Both	-0.051	0.056	-0.047	0.056	-0.066	0.053
GDP per capita - State A	0.009***	0.000	0.009***	0.000	-0.006***	0.000
GDP per capita - State B	0.005***	0.000	0.005***	0.000	-0.007***	0.000
GDP per capita - A x B	0	0.000	0	0.000	0.001***	0.000
Nuclear State - State A	0.138***	0.038	0.139***	0.038	0.177***	0.030
Nuclear State - State B	0.082**	0.037	0.083**	0.037	0.179***	0.031
Nuclear State - Both	-0.416*	0.242	-0.416*	0.242	-0.099	0.200
Democracy - State A	0.034***	0.003	0.035***	0.003	0.018***	0.002
Democracy - State B	0.044***	0.002	0.044***	0.002	0.023***	0.002
Democracy - Both	0.002***	0.000	0.002***	0.000	0.002***	0.000
Rivalry Status - State A	0.185***	0.012	0.183***	0.012	0.057***	0.010
Rivalry Status - State B	0.193***	0.012	0.193***	0.012	0.059***	0.010
Rivalry Status - Dyadic	-0.881***	0.088	-0.879***	0.088	-0.804***	0.066
Distance (logged)	-0.179***	0.006	-0.178***	0.006	-0.141***	0.005
Alliance	0.632***	0.023	0.632***	0.023	0.203***	0.018
CINC - State A	14.812***	0.779	14.796***	0.778	9.851***	0.547
CINC - State B	18.532***	0.882	18.517***	0.882	11.605***	0.623
CINC A * CINC B	240.046	165.087	240.617	165.026	-64.101	51.165
Lagged DV					0.744***	0.004
Observations (dyad-periods)	141170		141170		124674	

Robust standard errors shown, clustered by dyad
Spline of years since last diplomatic recognition included in first two models but not shown
* significant at 10%; ** significant at 5%; *** significant at 1%