

# Undermining Authoritarian Innovation: The Power of China's Industrial Giants

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*Recent scholarship suggests that authoritarian leaders may use seemingly democratic institutions to strengthen their own rule. In this vein, China's leaders attempted to rein in local governments by introducing new transparency regulations, with environmental transparency a key focus. However, implementing these requirements necessitates cooperation from the very actors who may be weakened by them. Surprisingly, more industrial or more polluted cities were no slower in implementing environmental transparency than cleaner ones, with pollution measured using satellite data in order to avoid relying on questionable official sources. However, cities dominated by large industrial firms lagged in implementing environmental transparency, and this effect appears strongest when a city's largest firm is in a highly polluting industry. Our findings demonstrate that even institutional innovations designed to preserve authoritarian rule can face significant challenges of implementation.*

Transparent governance—the open sharing of information with citizens—is widely viewed as a crucial element of functioning democracy, helping to ensure accountability and responsive government (e.g., Stiglitz 2002).<sup>1</sup> For that very reason, authoritarian regimes generally restrict citizen access to information (Hollyer, Rosendorff, and Vreeland 2011), although some have conceded the need for a freer flow of data directly relevant for commerce and regulation while keeping a tight hold on political news (Rodan 2004). In light of this, it might be surprising to learn that in recent years China's government has taken significant steps to increase the access of ordinary people to government-collected information of all kinds.

Yet this greater transparency does not signal a fundamental shift towards liberal democracy, nor necessarily entail a reduction in state power. Rather than resulting from popular pressure, China's transparency initiatives came from the top, largely motivated by the desire to rein in local government officials. This fits an increasingly familiar pattern in which institutions or practices seemingly characteristic of democratic societies can actually serve to

buttress authoritarianism. Many scholars have argued that adopting or strengthening an independent judiciary, elections, legislatures, the news media, or other nominally democratic institutions may help canny autocrats stay in power. However, these studies face a number of methodological challenges. Some treat institutional variation as exogenous and then test whether it predicts longevity (Gandhi and Przeworski 2007; Svobik 2012), while others tell a functionalist story in which leaders cherry-pick the set of institutions that will best serve their objectives (Egorov, Guriev, and Sonin 2009; Kim and Gandhi 2010; Magaloni 2006; Rosberg 1995). This pushes the question back a step: why can some regimes make institutional changes to preserve their power while others cannot? Our uncertainty about these factors reduces our confidence in the causal claims of this literature—the longevity of such regimes and their ability to successfully solve their problems by introducing seemingly democratic institutions might both be the consequence of other underlying strengths. Autocratic leaders may know that pseudo-democratic institutional changes would help them keep power, but they find themselves unable to make them in the

<sup>1</sup>An online appendix with further details on the data and additional analyses is available at <http://dx.doi.org/10.1017/S0022381613001114>; replication data and code will be posted at <http://www.peterlorentzen.com> upon publication.

face of opposition from elements of the ruling coalition who might be harmed and who have the power to veto or covertly undermine these changes.

This article evaluates the factors affecting implementation of one specific institutional change, the Chinese Communist Party's (CCP's) attempts to increase transparency as a means to control unruly local governments. Specifically, we investigate the role of powerful local economic actors—the large, mostly state-linked firms that dominate China's economy—in undermining implementation of new environmental transparency regulations at the municipal level. In recent years, China's environmental problems have become a central obstacle to the CCP's two overarching objectives—economic growth and holding power. The regime's own attempt to estimate a “green GDP” taking into account environmental costs was shelved and censored when it came up with an estimate of negative or near-zero growth (Li and Lang 2010), and concerns about actual and potential pollution have also become a major driver of protests (Economy 2010). Air pollution is estimated to have caused a five-year gap in life expectancy between heavily polluted north China and the less polluted south (Chen et al. 2013). Yet China's environmental authorities have long been one of the weaker branches of the bureaucracy, facing severe problems eliciting cooperation from lower levels of government. Transparency requirements were therefore implemented most rapidly in this area in hopes of reducing this major threat to the regime. By forcing local governments to make pollution information public, central authorities could hope to complement top-down administrative authority with bottom-up public pressure.

In this article, we use environmental transparency ratings for 113 Chinese cities to assess the power of large industrial firms to stymie this seemingly democratic policy initiative by China's leaders. We find that the more a city's economy is dominated by large firms, the more it resists centrally mandated disclosures about pollution sources. By contrast, cities whose economies comprise smaller firms are more willing to impose onerous requirements on these firms. Furthermore, this negative effect on environmental transparency is most pronounced if the city's single largest firm is in a highly polluting industry. An obvious possibility is that this association simply captures the extent to which a city's economy is dependent overall on polluting industries, due to local officials promoting economic growth at any cost. To rule this out, we created several city-level measures of major air pollutants based on remote-sensing data. These satellite-generated data sidestep the problems

inherent in using official Chinese pollution data, which are incomplete and subject to the same political distortions that the transparency ratings aim to measure. We find that our results are robust to these controls for pollution and to controls for other measures of industrial structure and development. We also rule out other possible omitted variables, including an underlying propensity to greater transparency.

Surprisingly, we find no evidence that local officials blocked transparency reforms in an effort to protect the broad local economy (as opposed to specific powerful firms in it). A widely held view is that the fiscal structure and the CCP's power to appoint and promote government officials incentivize local officials to focus their efforts on producing economic growth (Jin, Qian, and Weingast 2005; Li and Zhou 2005; Montinola, Qian, and Weingast 1995; Oi 1992). This led us to expect less pollution disclosure in relatively industrial or polluted cities, where pressure to clean up could harm broad GDP growth. Instead, we find no association in our data between either a city's degree of dependence on industry or its level of pollution and its level of environmental transparency. While we would suggest care in overinterpreting this null result, it fits with other findings that Chinese officials do not face such strong pro-growth incentives as is sometimes thought (Landry 2008), but instead they may be concerned more with forging connections with powerful party elites (Shih, Adolph, and Liu 2012), rent extraction through clientelist arrangements with local businesspeople (Ong 2012), or with advancing their careers by creating the appearance of economic success at the expense of the reality (Cai 2004).

The remainder of this article proceeds as follows. First, we discuss China's move toward greater transparency and some of the particular problems of central-local relations in the context of environmental governance. We then move to our empirical analysis, discussing the conceptualization and measurement of our key variables before presenting our statistical findings.

## Authoritarian Institutions and Transparency

In January 2007, the Chinese government adopted a set of *Regulations on Open Government Information* (OGI Regulations), which took effect on May 1, 2008. The regulations require the automatic dissemination of several kinds of government-gathered information and specify that other nonsensitive information

should be disclosed upon request (State Council 2007). While these regulations are less comprehensive than analogous laws in democracies, leaving a broad exemption for information that might “endanger state security, public security, economic security and social stability” (State Council 2007, Article 8), they nevertheless represent a significant policy change. But why would an authoritarian state commit itself to greater openness?

Political scientists have traditionally explained the presence of seemingly democratic institutions or practices within authoritarian regimes two ways: either they are a meaningless sham put in place to deceive domestic or foreign audiences (Linz 2000), or they exist only because the authoritarian leadership is too weak to fully impose its will on society and must instead accept a weaker “hybrid” status in which it coexists with opposition forces (Levitsky and Way 2002). Huntington (1991) argued that such liberalized authoritarian regimes are inherently less stable, but the longevity of many such regimes has led an increasing number of researchers to the view that authoritarian rulers may actually choose to introduce or strengthen institutional features more commonly associated with democracy. These innovations may solve problems that could otherwise destabilize these regimes. For instance, Rosberg (1995) contends that Egypt’s NPD strengthened the judiciary and rule of law in order to increase its control over local authorities. Others have argued that elections and legislatures can also serve as tools to manage power sharing either within a ruling clique or between it and potential opposition groups (Blaydes 2011; Gandhi 2008; Gandhi and Przeworski 2007; Geddes 2005; Kim and Gandhi 2010; Lust-Okar 2005; Malesky and Schuler 2010; Svobik 2012). Elections can also help a dictator by generating information about the degree of regime support (Magaloni 2006). It has also been argued that a dictator might loosen control of the press as a check on underperforming local officials (Egorov, Guriev, and Sonin 2009).

In China, the central leadership has long had difficulty controlling policy implementation at the local level, despite the formal authority it holds through fiscal levers and the party’s authority over appointments. In addition to classic problems of agency, the center cannot unilaterally coerce local actors without incurring some political cost, as these actors are themselves members of the ruling selectorate (Shirk 1993). While scholars disagree about how far this independence goes (Cai and Treisman 2006), there is no question it represents a major challenge for China’s leaders (O’Brien and Li 1999). In re-

sponse, the CCP appears to have adopted the strategy of introducing seemingly democratic practices and institutions in order to strengthen control over local officials. These practices include holding village elections, reinvigorating legislative bodies, tolerating small-scale public protests, and granting greater journalistic freedom, among others (Nathan 2003; Oi 2005). These generate bottom-up pressures against local government malfeasance that complement the existing top-down mechanisms of political control, although they must be carefully managed in order to avoid empowering discontented citizens to challenge the central state (Lorentzen, n.d.).

In democracies, transparency is believed to improve accountability because politicians who do not act in the voters’ interest face the threat of removal (Humphreys and Weinstein 2012). The logic in authoritarian regimes, however, is quite different. Malesky, Schuler, and Tran (2012) find that placing information about randomly selected Vietnamese legislators’ activities online can cause them to become less vocal in discussing legislation or challenging higher-level leaders, for fear that higher-ups would prevent their reelection as punishment. In China, electoral incentives are negligible, yet officials still fear negative publicity because it can lead to punishment by higher-level authorities who might otherwise either ignore or be unaware of their misbehavior (Distelhorst 2012). Increasing transparency thus complements China’s other quasi-democratic practices by giving journalists, NGOs, and ordinary citizens information they can use to exert pressure against misbehaving local officials. Indeed, one of the drafters of the China’s OGI Regulations has stated that a major goal for top leaders was to eliminate the “headache” that corruption posed and to keep low-level cadres from using their power “for selfish purposes” (Zhou 2007, 105–6). Thus, like these other innovations, reforms aimed at increasing transparency resulted not from grassroots democratizing pressures but were instead put in place on the initiative of the central leadership (Horsley 2007).

### **Environmental Protection and Local Obstruction**

Since its founding in 1974 as a subsidiary of another ministry, China’s environmental protection authority has gradually risen in status, becoming the ministerial-level State Environmental Protection Agency (SEPA) in 1998 and the cabinet-level Ministry of Environmental Protection (MEP) in 2008. This reflects the growing importance China’s leaders place on environmental issues. Nevertheless, the ministry has had significant

difficulty managing local Environmental Protection Bureaus (EPBs), which are at the frontline of enforcement. While minimum requirements for environmental protection are set at the national level, local governments are responsible for managing environmental policy in their jurisdictions and often disregard national requirements when these interfere with other local objectives (Economy 2010; Stalley 2010).

Local officials face particular pressure to protect large firms. Cai (2004) finds that local officials are preoccupied with image-building activities that give the *appearance* of economic development at a long-run cost. By the same logic, they face strong incentives to avoid high-profile failures by large firms. In addition, the heads of these firms are powerful local political actors in their own right. State-owned enterprises (SOEs) are often ranked higher in the Chinese administrative hierarchy than the EPBs that regulate them (Wang et al. 2002). They also have many channels of influence over local government. Executives of both SOEs and large private firms have been appointed as delegates to China's legislative bodies, conferring them formal powers as well as many opportunities for interaction with government officials (Dickson 2008; Kennedy 2005). In addition, industry associations, business groups, and professional associations frequently interact with state agents to comment on policy and to advocate for favorable treatment (Kennedy 2005). SOEs continue to receive preferential treatment in the form of loans, subsidies, and favorable policies (Haley and Haley 2013). Many executives hold high-level party positions, resulting in a revolving door between the party and firms, as business executives are transferred to party and government posts elsewhere in the country and vice versa. This secures the party's control over the state sector, but the embeddedness of the state sector in turn provides it with significant political leverage (Dickson 2008).

EPBs have little insulation from these pressures. Like most branches of the bureaucracy, they report both to higher levels of the national environmental bureaucracy and to the local government (Xue, Simonis, and Dudek 2006, 24). However, two key institutional features make it difficult for them to go against the interests of the local party-state. First, most EPB funding is provided by local governments (Economy 2010, 96). In addition, as with any branch of local government in China, the careers of its employees are in the hands of the local party, which determines who will advance and who will not (Landry 2008). Even without interference from local party leaders, local EPBs often lack enforcement

capabilities, forcing them to bargain with noncompliant firms rather than simply enforcing fines according to regulations (Wang et al. 2002). EPBs may even be better off allowing firms to continue to pollute in order to secure a steady stream of payments to finance their operations (Xue, Simonis, and Dudek 2006, 24). Firms often go along because fines are usually lower than the costs of remedying the underlying environmental problem, leading to blatant collusion between EPBs and local businesses (Economy 2010, 114). In other cases, there may simply be kickbacks from polluting firms in return for ignoring pollution or lowering fines (Liu 2007).

### The Transparency Strategy

The challenge of local policy implementation led China's environmental protection authorities to experiment early on with initiatives supplementing top-down oversight with bottom-up pressures, including requiring public review of environmental impact assessments, expanding the public reporting and complaint system, and opening up space for the participation of nonstate environmental advocates (Tong 2005). The effects were limited. Environmental impact assessments have been criticized as being ineffective due to the limited access to information and to judicial redress and remedy (Zhao 2010). As for the complaint system, the "letters and visits" bureaus are inundated. From 2001 to 2005, SEPA received 2.5 million letters and 430,000 visits from citizens citing violations of environmental regulations, pollution concerns, and health-related issues (Stalley 2010). Local media and NGOs can serve as policy entrepreneurs, building coalitions to pressure local governments to comply with environmental regulations, but their success has been highly contingent (Mertha 2008).

Pushing this transparency strategy further, SEPA was the first national authority to specify what the broad OGI regulations implied for its own subordinate bodies, issuing its "Measures on Open Environmental Information" (OEI Measures) in 2007. In addition to setting general principles and reiterating the requirements of the OGI regulations, including that every EPB must have its own open government office responsible for assembling information and making it available, the OEI Measures specify 16 specific types of information that should be disclosed automatically. These include environmental "laws, rules, regulations, standards, and other regulatory documents," information on the allocation of emissions quotas and permits to enterprises, the amounts of pollution fees or penalties collected and any exemptions, reductions,

or postponements granted, the results of the investigation of public complaints, names of firms in violation of environmental regulations, and so forth. The OEI Measures also impose obligations on enterprises to disclose information about their environmental-protection efforts and pollution emissions, specifically ruling out the excuse that this information might constitute “trade secrets” (SEPA 2007).

The enthusiasm of the SEPA and its successor, the MEP, for open government is notable. The SEPA already had the authority to require that local bureaus pass this information upward to the center, but this reform mobilizes popular pressures against local actors to complement administrative authority. Making pollution information publicly available enables environmental NGOs to “name and shame” the worst offenders and to promote “green consumption,” creating economic pressures against these polluters (Stalley 2010). Publicizing information about the sources of pollution and the actions taken (or not) in response to complaints also helps ordinary citizens to understand when they might have a grievance and thereby mobilize for political or legal action (Van Rooij 2010).

Yet, the very factors that keep local EPBs from enforcing pollution regulations also militate against them fully implementing the new transparency measures. Environmental transparency thus serves as a natural window through which to understand the challenges that an authoritarian regime may face when trying to push through quasi-democratic institutional innovations designed to preserve its rule.

## Evidence

To restate, our central hypothesis is that large firms, having a strong economic interest in avoiding public exposure of their pollution emissions and their potentially collusive interactions with local EPBs and government, block the implementation of environmental transparency requirements against the wishes of the central state. We now test this claim.

### Dependent Variable: The Pollution Information Transparency Index

In 2009, in an attempt to evaluate the success of the new OEI Measures, two NGOs began conducting annual evaluations of environmental transparency in 113 Chinese cities, a list that includes all but two of

China’s provincial capitals and Special Economic Zones as well as most other major cities.<sup>2</sup> The evaluations focused on disclosure of information about specific polluting firms in each city, including the amount of pollution, violations and fines levied, and citizen complaints and their resolution. NGO researchers examined the information each city’s EPB had made available on the Internet and followed up by directly contacting local environmental protection bureaus. Each city received a score between 0 and 100 on this Pollution Information Transparency Index (PITI). Sixty points were assigned for behaviors mandated by law, with additional points assigned for other steps improving public access to information. The first PITI index was released in June 2009, assessing performance one year after the regulations took effect. Implementation of the transparency regulations varied significantly but was generally poor. The mean score was 31, and only four municipalities achieved the 60-point level that represented minimum legal compliance. Ningbo, the highest scorer overall, provided a user-friendly website with easy access to detailed information about environmental impact assessments and complaints against firms, and provided a link for submitting complaints (IPE & NRDC 2009, 16). Fuzhou set up a system that accepted information requests via web, e-mail, text message, phone call, fax, letters, or audio recording and posted this information in a searchable online database along with details of actions taken in response (18). By contrast, many cities provided no information at all in many of the mandated areas. Often, information provided was limited, out of date, and incomplete. One city only posted violation information for a few small enterprises that were about to be shut down (23). Another’s website was frequently inaccessible and only duplicated information available from the provincial government (28). Some cities only posted the name of an enterprise that had violated pollution standards without specifying the nature of the violation or how it was handled (32). Other cities only provided overall statistics on the frequency of penalties and violations, making it impossible to discern which firms were at fault, rendering local governments incapable of exerting pressure against them (43).

To assess responsiveness to information requests, the NGOs asked each city’s EPB to provide a list of firms that had been penalized for pollution violations and a list of complaints made to the EPB with details about how they had been handled. The OEI Measures

<sup>2</sup>See online appendix for further details of the sample.

state that this information should be actively disclosed. Nevertheless, only 27 of 113 cities provided the requested information. Some stated that they would only disclose information if provided a letter of authorization from a higher level of government (IPE & NRDC 2009, 29) or if they received prior permission from the polluting firms (43). Others simply hung up the phone on the requester, or no individual could be identified who would admit to being responsible for information disclosure (29). At the other extreme was one city that responded within two weeks of the NGO's online information request, faxing a letter back saying that the request had been received and the information posted online where not only the NGO but any other interested member of the public could access it (30). Other cities fell in between, disclosing information only reluctantly or in limited amounts.

The same exercise was repeated in 2010 and 2011 (IPE & NRDC 2010, 2011). The broad trend was towards greater transparency, with the mean score rising to 40 points and 19 cities surpassing the 60-point threshold by 2011. However, there remained a great deal of variation. Some backslid by as much as 14 points in a year, failing to release information they had previously publicized, while others significantly improved their performance, with gains as large as 32 points. Since the objective of our analysis is to capture the true propensity to comply with the central mandate, our dependent variable in all specifications is the average of a city's PITI score across all three years. This reduces measurement error that might result from transient factors, for example, if local bureaucrats were overenthusiastic in a particular year about disclosing information that the local party bosses and industry heads would not want released and then were reined in later.

### **Primary Independent Variable: Large Firm Dominance**

As discussed above, large firms enjoy specific avenues to exert political influence within a municipality. To measure the importance of large firms in the local economy, we identified the largest industrial employer in each city as of 2007, a year before the OEI Measures took effect. The firms are in a variety of industries, but mining and heavy industries predominate and all produce significant pollution emissions. All but two are PRC-based, and the vast majority are state-owned. These firms are large, with a mean size of 34,300 employees and a median of 20,100. Even relative to the size of China's cities, these numbers are

substantial. Taking each firm's number of employees as a fraction of the city's total population (including children, the elderly, and the unemployed), we find that the median firm employs 1.1% of the people in the city, with the biggest relative employer in the sample, the Xinjiang Uighur Autonomous Region Petroleum Management Bureau, employing 15.7% of its city's population. We create the variable *Large Firm Dominance* (LFD) by dividing the number of employees in the firm by the city's total population and taking the log of this value.

This variable is not intended simply to capture the influence of one firm, but rather is a simple measure of the concentration of industrial enterprises that we can use in the absence of a top-to-bottom enumeration of the firms in each city.<sup>3</sup> A city in which the largest firm employs 10% of the population may have a second-largest firm employing 8%, a third-largest employing 6%, and so forth. Each of these firms may be quite influential—the point is that this city's leadership faces a much more powerful “lobbying” group of industrial enterprises than does the leadership of a city in which the single largest firm only employs 1%.

A natural concern is that the size of these firms in 2007 might actually be influenced by expectations about how strictly a particular city might enforce these new transparency regulations. Shanghai introduced transparency regulations as early as 2004 (Horsley 2007), and industrial leaders would have been aware that new national regulations were under development by the early 2000s. Given this, they might choose to scale back or even end their activities in cities expected to be relatively enthusiastic for such reforms. To mitigate this endogeneity concern, we instrument for *Large Firm Dominance* in 2007 with the same variable measured in 1999, well before transparency reforms were a major focus of discussion. Unsurprisingly, the correlation between the two values is quite high, at 0.66. Although only 31 of the firms on top in 1999 were still on top in 2007, almost all of them were still in business, so their successors had to achieve similar or greater scale to replace them.

### **Control Variables**

Other factors may also be correlated with environmental transparency. First, transparency is costly.

<sup>3</sup>Lack of a complete industrial census makes it impossible to construct a more refined index of concentration. However, this measurement error should only lead to underestimates of the influence of large firms.

Scoring high on the PITI index requires a municipal EPB to do a number of things. An EPB must collect and organize the necessary data, input the data, and create a website. Furthermore, it must hire staff to process information requests, evaluating whether they comply with the regulations and assembling the necessary responses. Therefore, cities with greater budget revenues at their disposal are likely to find it less onerous on the margin to ensure that the local EPB has adequate resources to perform these tasks. In addition to the absolute size of their budgets, Chinese cities vary a great deal in the quality of their finances. The central government has mandated that local governments pay for crucial social services such as education, health care, and social welfare, while providing no guarantee that funds will be made available for localities that lack the resources to do so, leaving many localities in poor financial shape (Wong 2009). Indeed, in our sample, only 14 of the 113 cities rated had revenues that exceeded their expenditures. Cities that have fewer resources relative to the demands on their staff and finances may find it challenging to implement the regulations even with the best of intentions. Therefore, we will also control for the ratio of the city's expenditures to its revenues. Cities where this number is higher are in worse financial straits.

As discussed above, it is commonly asserted that officials face strong incentives to promote economic growth in order to rise within the government hierarchy, although the empirical evidence is mixed. Such incentives should make them reluctant to implement transparency requirements if their city's economy is dependent on highly polluting activities. We control for this in two ways. First, we control for the fraction of the city's GDP output that comes from the cleaner service sector, as opposed to manufacturing or natural resource extraction. To get even more directly at a city's dependence on polluting businesses, we would like to include a measure of the overall level of pollution in each city. However, Chinese data on this are both incomplete and of questionable quality. Since distorted or poor-quality pollution data might correlate with lower pollution transparency, these data flaws cannot be taken lightly. Consequently, we compiled satellite-generated remote-sensing data to create new estimates for each of China's 287 prefecture-level cities of the average ground-level concentration of three crucial air pollutants: sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), and fine particles (PM<sub>2.5</sub>). Each of these substances is associated with long- and short-term respiratory problems. Water pollution is of course another important factor, although it is probably of less concern to urban residents than to

farmers who draw the water directly for drinking and irrigation. As no analogous objective measures of water pollution are available, we use water-pollution data assembled by the nongovernmental Institute for Public and Environmental Affairs from Chinese official sources.<sup>4</sup>

## Empirical Analysis

To assess the relationship between these factors and the level of environmental transparency, we conduct a two-stage least squares regression between these independent variables, measured prior to the time the transparency regulations took effect in 2008, and the city's pollution transparency score averaged over 2009–2011, instrumenting for the 2007 level of large-firm dominance with the 1999 level as discussed above. The results on Table 1 strongly support our primary hypothesis, showing that large-firm dominance has a robust negative association with transparency across a variety of specifications.<sup>5</sup> Column 1 provides the simplest specification, without controls. Column 2 includes a small set of control variables, which have essentially no effect on the estimated coefficient. Notably, the only significant coefficients come from the two variables characterizing a city's fiscal situation. The positive coefficient on budget revenue suggests that cities with more resources at their disposal find it easier to incur the fixed costs of organizing the pollution data they have and setting up a website. The negative coefficient on the ratio of budget expenditures to revenues shows that cities in tight financial circumstances are less likely to spend money on what may be a second-order concern relative to providing basic services.

Surprisingly, we find no evidence that a city's environmental transparency can be explained by officials' desire to promote *overall* economic growth at the expense of the environment. First, the negative but nonsignificant coefficient on the proportion of services in a city's economy shows that cities that are relatively postindustrial are no more transparent than those that depend on manufacturing or extractive industries. Even more tellingly, we see that

<sup>4</sup>Additional details on pollution variables are available in the online appendix.

<sup>5</sup>The instrumental variable easily passes the standard test for weak instruments. Across all four specifications the lowest F-statistic 37.6, is much higher than the rule-of-thumb standard of 10 (Staiger and Stock 1997). First stages are reported in the online appendix.

**TABLE 1** Effect of Large-Firm Dominance on Pollution Information Transparency Index (PITI) score (three-year average)

Variables	Baseline	Primary Controls	Alternate Pollution Controls	Additional Controls
Large-firm dominance	-6.025** (1.928)	-6.366*** (1.598)	-6.459*** (1.692)	-8.085*** (2.175)
Budget revenue (log)		5.290*** (1.485)	5.280** (1.657)	7.16 (4.172)
Ratio of budget expenditures to revenues (log)		-16.91** (5.802)	-15.18* (6.592)	-13.60 (9.156)
Ratio of services in GDP		-14.11 (10.64)	-14.04 (10.83)	-9.825 (14.29)
Air pollution (principal components)		1.081 (0.745)		
Sulfur dioxide (SO <sub>2</sub> ), (log)			1.701 (3.425)	0.615 (3.517)
Nitrogen dioxide (NO <sub>2</sub> ), (log)			5.644* (2.466)	6.732* (2.979)
Fine Particles (PM <sub>2.5</sub> ) (log)			-6.275* (3.177)	-6.093* (3.028)
Industrial water pollution/gdp (log)			0.970 (1.288)	0.725 (1.384)
GDP/cap (log)				1.681 (4.932)
Population (log)				-2.864 (5.017)
Provincial capital or central municipality				-4.928 (4.775)
Coastal province				-4.935 (3.266)
Designated tourism city				2.416 (2.696)
Constant	65.16*** (9.829)	9.175 (21.63)	34.15 (29.38)	10.27 (46.61)
Observations	112	112	106	106

Note: Standard errors in parentheses

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

the degree of air pollution, summarized here with a measure derived from the first principal component of our three satellite-based pollution measures, has no significant association with environmental transparency. To put it another way, if we imagine comparing two hypothetical cities, identical except that one is industrial and highly polluted while the other is not, our results imply that they would be equally transparent. By contrast, if two cities were equally polluted and equally dependent on polluting industry, but one city's pollution was generated by a large number of small firms, while the other city's pollution came primarily from one large enterprise, transparency would be much lower in the second city. This suggests that officials are willing to challenge the central state (or at least its Ministry of

Environmental Protection) in order to protect well-connected and high-profile large firms but not necessarily to support overall economic development. This contradicts (or at least offers no support for) the idea that China's local officials are highly motivated stewards of their local economies, since this would lead us to expect transparency to be sacrificed in more industrial or polluted cities.

The next two specifications explore further the robustness of our core finding on the negative relationship of LFD to transparency. In column 3, we break our air pollution variable into its three component parts in order to make the most use of the underlying data. Interestingly, in this specification, higher NO<sub>2</sub> is actually associated with greater



environmental transparency, while higher levels of particulate matter are associated with less. Interpretation of this finding is tricky, since all three of these substances are put in the atmosphere by any combustion process, and they are highly correlated in our sample. We therefore choose not to overinterpret those coefficients—the important point is that the estimated coefficient on large firm dominance remains unaffected, as do those of the budgetary variables.

Column 4 includes a “kitchen-sink” of other potentially relevant variables. GDP per capita addresses the possibility that economic development may lead to better governance or greater concern for the environment. Population is added because it might be more difficult to gather information in larger cities. In addition, since most cities in the sample are at the same subprovincial level of government but many are provincial capitals or even have provincial status, we also control for administrative level. Location in a coastal province is included as these provinces are generally thought to be better managed (although this is conflated with their wealth). Finally, many cities have been formally designated as tourist destinations and might be more eager to attract visitors by reducing pollution. None of these control variables have a statistically significant association with transparency. The coefficient on large-firm dominance actually increases. Standard errors for the budget variables increase substantially because of multicollinearity resulting from the inclusion of per capita GDP and population.<sup>6</sup>

It also stands to reason that firms in some industries would be more concerned to keep their pollution from becoming public than others. While it is unlikely that any large industrial firm employing thousands of people creates no pollution at all, some industries are inherently cleaner and have less to hide than others. Additional employment in a cleaner firm should have a smaller marginal effect on transparency than equivalent employment in a dirtier firm. In order to approximate this, we use a list of heavily polluting industries issued by the Ministry of Environmental Protection in 2010, assigning a value of 1 to a city if its largest firm is in one of these industries and 0 other-

wise. By this standard, 43 of the 110 firms are coded “clean”, while the remaining 67 are “dirty.” Regressions using this dummy variable should if anything understate the true relationship since this is a relatively weak measure of the extent to which large firms in a city would oppose environmental transparency. First, the classification does not take into account variation within firms in the same industry, making it a very rough measure of the clean/dirty continuum. Second, a city’s second- or third-largest firm might be almost as politically influential, and these are also more likely than not to be major polluters, given the characteristics of the top firms. These facts are not captured by our use of the single largest firm as indicator. An additional problem is that the identity of all but 31 of the firms changed between 1999 and 2007. In earlier specifications, when we use the size of the largest firm as a proxy for the overall concentration of industry in the city, this was not consequential, but here it is—any association between whether the city’s largest firm was in a polluting industry in 1999 and whether that was true in 2007 is spurious for the 72 cities in which the top firm has changed. We thus proceed with ordinary least squares (OLS), recognizing that this raises natural concerns about endogeneity.

Columns 1 and 2 of Table 2 compare the regression results when we evaluate separately the subsamples of cities in which the largest firm is not on the polluter list and those in which it is. Where it is not, large-firm dominance is negative, but not statistically distinguishable from zero, while where the largest firm is a polluter, the coefficient is larger and statistically significant. Column 3 includes all cities, adding the dummy variable and its interaction with large-firm dominance to the regression. Again, we see that large-firm dominance has a relatively small estimated effect when the largest firm is not a polluter and a larger effect when the largest firm is a polluter (LFD\*MEP). While standard errors are large enough that we cannot reject the hypothesis that the coefficient on the interaction is zero, we can reject the hypothesis that the total effect of LFD+LFD\*MEP (the marginal effect of the largest firm being greater if it is a polluter) is zero, at the 97% level. We therefore get a consistent story from each of these two approaches: transparency decreases with the size of the largest firm, if that largest firm is a polluter. Using a de-measured measure of LFD also implies that the coefficient on the dummy variable can be interpreted as a test of the hypothesis that when LFD is at its mean level, a city whose largest firm is a polluter will be less transparent than it would be otherwise. This difference is also significant.

<sup>6</sup>We present several other specifications in the online appendix, none of which significantly reduces the coefficient estimate for LFD. We also explore the relationship between environmental transparency and other forms of transparency. If some city governments are simply more inclined to be open than others, it is possible that variation in PITI scores reflect this. Controlling for this by including available measures of transparency in non-environmental domains does not notably change the coefficient estimate for large firm dominance.

**TABLE 2** Difference in Marginal Effects Depending on Industry of Single Largest Firm

Variables	Not Polluter	Polluter	Interaction
Large-firm dominance (LFD) (demeaned)	-1.751 (2.144)	-2.747* (1.280)	-0.505 (2.239)
Budget revenue (log)	6.743** (2.077)	4.768*** (1.352)	5.798*** (1.190)
Ratio of budget expenditures to revenues (log)	-28.14*** (7.561)	-7.636 (6.382)	-15.46** (5.148)
Ratio of services in GDP	-13.64 (14.60)	-0.661 (11.71)	-7.424 (9.714)
Largest-firm MEP heavy polluter			-4.538* (2.136)
LFD*MEP (demeaned)			-2.181 (2.556)
Constant	-35.66 (26.33)	-25.62 (18.06)	-28.83 (15.37)
Observations	46	67	113

Note: Standard errors in parentheses

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

In addition, following the recommendation of Berry, Golder, and Milton (2012), we consider what our theory suggests about the difference between these two types of cities when at the extremes of the sample. These results also support our theory. At the highest level of LFD, the estimated effect of the largest firm being in a polluting industry is  $-9.6$  points in the PITI ranking. As expected, this is much higher than at the mean level, although the large standard deviation at this tail of the distribution means the  $p$ -value of this estimate is only 0.18. The lowest level of LFD in our sample is 0.09%, roughly one person in a thousand working for the largest industrial firm. Consequently, we would expect it not to matter much if this firm is in a typically polluting industry or not. The estimated effect of these very small firms being a polluter turns out to be very small and positive, 0.87 points in the PITI ranking, essentially indistinguishable from zero.

## Discussion and Conclusion

To recap, this article offers three key empirical findings. First, when China's central government attempted to implement transparency reforms in the environmental sector, it had notably less success in cities dominated by large industrial firms. Second, this dominance mattered more when the largest firm in a city was in a particularly high-polluting industry. More tentatively, we also highlight a surprising null result: cities that were more industrial or more pol-

luted were no less transparent than cleaner services-oriented cities. To be clear, these results do not imply that central authorities are completely incapable of enforcing their dictates. The average city improved its score by 9 points in the two years following the initial PITI rankings. The regime might also hope for complementarity between transparency initiatives, with large firms losing influence as OGI regulations make it harder to conceal their collusion with municipal governments, although we see no evidence of that in our data.<sup>7</sup> Yet overall, results from a variety of analytical approaches yield strong evidence that the concentrated power of large firms in Chinese cities has impeded the implementation of this major national reform initiative.

This article therefore makes several contributions to our understanding of authoritarian regimes. First, it highlights another arena in which what might appear like a step toward democratizing reform can actually be designed to enhance the stability of an authoritarian regime. But in this case, it is not necessarily true that an institutional change promoting authoritarian stability harms ordinary citizens, as would be the case if we conceive of "state" and "society" as locked in a zero-sum conflict. Instead, this reform takes advantage of the shared interest of China's top leaders and its ordinary citizens in reining in local officials who might otherwise be reluctant to stand up to powerful interests in the name of sustainable long-run development. Second, it demonstrates quantitatively the political influence of

<sup>7</sup>See the online appendix for an empirical exploration of this.

China's large, mostly state-run firms. While there has been increasing attention in recent years to their continued importance in China's economy and the economic distortions that result (Huang 2008; World Bank 2012), the political role of these firms has been neglected. Our research suggests that these powerful firms may not only be hampering China's economic reform, but also restricting the ability of China's top leaders to implement political reforms, even when these reforms are aimed at promoting sustainable long-run economic growth and preserving CCP rule.

Our findings also cast further doubt on the widespread notion of the Chinese state as a mostly meritocratic developmental bureaucracy, one in which local officials strive to promote local economic development in order to advance up the hierarchy, if perhaps at the expense of the environment. Instead, we see that in at least one policy arena, local officials appear unduly motivated to protect powerful firms. By contrast, we see no evidence that a city's overall level of pollution or industry affects its implementation of environmental transparency reforms, as we would expect if officials were simply sacrificing the environment for broad GDP growth.<sup>8</sup>

Finally, while we do not dispute the claim that introducing seemingly democratic institutions can help extend authoritarian rule, we show that it cannot be taken for granted that leaders can easily establish such institutions. The success of such reforms depends on the distribution of power among regime insiders. China's large firms have held back the implementation of an important institutional innovation, thereby making it harder for the CCP to resolve one of the most pressing threats to its continued rule. This suggests that scholars examining the role of quasi-democratic institutions in preserving authoritarian rule should pay closer attention to the challenges authoritarians face putting these institutions in place. A better understanding of when authoritarians can or cannot make self-preserving institutional changes will help us avoid confounding the *ability* to make institutional changes with the *effect* of these changes when exploring their association with authoritarian resilience.

<sup>8</sup>Following up on these results as presented in our earlier working paper, Tan (N.d) finds that the average output of firms in a city is negatively associated with the PITI score, consistent with our central finding. She also finds a negative association between SO<sub>2</sub> emissions and the PITI score, a finding which is more consistent with the conventional wisdom but which relies on inherently problematic official data.

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