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The Ways of Corruption in Infrastructure: Lessons from the Odebrecht Case

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In 2010, the Swiss business school IMD chose Odebrecht, a Brazilian conglomerate, as the world's best family business. Odebrecht was chosen for the excellent performance of its companies, its continuous growth, and its social and environmental responsibility. Sales had quintupled between 2005 and 2009, and Odebrecht had become Latin America's largest engineering and construction company and ranked 18th worldwide among international contractors (*Engineering News-Record Magazine* 2009).

By 2015, however, Odebrecht chief executive Marcelo Odebrecht had been arrested on corruption charges. Nine months later he was sentenced to more than 19 years in prison. The Odebrecht case, as it came to be known, involved bribe payments in ten countries in Latin America and two countries in Africa. Deltan Dallagnol, lead prosecutor in Brazil, commented (as reported by Pressly 2018): "The Odebrecht case leaves you speechless. This case implicated almost one-third of Brazil's senators and almost half of all Brazil's governors. A single company paid bribes to 415 politicians and 26 political parties in Brazil. It makes the Watergate

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scandal look like a bunch of kids playing in a sandbox." The US Department of Justice (2016) described the case as "the largest foreign bribery case in history."

The US Department of Justice prosecuted Odebrecht under the US Foreign Corrupt Practices Act of 1977, which prohibits paying bribes. The US Department of Justice had jurisdiction in the Odebrecht case, as it did in a number of other international bribery cases, because the company made payments from bank accounts in New York, and some meetings to negotiate bribes were held in Miami (as reported in Shield and Chavkin 2019). As shown in Table 1, Odebrecht is by far the largest case prosecuted in the 40-year history of the Foreign Corrupt Practices Act, both in terms of the profits obtained from corruption and the size of the fine. Indeed, Table 1 shows that Odebrecht's profits from corruption were as large as the combined profits of the remaining nine firms.

The Odebrecht Bribes

The Odebrecht case emerged as an offshoot of the Lava Jato ("Car Wash") investigation in Brazil. The Lava Jato case began as a minor investigation of money laundering by *doleiros*, black market foreign exchange dealers operating through car washes and gas stations. As investigations continued, links were found to Petrobras, the large Brazilian state-controlled oil company. In plea agreements, Petrobras executives confessed that between 2004 and 2012 they colluded with contractors to run a bid-rigging scheme that exchanged contracts for bribes. Contractors would pay bribes of 1–3 percent of the value of the contract, which were split between Petrobras executives, politicians, and political parties. As the Lava Jato investigation unfolded, it uncovered a separate corruption scheme run by the construction firm Odebrecht (and its petrochemical affiliate Braskem). As it turned out, Odebrecht had bribed about 600 politicians and public servants in ten Latin American countries to win the public bidding process of large infrastructure projects, and to renegotiate the projects at higher prices after winning them.

By 2006, bribery at Odebrecht had become so institutionalized that the company created the Division of Structured Operations (DSO), a stand-alone department dedicated to corruption. According to the plea agreement between the Odebrecht chief executive officer Marcelo Odebrecht and the US Department of Justice, the DSO specialized in buying influence through legal and illegal contributions to political campaigns and also in paying bribes to public officials and politicians. Within the DSO, three full-time executives and four experienced assistants were responsible for paying bribes to foreign accounts. Bribe payments followed a clear organizational flow. A contract manager would deal with potential bribe recipients—public officials and politicians—and reported to the country manager. The country manager could approve small bribes paid with local funds. Larger bribes were vetted by an executive reporting directly to the Odebrecht chief executive officer who often made the final decision.

Table 1

Top Ten Foreign Corrupt Practices Act Cases: Gross Profits from Bribes

(in millions of US dollars)

Case	*Countries*	*Gross profits from bribes*[a]	*Amount of bribes paid*	*Total fine*[c]	*Countries to which fines were paid*
Odebrecht (2001–2016)	Angola, Argentina, Brazil, Colombia, Dominican Republic, Ecuador, Guatemala, Mexico, Mozambique, Panama, Peru, Venezuela	3,336	788	2,600	Brazil, Switzerland, United States
Siemens (1996–2007)	Argentina, Bangladesh, China, Iraq, Israel, Mexico, Nigeria, Russia, Venezuela, Vietnam	1,100[b]	1,400[b]	1,600	Germany, United States
Societe Generale and Legg Mason (2004–2011)	Libya	523	91	860	France, United States
Keppel (2001–2014)	Brazil, Iraq	500	55	422	Brazil, Singapore, United States
Ericsson (2000–2017)	China, Djibouti, Indonesia, Kuwait, Saudi Arabia, Vietnam	458	150	1,060	United States
Telia (2007–2012)	Uzbekistan	457	331	965	Netherlands, Sweden, United States
Alstom (2000–2010)	Bahamas, Egypt, Indonesia, Saudi Arabia, Taiwan	296	75	860	United States
Teva (n.a.)	Mexico, Russia, Ukraine	221	n.a.	541	United States, Israel
Total (1995–2005)	Iran	150	60	398	United States
Fresenius (2009–2016)	Angola, Benin, Bosnia and Herzegovina, Burkina Faso, Cameroon, China, Gabon, Ivory Coast, Mexico, Morocco, Niger, Saudi Arabia, Senegal, Serbia and Montenegro, Spain, Turkey	140	30	232	United States

Note: [a]Gross profits from bribes and bribes paid were extracted from Stanford's Law School Foreign Corrupt Practices Act Clearinghouse Database at https://law.stanford.edu/foreign-corrupt-practices-act-clearinghouse-fcpac. Gross profits are profits before paying bribes. This table considers information up to January 2020. [b]Siemens paid more in bribes than the gross profits it made. This is consistent with the information contained in the complaint of US Securities and Exchange Commission 2008, p. 2. [c]Total fines were extracted from Stanford Law School Foreign Corrupt Practices Act Clearinghouse Database and the OECD (2019, p. 119).

Once a bribe was authorized, the Division of Structured Operations registered, managed, and made the payment through a network of shell companies, off-book transactions, and off-shore bank accounts. This included the Antigua subsidiary of Austria's Meinl Bank, bought for this purpose by Odebrecht. The DSO also used an independently funded parallel cash trove (called Caixa 2). As the US Department of Justice (2016) described the arrangements: "[T]o conceal its activities, the Division of Structured Operations utilized an entirely separate and off-book communications system . . . to communicate with one another and with outside financial operators . . . via secure emails and instant messages, using codenames and passwords." The DSO also used a bespoke information management system for bookkeeping and to track information flows.

Before the creation of the Division of Structured Operations, bribes in the construction sector in Latin America were usually paid in cash, which is inefficient, because some of the money in the suitcase "leaks." According to the executive who headed the DSO: "When you are working with cash that is off the books, it can disappear. So they needed someone who could guarantee it wouldn't disappear" (as reported by Smith, Valle, and Schmidt 2017). Moreover, the bribee must conceal and launder the cash. The DSO was designed to solve both "problems," with full-time employees making payments through a web of offshore entities via tax havens with strong banking secrecy laws. In such ways, the DSO increased the effectiveness of bribe payments and reduced their cost.

On December 21, 2016, 77 current and former Odebrecht executives signed plea agreements with the US Department of Justice and with Swiss and Brazilian authorities in exchange for leniency. Marcelo Odebrecht, the former CEO of Odebrecht, and two other executives were sentenced in Brazil to 19 years in prison for corruption, money laundering, and criminal association. However, the sentence was later reduced, and Marcelo Odebrecht was instead placed under house arrest.

As Table 2 shows, the plea agreement between Odebrecht and the US Department of Justice comprised bribes paid in ten Latin American countries (Argentina, Brazil, Colombia, Dominican Republic, Ecuador, Guatemala, Mexico, Panama, Peru, and Venezuela), and two African countries (Angola and Mozambique). For the first eight countries listed in Table 2, we were able to determine the initial cost estimate and the final cost after renegotiation of each project that Odebrecht undertook during the period covered by the agreement with the US Department of Justice. This includes 88 projects: 62 where Odebrecht paid bribes and 26 projects without bribes. The 88 projects were procured either as public works (68 projects) or as public-private partnerships (20 projects). Odebrecht also built 140 projects in Brazil, of which we were able to gather data on 105. Bribes were paid in 72 of them.

With the exception of Venezuela and Mozambique, the US Department of Justice was able to estimate gross profits made by paying bribes in each country—"any profit earned on a particular project for which a profit was generated as the result of a bribe payment" (the third column in Table 2). From Table 2,

Table 2
The Odebrecht Case: Basic Statistics
(in millions of US dollars)

Country	*Bribes*[a]	*Gross profits from bribes*[a]	*Projects*[b]	*Projects with bribes*[c]	*Initial cost*[d]	*Cost after renegotiation*[d]
Argentina (2007–2014)	35	278	6	5	4,141	13,343
Colombia (2009–2014)	11	50	4	3	1,828	2,134
Dominican Republic (2001–2014)	92	163	16	15	4,588	5,853
Ecuador (2007–2016)	33.5	116	10	7	3,466	4,074
Guatemala (2013–2015)	18	34	1	1	384	384
Mexico (2010–2014)	10.5	39	6	3	2,155	3,059
Panama (2010–2014)	59	175	20	13	8,839	10,391
Peru (2005–2014)	29	143	25	15	14,904	17,253
Brazil (2004–2016)	349	1,900	105	72	66,080	77,559
Total (2001–2016)	637	2,898	193	134	106,384	134,051
Angola (2006–2013)	50	261.7	n.a.	n.a.	n.a.	n.a.
Mozambique (2011–2014)	0.9	n.a.	n.a.	n.a.	n.a.	n.a.
Venezuela (2006–2015)	98	n.a.	n.a.	n.a.	n.a.	n.a.
Total (all countries) (2001–2016)	786	3,160	n.a.	n.a.	n.a.	n.a.

Note: [a]Bribes and gross profits from bribing were taken from the plea agreement between Odebrecht and the US Department of Justice. Gross profits from bribing means any incremental profit obtained because Odebrecht paid a bribe, gross of bribes. In projects where bribes exceeded the estimated profits, the Department of Justice set gross profits equal to the bribe. [b]The number of projects in each country was obtained from Odebrecht's annual reports. [c]The number of projects where Odebrecht paid a bribe was obtained from legal documents and press reports. [d]We estimated initial cost and cost after renegotiations for each project undertaken as follows. First, from Odebrecht's annual reports and the websites of Odebrecht's subsidiaries, we obtained the list of public infrastructure projects awarded each year to Odebrecht in each country. Second, for each country we defined a list of websites where we searched for documents mentioning the projects. Third, we divided the websites in two categories: official and media sources. Official sources contain documents issued by the government, judicial bodies, reports from the Comptroller General, reports from investigative commissions related to the Odebrecht case in the country, and information provided in annual company reports. Media sources included reports from investigative media and information provided by nongovernment organizations. Fourth, we downloaded all documents from official and media sources that mentioned a project. These documents included contracts, documents related to the bidding process, supplementary contracts, depositions of Odebrecht executives, legal documents from judicial bodies, media reports, and information provided by nongovernment organizations. Fifth, we reviewed each document searching for the initial and final cost. If two (or more) official sources provided different information for a project, preference was given to information from contracts (original and supplementary), and secondly to documents related to the tendering process. If two (or more) media sources provided different information for the same project, priority was given to information from investigative media sources. The increase in costs due to renegotiations was estimated in real terms.

Odebrecht paid $786 million in bribes and obtained gross profits equal to $3,160 million.[1] That is, Odebrecht made $3 in net profits for every $1 it paid in bribes.

The last two columns of Table 2 report the initial cost estimates and the cost increase after renegotiations. For the eight countries with complete data at the top panel of the table, cost increased by 40.1 percent after renegotiations, with substantial variation across countries and projects. For the 105 projects from Brazil for which we have data, costs increased by 17.4 percent.

The Odebrecht case had major economic and political consequences throughout Latin America. In many cases, large projects were suspended or abandoned due to anticorruption clauses in the contracts (de Michele, Prats, and Losada 2018). For example, construction of Gasoducto del Sur, a large pipeline duct in Peru that would transport natural gas from the Camisea fields to the south of the country, was suspended even though the generating plants that would use the gas had already been built. The IMF (2018, p. 21, box 2) estimates that the macroeconomic cost brought about by the Odebrecht case in Peru was of the order of 0.8 percent of GDP in 2017. Though there are no definitive estimates, several reports speculate that the Lava Jato and the associated Odebrecht case had a significant macroeconomic impact in Brazil as well: for example, the Lava Jato case has generated a suspension of projects worth approximately $27 billion (as reported by Pereira 2017).

The plea agreement between the US Department of Justice and Odebrecht triggered judicial investigations in several countries, leading to plea bargains and additional disclosures of political corruption. In Peru, President Pedro Pablo Kuczynski was forced to resign, and of the three previous Peruvian Presidents, Alan García committed suicide, Alejandro Toledo fled the country, and Ollanta Humala spent time in jail. In Brazil, former president Luis Inácio Lula da Silva spent 19 months in prison in connection with alleged bribe payments made by rival construction firm OAS; in Ecuador, former vice-president Jorge Glas was sentenced to six years in jail. The Odebrecht case may have weakened the confidence of the public in democracy and helped lead to the current wave of populism in Latin America. As Simon (2019) argued: "From Mexico to Brazil, the Odebrecht scandal helped push corruption to the center of public debate. It also bolstered a widespread revolt against political and business elites—a decisive element in most of the elections held in Latin America over the past two years."

[1] In the plea agreement, the US Department of Justice states that Odebrecht's gross profits from bribing were equal to $3,336 million and that bribes paid were $788 million. We cannot explain this discrepancy in the US Department of Justice numbers. In our discussion, we will use the country-level data from the table.

What Did Odebrecht Obtain in Exchange for Bribes?

Our examination of judicial documents and media reports provides details on the *quid pro quos* between Odebrecht and corrupt officials. They show that Odebrecht bribed to tailor auctions in its favor and to obtain favorable terms when renegotiating the contract after the projects were awarded.

Manipulation of Subjective Bid Criteria

The literature has argued extensively that subjective criteria in government bidding are prone to corruption, even when the tendering process is open (for example, see Huang and Xia 2019; Tran 2009; Burguet and Perry 2007; Burguet and Che 2004).

Odebrecht distorted the firm selection process in various ways. The evaluation of the technical expertise of participants was often biased in projects that were tendered competitively. For example, if the technical score was a weighted average of objective and subjective components, the weights would be chosen to favor Odebrecht. Alternatively, Odebrecht could be arbitrarily awarded the highest possible technical score, while its competitors received a lower score. In other cases, potential bidders were disqualified by setting technical requirements that only Odebrecht could meet.

As one example, consider the tender for the construction of the Trasvase Daule-Vinces reservoir in Ecuador. The final score was the weighted average of the technical score (55 percent) and the cost bid (45 percent). According to prosecutors, Odebrecht paid $6 million to Carlos Villamarín, the president of the tender commission, to ensure that the only rival of Odebrecht received a lower technical score and thus Odebrecht won the contract.[2]

A second example is the Poliducto Pascuales-Cuenca pipeline in Ecuador. Odebrecht paid $5 million to José Rubén Terán, a bribe intermediary, who distributed the bribes to Petroecuador's chief executive officer and to three other executives responsible for the auction. These executives tailored the technical requirements and the documents needed to prove experience so as to disqualify the other three bidders, and Odebrecht won the project.[3]

Finally, in the tender for the Santos Dumont Airport in Rio de Janeiro, Brazil, Odebrecht paid $3.8 million to the president and three board members of Infraero, the government agency in charge of airports. In exchange, these officers added financial requirements to the tender documents that disqualified six of the twelve companies that entered the tender. The remaining six companies were members

[2] See "Judicial Report of *Process N°* 17721-2017-00222," Procuraduría General del Estado, p. 6, Jan 29, 2019. Available at https://es.scribd.com/document/394930485/ReporteProceso-17721-2017-00222-Juicio-Asoc-Ilicita.

[3] See Deposition of José Conciencao Santos Filho, an Odebrecht executive, to Ecuadorian prosecutors, pp. 6–9, Available at https://www.dropbox.com/s/xho8srvafa3t6gf/Delaci%C3%B3n%20Jos%C3%A9%20C.%20Santos.pdf?dl=0.

of a cartel led by Odebrecht. After sham competition between the members of the cartel, Odebrecht won the tender.

Better Terms in Renegotiations

Bribing to obtain better terms in a renegotiation has also been mentioned as a *quid pro quo* in the research literature (for example, Guasch and Straub 2009). Nevertheless, direct evidence is hard to find, and most studies only search for a correlation between the frequency and size of renegotiations and an aggregate corruption indicator.

There exists ample evidence of renegotiations of infrastructure contracts that do not necessarily involve bribe payments. For example, Bajari, Houghton, and Tadelis (2014) examined 819 highway procurement contracts in California and found that the final price was, on average, 5.8 percent higher. This raises the question of whether the cost increases were larger in projects where Odebrecht paid bribes.

The first column of Table 3 shows the cost increase after renegotiations for projects with and without bribes. Data on the amount renegotiated comes from government agencies. We determined whether bribes were paid in each project doing a thorough search and review of legal records and media sources. As the first column of the table shows, in the 26 projects with no bribes, costs increased by a weighted average of 5.6 percent after renegotiations (simple average 16.3 percent). In contrast, in the 62 projects where Odebrecht paid bribes, costs rose by 70.8 percent after renegotiations. Thus, cost increases in renegotiations are about 12 times larger when Odebrecht paid a bribe. As a robustness check, the second column of the table repeats the computations using only legal documents. Under this stricter criterion, Odebrecht paid bribes in 45 projects. Now the amount renegotiated increases from 10.9 percent when there are no bribes, compared to 84.9 percent with bribes.

Data from the Odebrecht projects in Brazil for which we could obtain information also show that renegotiations were larger when bribes were paid, even though cost increases were smaller overall. Specifically, using legal and media sources to detect bribe payments, we find that renegotiations in projects with bribes led to a cost increase of 18.9 percent compared with 4.1 percent for projects without bribes (both weighted averages). If instead we consider simple averages, the percentages are 24.5 and 6.2 percent, respectively. Again, as a robustness check, if we only consider legal sources to determine whether bribes were paid, the above percentages are 18.8 versus 6.2 percent for weighted averages (or 24.6 versus 6.9 percent for simple averages).

To the best of our knowledge, the evidence presented above is the first to establish a direct link between bribe payments and the magnitude of contract renegotiations.

Our examination of judicial documents and media reports confirms that Odebrecht paid bribes in the expectation that it would renegotiate the contract to its advantage. Consider the Vía Costa Verde–Tramo Callao project in Peru. Under

Table 3
Cost Increase after Renegotiations

		Evidence of bribes	
		Legal or media	*Legal*
No bribes	Number of projects	26	43
	Simple average:	16.3%	23.3%
	Weighted average:	5.6%	10.9%
Bribes	Number of projects	62	45
	Simple average:	59.1%	68.6%
	Weighted average:	70.8%	84.9%

Source: Authors' calculations using data from the US Department of Justice, media, and investments as reported by government agencies.

Peruvian law, the Ministry of Finance sets a "reference cost" for any project and requires bids to be within 10 percent of the reference value—or else be rejected outright. Odebrecht, which had previously paid $4 million to Felix Moreno, the regional governor of Callao, asked him to increase the reference value. According to the plea agreement of an Odebrecht executive, Moreno pointed out that the Ministry of Finance would not acquiesce to a change in the reference value but promised to increase the project value in a subsequent contract renegotiation (Poder Judicial del Perú 2019). Eventually the contract was renegotiated eight times and the total cost increased by 55 percent from $106 million to $161 million.

As an example of renegotiations that added major works to the initial project, consider the Linea Noroeste aqueduct in the Dominican Republic. According to the Prosecutor of the Dominican Republic, Odebrecht acted through Ángel Rondón, a well-connected businessman, to bribe two successive Directors of the Water Works, and then also bribed Porfirio Bautista, President of the National Senate, which had to approve the budget for the additional works. Odebrecht paid $1.6 million to enlarge the project, increasing the value of the contract by $89 million (Poder Judicial de la República Dominicana 2018). The contract was renegotiated four times and its cost increased from $161 to $250 million.

An even more extreme example is the hydroelectric plant Pinalito in the Dominican Republic. Odebrecht bribed the Vice President of the Dominican Corporation of State-Owned Electric Companies (CDEEE), to add a fully independent project to the original contract (Poder Judicial de la República Dominicana 2018). The addition was the El Abanico-Constanza road, which increased the value of the contract by $88 million. The Pinalito contract was eventually renegotiated six times and the total cost increased from $131 million to $231 million.

At times, bribes were paid to circumvent the very controls meant to prevent opportunistic renegotiation. For example, consider the agreement between Odebrecht and the Ministry of Transport and Communications during the execution

Table 4
Reasons for Bribing

Tailored bidding process	*Favorable renegotiations*	*Extortion*	*Number of projects*
Yes	Yes	Yes	1
Yes	Yes	No	19
Yes	No	Yes	6
No	Yes	Yes	1
Yes	No	No	20
No	Yes	No	9
No	No	Yes	1
No	No	No	5
46	**30**	**9**	**62**

Note: [a]This table summarizes evidence from the 62 case studies of projects where Odebrecht paid bribes. We consider three corruption mechanisms: tailoring of the bidding process, favorable renegotiations, or ex post extortion. [b] We classified the case studies using legal documentary evidence and investigative media sources. We have documentary evidence on the quid pro quo for 40 projects. We use information from investigative media for the remaining 22 projects. [c]In 5 of the 62 projects, we do not have enough information to determine the corruption mechanism and the quid pro quos.

of IIRSA Norte highway, the Peruvian section of an East-West transcontinental highway. Odebrecht agreed with the head of the unit in charge of public-private partnerships to add $28.3 million in expenses and additional investments. Peruvian law required that the agreement be approved by an arbitration panel. According to the prosecutors, two panel members were paid $110,000 by Odebrecht to ensure that the firm would win the arbitration process.[4]

Multiple Quid Pro Quos

Often Odebrecht bribed officials and politicians at different stages of a project, involving different *quid pro quos*. To see this, in Table 4 we tabulate reasons why Odebrecht paid bribes. In the eight countries for which we have complete data, we found judicial documentary evidence of the *quid pro quos* associated with bribe payments in 45 out of 88 projects. For 17 projects, for which we could find no judicial information, we use data culled from investigative press reports.

We found the following: First, for 46 of the 62 projects where we found evidence of a *quid pro quo*, Odebrecht bribed to manipulate subjective bid criteria to either exclude or disadvantage rivals. Second, in 30 projects, Odebrecht bribed to obtain better terms when renegotiating the contract after the projects were awarded. Third, in nine projects, Odebrecht paid a bribe because a public official threatened to block the project. Extortion has been mentioned in the literature as a reason to pay bribes, but it is less frequent in the Odebrecht case. For 27 out of the 62 projects for which we found evidence of the *quid pro quo*, more than one of these reasons applied.

[4] See "Prosecutor's Office accusation against Odebrecht," Disposición N°10, April 17, 2018, p. 5. Available at https://es.scribd.com/document/378437881/Investigacion-fiscal-contra-los-a-rbitros-caso-Lava-Jato.

The following cases illustrate that Odebrecht bribed different individuals as projects progressed. Consider the Ruta del Sol, a 528-kilometer highway running from Puerto Salgar to San Roque in Colombia. A consortium headed by Odebrecht was awarded a public-private partnership contract in 2010 to build and operate it.

Odebrecht paid $6.5 million to Gabriel Garcia Morales, Vice Minister for Transportation, who ensured that the National Infrastructure Agency (ANI), which tendered the project, tailored the auction to favor Odebrecht. To this effect, it included a discretionary pass/fail qualification stage that verified a bidder's financial capacity, the fulfillment of legal requirements, and the bidder's experience delivering public-private partnerships. As a result of the efforts of García Morales, one of Odebrecht's rivals failed on the experience requirement, and the remaining bidder failed on all criteria. Odebrecht bid close to the maximum that bidders could charge because it expected to be the only bidder in the auction.

Next came bribes to get better terms in renegotiations. Odebrecht paid $4.6 million to Otto Bula, a former congressman, to lobby and bribe government officials and politicians. When asked about whether adding the new road to the original project was admissible, the Colombian National Comptroller replied (our translation): "If the object of a concession contract is to build, maintain, and operate a highway between points A and B, it is clear that any facility not included within that highway, such as an extension to a geographic point C, cannot be agreed upon nor executed as an addition to the original contract." Nonetheless, after being bribed, Luis Fernando Andrade, the head of ANI, added the Ocaña-Gamarra project to the Ruta del Sol concession without an open tender. Bula also bribed a member of the Senate Budget Commission responsible for approving the contract renegotiation. Furthermore, Odebrecht modified the original contract by adding toll plazas and by increasing tolls by 15 percent. Overall, the contract was renegotiated ten times, new works were added, and the total cost increased by 29 percent to $1.25 billion, and completion of the project was delayed by five years until at least 2022.

Consider next the second stretch of the 300-kilometer Southern Interoceanic Highway (IIRSA Sur, section II) in Peru. In 2005, a consortium led by Odebrecht was awarded a 25-year contract to build and operate the highway. This project, which was budgeted at $263 million, was politically motivated as it became apparent early on that the highway would not carry much traffic. To exempt the project from a cost-benefit evaluation, the government tendered it as a Design-Build-Operate public-private partnership and not as a public work. The Public-Private Partnership law left the design of the project to the firm, and bidding for the project took place without a preliminary design, which fast-tracked the adjudication.

At this stage, President Toledo's security chief approached Odebrecht offering to use the president's clout to influence ProInversión, the agency in charge of tendering public-private partnerships in Peru, and ensure that Odebrecht would win the contract. They agreed on a $35 million bribe. However, President Toledo failed to deliver, as he could not get ProInversión to raise the unrealistically low official reference value of the project. This was a problem for Odebrecht, because

as mentioned before, bids for the project could not exceed the reference value by more than 10 percent. Toledo was also unable to deliver on other petitions to modify the tender documents. According to Jorge Barata, President Toledo ended up receiving only a $20 million bribe for helping Odebrecht to win the project.

Odebrecht was the only bidder, and the adjudication was rushed through by ProInversión. After the tender, the contract was renegotiated eight times to add major new works, all without a competitive tender. The cost of the project tripled to $654 million. Then Odebrecht paid bribes to the arbitration judges who adjudicated contractual disputes with the Peruvian state. For example, Horacio Cánepa received $1.4 million both to vote in favor of Odebrecht and to suggest which other judges to bribe. Odebrecht won 10 of 13 arbitration cases.[5]

The last case involves construction of the first line of a Metro system in Lima, Peru. Construction had begun in the 1980s during the first government of President Alan García but remained incomplete until revived in 2006 during García's second presidential term. The government tried to auction the first section of the Línea 1 as a public-private partnership in 2006 and 2008, but there were no bidders. In 2009, the government decided to tender the project as a conventional public work with only a preliminary design. Bids were evaluated using a scoring function that put a 70 percent weight on the technical score and the remainder on the cost bid. One of the components of the technical score was a subjective assessment of improvements to the preliminary design.

In his plea agreement, Odebrecht executive Jorge Barata described the *quid pro quo*. The Vice Minister of Transport and Communications Jorge Cuba offered to tailor the technical requirements in exchange for a $1.4 million bribe. Two officials in charge of scoring the technical proposals connived with Cuba, ensuring that Odebrecht obtained the highest technical score. Five bidders were prequalified, but two were excluded for not exhibiting the required legal documents at the prequalification stage. An additional bidder was excluded at the tendering stage for failure to achieve the minimum requirements. Therefore, only two participants made it to the bidding stage. As mentioned before, the auction rules required bids to lie between 90 and 110 percent of the reference value published by the regulator. Odebrecht obtained the maximum technical score and submitted the minimum cost bid allowed. The second bidder got a slighter lower technical score (99.25 instead of Odebrecht's 100) and its cost bid was 6 percent higher than the reference value. As Barata explained: "[G]etting the highest technical score ensured that we [won the project] if we bid the minimum allowed."

Two years later, the second section of Línea 1 was put to tender. This time, however, Jorge Cuba asked for $6.7 million, and Edwin Luyo, who oversaw the tendering process, received $0.5 million. Barata stated that, had Odebrecht refused to pay the larger bribes, Cuba would have allocated the project to a different

[5] See "Prosecutor's Office accusation against Odebrecht Disposicion N°10," Public Prosecutors' office from Perú, April 17, 2018. Available at https://www.scribd.com/document/378437881/Investigacion-fiscal-contra-los-a-rbitros-caso-Lava-Jato.

bidder—which suggests that the bidders competed in bribes. As in the first section of the Línea 1, only two bidders made it to the bidding stage, because other consortia were disqualified on technical grounds. Odebrecht again obtained the maximum technical score, and both consortia submitted cost bids equal to the minimum allowed value. Thus, paying a bribe to receive the maximum technical score was essential for Odebrecht to win this project.

Lima's metro lines were renegotiated several times. The cost of the first section increased by 25.2 percent, while the cost of the second section increased by 47.6 percent. An interesting feature of the contract was a built-in renegotiation clause, which was added by decree after the project was awarded to Odebrecht. The decree allowed Odebrecht to unilaterally increase "unit prices"—the values for the various construction components that are required to build the project—once it had completed the design.

The Size of Odebrecht's Bribes and Profits

The broader research literature suggests that the bribes paid to public officials and politicians are often large. For example, Kenny (2009) concludes that bribes in the infrastructure sector are between 5 and 20 percent of construction costs while Glaeser (2019) reports that highway cost overruns due to corruption lie between 20 and 30 percent of project cost. Olken (2007) measured the difference between what an Indonesian village government spent on a road and a cost estimate by expert engineers. Unaccounted expenditures averaged approximately one-fourth of the total cost of the road. Collier, Kirchberger, and Söderbom (2016) showed that the unit cost of roads is 15 percent higher in countries where corruption, as measured by the World Governance Indicators, is above the median. In 2004 the American Society of Civil Engineers claimed that corruption accounts for an estimated $340 billion of worldwide construction costs each year, around 10 percent of the global construction industry value added of $3.2 trillion (ParentAdvocates.org 2004).[6]

In the Odebrecht case, however, bribes as well as the profits derived from corruption were small relative to the size of the projects. To estimate the size of bribes relative to costs, we obtained data on the final cost, including renegotiation,

[6]There are also estimates of the size of bribes in noninfrastucture projects, with a large variation in the relative size of bribes, ranging from a few percentage points in Iraq's Oil for Food Program (Hsieh and Moretti, 2006) to 80 percent in the primary education program in Uganda (Svensson 2003). Reinikka and Svensson (2004) examine a public education program that offered a per-student grant to cover nonwage expenditures in primary schools. Between 1991 and 1995, schools received only 13 percent of what the central government spent on the program. Olken (2006, 2007) shows that in a large antipoverty program in Indonesia, 18 percent of subsidized rice was stolen and that 29 percent of funds allocated to a road building project disappeared. Di Tella and Schargrodsky (2003) compare prices paid for basic homogeneous inputs at public hospitals in the city of Buenos Aires. They show that prices paid fell by 15 percent during the first nine months after a crackdown on corruption in 1996 and 1997. Kaufmann (2005) and IMF (2016) estimate worldwide bribe payments at roughly 2 percent of GDP.

Table 5
Odebrecht Bribes and Associated Profits, Relative to Investment

	Number	*Bribes/ final cost*	*Profits from bribes/ final cost*
All projects	88	0.51%	1.26%
Projects with bribes (legal or media sources)	62	0.79%	1.95%
Projects with bribes (legal sources)	45	0.98%	2.41%

Source: Authors' calculations using data in Table 2.

for the 88 projects. As Table 5 shows, bribe payments as a fraction of final cost were less than 1 percent.[7] Profits due to bribes are larger than bribes but still small at approximately 2 percent of final cost.

Odebrecht's profits from bribing, as a percentage of cost, were low. Nonetheless, they represented a large fraction of Odebrecht's total profits. To see this, we compare the profits made from bribing, as reported by the US Department of Justice, with the overall profits of Odebrecht, as reported in financial statements.[8] These show that profits from all operations between 2004 and 2014 were $2.4 billion on revenues of $286.8 billion, or 1 percent of revenues.[9] In comparison, the US Department of Justice estimated that net profits from bribes were around $2.4 billion. This suggests that most of the profits Odebrecht made during the period were due to bribing.

Our conclusion that almost all profits that Odebrecht made came from bribing assumes that the financial statements measure Odebrecht's profits accurately, and there is little, if any, "tunneling"—that is, no unaccounted for transfers of wealth to the owners and managers. A first independent check on this assumption is to compare Odebrecht's profits to the net worth of the Odebrecht family who owns the firm. Data from *Forbes* suggests that during the period, the net worth of the Odebrecht family stayed in the range of $4–6 billion (as reported by Antunes, 2012, 2013, 2014). A second piece of evidence suggesting that our estimate of profits is in the right ballpark is the size of the fine paid by Odebrecht.

[7]In the cases involving Colombia, Ecuador, Panama, and Peru, the respective National Attorneys presented evidence suggesting that bribes paid by Odebrecht were larger than those stated in the plea agreement between Odebrecht and the US Department of Justice. Nonetheless, additional bribes do not change the fact that the total remains relatively small.

[8]Odebrecht is a family-owned firm, so it had no legal requirement to produce and publish audited financial reports. However, we were able to track the information from the annual reports that allowed us to reconstruct sales and profits for every year in 2004–2018, with the exception of 2008. There is no publicly available data for Odebrecht's profits in 2008. During the period Odebrecht issued bonds in the international market, including New York, which requires going through the standard due diligence process.

[9]Interestingly, the low profits as a share of sales nonetheless represent a reasonable return on equity. In 2014, for example, Leahy, Rathbone, and Schipani (2015) report: "Like many construction companies, the emphasis is on volume and keeping costs low, which explains Odebrecht's wafer-thin margins: in 2014, net profits were just $210m from $41bn of sales." However, our own calculations show that this is a reasonable 11.3 percent rate of return on equity in the period ending in 2014.

Initially, the US Department of Justice sought to impose a $4.5 billion fine, but Odebrecht successfully argued that such a fine would lead to its bankruptcy and ultimately paid $2.6 billion, a number close to the $2.4 billion in corporate profits mentioned above.

Odebrecht's revenues and market share increased dramatically following the creation of the Division of Structured Operations in 2006. Odebrecht's construction sales increased from around $2 billion in 2003 to approximately $17 billion in 2016. According to the trade publication *Engineering News Record,* in 2003 Odebrecht was the 31st-largest construction company in the world. In 2016, when Odebrecht signed its plea agreement with the US Department of Justice, it had become the sixth-largest construction company in the world.

Our calculations show that Odebrecht's profitability remained low during the entire period we studied (2004–2014). This is surprising, as it may seem that the frequency of contract renegotiations, plus the ability to bias procurement auctions in its favor, should have allowed Odebrecht to obtain a high profit rate on projects. Certainly, Odebrecht's sales and market share grew quickly following the creation of the DSO in 2006. Nevertheless, its profits as a percentage of sales fell. This seems at odds with Shleifer and Vishny (1993), one of the few papers that posits a model that describes the magnitude of bribes. They point out that a corrupt public official with power to exclude firms can increase the corruption rent (in the same way that a monopolist creates a rent by restricting output). In that case, the firm's profit margin and the bribe should be large. Nevertheless, as we have seen, profits were on the order of 2 percent of the final cost of the projects (see Table 5), and bribes were even smaller. Small profits also suggest that Odebrecht won only a small advantage over other competitors by paying bribes. This poses the challenge of explaining why Odebrecht increased its market share dramatically while its overall profits remained flat.

One possible rationalization is that Odebrecht's CEO engaged in empire building by increasing sales at the expense of profits (Jensen and Meckling 1976). This argument is not very compelling because Odebrecht is a family-owned firm managed by the principal. A related explanation is that Odebrecht increased its market share in the expectation of future increased profitability.

Campos et al. (2019) present an alternative explanation. Say that competition in the initial bids forced Odebrecht to lowball and bid below the anticipated cost of the project in the expectation of making good its losses during the renegotiation stage. Because the creation of the DOS gave Odebrecht an advantage in bribing, in a situation where competition among firms is intense and construction firms have similar costs, that small advantage in bribing will lead to a large increase in market share but not to a large increase in profits. This is similar to the reasoning showing that under Bertrand competition, a small cost advantage increases market share dramatically without a substantial increase in profits. Consistent with this explanation, Odebrecht's advantage was bound to be replicated and four years later, a competing Brazilian construction firm, OAS, created its own bribing unit (*IDL-Reporteros* 2019). This unit was smaller than Odebrecht's, which enjoyed a first-mover advantage.

Some Policy Implications

The Odebrecht scandal improves our understanding of corruption in public infrastructure projects and suggests some possible anti-corruption reforms. A rather surprising observation is that in many countries, even those affected by corruption, auctions of large infrastructure projects were fairly competitive at the bidding stage. Despite Odebrecht being the largest corruption case ever prosecuted under the US Foreign Corrupt Practices Act in its 40-year history, margins and profits were small relative to the size of the projects and so were the bribes Odebrecht paid. Small profits suggest that Odebrecht competed, and small bribes suggest that public officials were unable to obtain large rents by selling access to projects. Indeed, no single agent seems to have been in control of an entire project.

The combination of competition and some transparency at the tendering stage limits the discretion of public officials and may reduce the value of bribing. Indeed, as Jorge Barata, one of Odebrecht's Peruvian executives, revealed in the plea agreement with the US Department of Justice, Odebrecht reduced President Toledo's bribe for not being able to make ProInversión—a technical agency—change the tendering documents. Similarly, improved disclosure of financial information for firms that operate in international bond markets limits their ability to generate funds to pay bribes. Last, a complementary explanation for small bribes is the desire to keep a low probability of detection.

Competitive tendering and transparency requirements at the bidding stage are not a coincidence but rather the result of decades of insistence by multilaterals and academics that governments should procure infrastructure in open and competitive auctions. For example, the World Bank has promoted competitive bidding for the projects it finances since the 1990s. More generally, competitive bidding and some transparency in public auctions for infrastructure have become fairly common in many developing countries, especially in Latin America. As Knack, Biletska, and Kacker (2017) find in a sample of 88 countries, more transparency in the procurement process fosters participation in auctions because firms pay smaller bribes and less frequently. Also, Tran (2009) provides evidence that competitive bidding based on objective criteria such as lowest price reduces corruption, while competitive bidding based on subjective criteria does not.

Nevertheless, it is also clear from the Odebrecht case that there is urgent need for improvements. One obvious reform is to use only objective criteria in tenders to adjudicate infrastructure projects. Governments would rely less on subjective criteria if they would tender well-designed projects. On the contrary, several projects where Odebrecht paid bribes were tendered with only preliminary designs, and part of the subjective evaluations consisted of scoring the improvements proposed by bidders. We conjecture that public officials may include subjective criteria and tender projects with incomplete designs to increase the opportunities for corruption.

In contrast to the bidding stage, there is ample need for improvements in the post-tender stage. Multilaterals have had little success in dealing with contract renegotiations, despite the fact that the monograph establishing that contract

renegotiations of public-private partnerships were pervasive in Latin America (that is, Guasch 2004) was written by an economist at the World Bank. A straightforward improvement is to disclose the information on contract renegotiations and make it easily available to the public, which is seldom done, even in developed countries. A more ambitious reform is to reduce the incentives and ability to bias the renegotiation process. Renegotiations should be subject to review by an independent panel of experts, and additional works should be tendered in open auctions that exclude the firm that won the initial contract. This would increase the government's bargaining power and reduce the rents from renegotiation. Doing so would lower the value of renegotiations and moderate the incentive to pay bribes. Chile's Public-Private Partnership Act of 2010 introduced the above-mentioned reforms, and they were followed by a reduction in renegotiations of more than 90 percent (Engel, Fischer, and Galetovic 2020, see Table 5).

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