

Structural economic reforms, markups, and firm-level corruption

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1. Introduction & related literature

Do structural economic reforms reduce corruption levels in the developing countries? This is an important question given that developing countries have undertaken massive economic reforms in different sectors of the economy in the recent years under the guidance of the World Bank and the IMF. The main objective of these reforms is to remove burdensome regulations thereby leading to an efficient allocation of resources and promoting economic growth. In this regard, the role of structural reforms, e.g. reducing rigidities in the product and the factor markets, liberalizing international and domestic capital flows, and freeing up international trade have all been important components of the overall strategy to promote sustained economic growth (Prati et. al. (2013)). Thus, a priori there is no clear-cut relationship between economic reforms and rent seeking and corruption levels, and any impact of reforms on corruption levels is likely to be an unintended consequence of the policy changes. It is also important to note that recent research has pointed to the crucial role that domestic institutions play in determining the relationship between structural reforms and economic performance. For example, Easterly and Levine (2003) find that macroeconomic policies do not have significant effect on economic development once institutional quality is controlled for in the regressions. Thus it is likely that pre-existing institutional characteristics of the economy impact the current state of economic relationships, and will therefore play a role in the relationship between economic reforms and corruption. Also important is the role of market structure, viz. that of competition and market concentration since several studies have suggested that economic liberalization leads to reduced mark-ups of firms (e.g. Krugman (1979), Feenstra and Weinstein (2010), Edmond et al. (2015)). The

competition between firms from different countries is an important channel that would affect rent seeking in the economy, and the amount of bribes paid by the firms. In this paper, I attempt to identify the transmission of the impact of economic reforms on corruption through the firms' mark-ups and the institutional strength of the country. The results from the baseline specification suggest that this mark-ups channel is important in the relationship between structural reforms and bribes paid by firms. While structural reforms by themselves do not have any statistically significant effect on bribe payments, they are found to be significant only when I control for the effect of mark-ups in the regressions. Moreover, the results also suggest significant differences in the effects of economic reforms on corruption. Firm-level bribe payments are found to be negatively associated with financial liberalization, capital account liberalization, and current account liberalization. On the other hand, economic reforms measured by trade liberalization, agriculture market liberalization, product market liberalization are found to be associated with higher bribe payments by firms.

The current paper is motivated by the stylized fact that a number of developing and emerging economies that had instituted widespread economic reforms experienced higher corruption levels thereafter. For example, India continues to stand out as one of the most corrupt nations in various rankings and references related to corruption, and the corruption perception index (CPI) published by Transparency International shows a consistent downward slide of India in its corruption rankings. Recent incidents of graft and illegal use of public office, as well as financial scandals have rocked the country in the post-reform period. Similarly, the process of privatization of State-owned enterprises in Russia has led to concentration of these assets in the hands of a small number of

oligarchs and substantial opportunities for rent seeking (Acemoglu and Robinson (2013)). This is also reflected in the worsening levels of corruption in Russia as highlighted in the various corruption indices. A number of papers have investigated the relationship between corruption and economic openness (or lack thereof) using cross-country data. For example, Ades and Di Tella (1999) and Emerson (2006) found that countries characterized by greater product market competition are associated with lower corruption levels. Bakshi, Bose and Pandey (2009) found an inverse-U relationship between corruption and trade openness measured by import-GDP ratio, which suggested that developing countries are likely to experience greater corruption at the early stages of trade liberalization, after which corruption levels are likely to go down. In contrast, studies using firm-level survey data either does not find any statistically significant effect of product market liberalization on corruption (e.g. Alexeev and Song (2013)), or find corruption to be positively associated with greater market competition (Dibay and Sylwester (2015)). For example, Sequeira (2013) matched bribe payments by firms in Mozambique to reduction in tariff rates across industries, and found that trade liberalization led to reduction in bribe payments by firms to customs officials for tariff evasion. This was, however, offset by the customs officials resorting to other coercive methods of bribe payments which suggests that trade liberalization by itself, might not be sufficient to reduce corruption in the developing countries. Using firm-level survey data from the World Bank's Productivity and the Investment Climate Private Enterprise Survey (PICS) database, Alexeev and Song (2013) found that collusive corruption measured by firm-level bribe payments are positively associated with various measures of product market competition. These results suggest that that the effect of product

market competition on corruption depends on whether corruption is “coercive” (extortion) or “collusive (cost-reducing) in nature (Shleifer and Vishny (1993), Sequeira and Djankov (2010)). Results from Sequeira (2013) also suggest that trade liberalization by itself might not be sufficient to entirely eradicate corruption in a country. Thus while trade liberalization is able to mitigate some forms of corruption, e.g. bribe taking by customs officials to allow tariff evasion, it might not have significant impact in deterring corruption in other sectors. For example, bribes are often asked for issuance of necessary licenses and permits that are otherwise expected to be automatic; getting connections to utilities like water and electricity supply; obtaining bank loans or foreign currency for purchase of foreign inputs, etc. Thus it is important to take into account the multidimensional aspect of economic reforms, and understand the impact of these reforms on the level of corruption. To my knowledge, this is the first paper to address the multidimensional component of economic reforms on firm-level corruption. The study thus contributes to the literature on the effect of economic reforms on economic outcomes. The paper also contributes to the literature on the effect of product market liberalization on corruption (e.g. A-S (2013)). However, while the focus of A-S (2013) is on the effects of various measures of competition on the bribes paid by firms, the current paper is more interested in uncovering the role of the market competition/ concentration channel in the effect of structural economic reforms on firms’ bribe payments. The role of market structure, viz. that of competition or market concentration has not been extensively studied in this context, despite several studies have suggested the effect of economic liberalization on firm-level markups. Feenstra and Weinstein (2010) suggest that globalization affects markups through two different channels. According to the *pro-*

competitive effect, firm's elasticity of demand is inversely related to a product's market share so that markups decrease as more firms enter the market due to globalization. On the other hand, domestic firms may exit the industry with more foreign competition and they refer to this the *domestic exit effect*. Thus the net effect of globalization on the level of competition in the economy depends on the relative strengths of these two effects.

2. Empirical model & measurement of variables

2.1 Empirical model

The main empirical model used to study the relationship between bribe payments by firms, economic liberalization, industry concentration, and institutional quality is the following:

$$\beta_{ijt} = \alpha_0 + \alpha_1 \text{Re form}_{t-1,c} + \alpha_2 \text{MarketPower}_{ijt} + \alpha_3 \text{IE}_{t-1,c} + \alpha_4 \text{B}_{ijt} + \alpha_5 \ln(\text{GDPpc})_{ct} + e_{ijt} \quad (1)$$

In equation (1), β_{ijt} are bribe payments made by firm i in industry j located in country c at time period t , $\text{Re form}_{t-1,c}$ are the various structural reform indices that measure economic liberalization in country c at time period $(t-1)$, MarketPower_{ijt} is the measure of the firm i 's mark-up over production cost, $\text{IE}_{t-1,c}$ is the set of variables characterizing the institutional environment in country c at time $(t-1)$, B_{ijt} is a set of variables that reflect the individual firm's characteristics, $\ln(\text{GDPpc})_{ct}$ is the measure of a country's economic development measured by logarithm of per capita real GDP, and e_{ijt} is a stochastic error term. All model specifications include country dummies to capture the effects of within-country changes in bribe payments by firms. Time dummies

and country-specific time trends are also added to eliminate the effects of exogenous factors on bribes paid. The empirical model in equation (1) also controls for industry effects, and industry-specific time dummies. Endogeneity concerns regarding my empirical strategy are low since it is unlikely that specific firm experiences in paying bribes drive structural economic reforms or institutional quality at the more aggregate country level. Nevertheless, to mitigate any potential reverse causality of the effect of bribe payments on economic reforms or institutional quality, I use lagged values of economic reforms and institutional quality as right-hand side explanatory variables. I take this model to the data by using firm-level observations from the PICS database, and country-level measures of structural reform indicators obtained from the IMF.¹

2.2 Measuring product market power and industry-level competition

I employ a number of different measures for markups estimated both at the firm-level as well as at the industry-level.

2.2.1 Intra-industry measures of market power

The first measure has been constructed following A-S (2013) where $Markup_{ijt}$ is equal to the ratio of the difference between total market value of production and production costs (raw materials, energy, manpower, interest and financial fees, overhead, and “other” costs) to the total market value of production.² The second measure of product market pricing power $Markup_{ijt}$ has been widely used in the industrial organization literature (e.g. Lindenberg and Ross (1981), Domowitz et al. (1986), Datt et al. (2013)). This measure is calculated as $PCM_{ijtc} = (\text{Sales} - \text{cost of goods sold} - \text{sales}$,

¹ The PICS database was obtained from Michael Alexeev and the Structural Reforms dataset was obtained from Antonio Spilimbergo.

² When total market value of production was not reported, total sales were used instead. Markup values lower than -0.1 were replaced by -0.1.

general, and administrative expenses)/Sales³ and is referred to as the price-cost margin divided by sales. Although the price-cost margin has been used to capture the firm's product market pricing power, this measure does not isolate firm-specific factors that influence product market pricing power from industry-wide factors and can fluctuate due to industry-specific attributes that are unrelated to the firm's own pricing power. To address this problem, I compute a value-weighted industry-adjusted Lerner Index which is the difference between the firm's price-cost margin and the sales-weighted price-cost margin of all firms within an industry. It is calculated as follows: $AdjustedLI_i = LI_i - \sum_{i=1}^N w_i LI_i$, where LI_i is the Lerner Index for firm i as defined above, w_i is the proportion of sales of firm i to total industry sales where industry is defined as the firm's industry in the PICS database, and N is the total number of firms in the industry. The industry-adjusted Lerner Index captures the intra-industry market power of a firm, thereby purging the effects of industry-wide factors common to all firms in a specific industry. Moreover, this adjustment addresses the fact that different industries have structurally different profit levels due to factors unrelated to intra-industry differences in the market power of firms. Finally, I construct another measure of firm-level market power following the recent literature on international trade and applied industrial organization where markups are estimated from the firm's production function (De Loecker and Warzynski (2012), De Loecker and Van Biesebroeck (2015)). The methodology relies on the insight that the output elasticity of an input is equal to its expenditure share in total revenue only when price equals marginal cost of production, i.e. in case of perfect competition. In case of imperfect competition, the markup equals

³ This measure excludes depreciation, interest, special items, and taxes.

the difference between the input's revenue share and its output elasticity. Following De Loecker and Warzynski (2012), firm-level markup is equal to the ratio of an input's output elasticity and its revenue share, where the output elasticity is estimated from the production function. However, to estimate the output elasticity, we require data on capital inputs that are missing from the PICS dataset. Instead, I rely on the well-known result that if the production function is Cobb-Douglas (CDPF), then the markup can be shown to be inversely related to the share of expenditure on labor input in total sales (given that the output elasticity of an input is constant in case of CDPF). While the assumption of the Cobb-Douglas production function is too simplistic, nevertheless this gives me a measure of markup that is structurally obtained from the production function. However, due to the large number of missing observations on workers' compensation in the PICS data, I have too few observations to run regressions with this measure, and instead I only report the correlations of this measure with the previous markup measures in the summary statistics.

2.2.2 Industry-level measures of competition

(i) Industry Lerner Index: Following Cremers et al. (2008), I use the industry median price-cost margin to capture competition at the industry level. The authors argue that higher profit margins in an industry reflect a less competitive environment while smaller margins are associated with more competition since adverse input price shocks cannot be passed on to the consumers through output price hikes.

(ii) Number of firms in the industry: One of the main factors that determine the intensity of competition in an industry is the number of firms in that industry, where the presence of larger number of firms denotes greater competition. Hence, in line with Datta et al.

(2013), I use $1/n$ as an alternative measure of industry competition, where n is the number of firms in the industry.

(iii) Herfindahl index (HHI):

3. Data sources and summary statistics

In this paper, I use firm-level survey data from the aforementioned PICS database and complement them with country-level data from various sources. The corruption measure is the answer to the question “unofficial payments to get things done (% of annual sales)”. The regression equation controls for several firm-level characteristics, e.g. ownership structure, firm size, and the firm’s age. Firm’s mark-up has been constructed following A-S (2013), and is measured as the ratio of the difference between total market value of production and production costs (raw materials, energy, manpower, interest and financial fees, overhead, and “other” costs) to the total market value of production. For observations in which the value of production was not available, the total sales were used instead. The database on country-level structural reforms has been obtained from the IMF. This database includes information on several structural reforms in both the real and the financial sectors of the economy for a number of developing countries roughly over the period from 1973-2005. Indices of structural reform in the real sector measure the extent of openness to international trade (“Trade liberalization index”), the reduction of public intervention in the agricultural markets (“Agricultural liberalization index”), and the degree of liberalization in the telecommunications and electricity markets (“Product market liberalization index”). Indicators of structural reforms in the financial sector

encompass the overall domestic financial sector (“Domestic financial sector liberalization index”), and two other measures of external account openness (“Current account liberalization index”, “Capital account liberalization index”). I also implement principal component analysis methods to construct an overall index of economic reform (“Composite reform index”) from the underlying reform indices. The regression controls for the institutional strength of the countries by using three indices obtained from the International Country Risk Guide (ICRG) to represent (i) transparency (inverse of corruption) within the political system; (ii) quality of the judicial system and popular observance of the law; and (iii) the quality of bureaucracy. Finally, I control for the macroeconomic environment common to all firms in terms of economic development by including the natural logarithm of GDP per capita obtained from the World Development Indicators.

4. Estimation results

Equation (1) has been estimated using the OLS method with the logarithm of bribe payments as the dependent variable. Based on the results reported in Table 1, economic reform has a statistically significant effect on bribe payments only when the regression controls for firm’s mark-up levels. For example, one standard deviation increase in the domestic financial reform index is associated with approx. 28% decline in bribe payments. On the other hand, a standard deviation increase in the trade liberalization index leads to about 9% increase in bribe payments. Interestingly, product market liberalization is accompanied by an extremely large increase in bribe payments by more than 200%. Finally, bribes are found to be positively associated with the overall

reform index thereby suggesting that economic reforms might have contributed greater corruption levels.

4. Conclusion

I investigate the effect of economic reforms on corruption measured by bribes paid by firms in different industries. I investigate the role of the mark-up of firms in this relationship in addition to the institutional characteristics of the country. This mark-up channel is found to be important since structural reforms are found to have significant effect on corruption when the regression controls for the effects of mark-ups. Bribe payments are found to be positively associated with a broad index of economic reforms.

References

- Ades, A., R. Di Tella (1999) "Rents, competition, and corruption" *American Economic Review*, 89(4), 982-993.
- Acemoglu, D., J. Robinson (2013) "Economics versus politics: pitfalls of policy advice", *Journal of Economic Perspectives*, 27(2), 173-192.
- Baksi, S., P. Bose, M. Pandey (2009) "The impact of liberalization on bureaucratic corruption", *Journal of Economic Behavior & Organization*, 72, 214-224.
- De Loecker, J, F. Warzynski (2012) "Markups and firm-level export status", *American Economic Review*, 102(6), 2437-2471.

De Loecker, J., J.V. Biesebroeck (2017) “Effect of international competition on firm productivity and market power”, forthcoming in *The Oxford Handbook for Productivity Analysis*.

Dibay, A., K. Sylwaster (2015) “Corruption and Market Competition: Evidence from Post-Communist Countries”, *World Development*, 66, 487-499.

Dreher, A., L. Siemers (2009) “The nexus between corruption and capital account restrictions”, *Public Choice*, 140: 245-265.

Edmond, C., V. Midrigan, D., Y. Xu (2015) “Competition, markups, and the gains from international trade”, *American Economic Review*, 105(10), 3183-3221.

Emerson, P. (2006) “Corruption, competition, and democracy”, *Journal of Development Economics*, 81(), 193-212.

Easterly, W., R. Levine (2003) “Tropics, germs, and crops: how endowments influence economic development”, *Journal of Monetary Economics*, 50(1), 3-39.

Feenstra, R., D. Weinstein (2010) “Globalization, markups, and U.S. welfare” *National Bureau of Economic Research Working Paper Series # 15749*.

Krugman, P. (1979) “Increasing returns, monopolistic competition, and international trade”, *Journal of International Economics*, 9(4), 469-479.

Prati, A., G.O. Massimiliano, C. Papageorgiou (2013) “Which reforms work and under what institutional environment? evidence from a new data set on structural reforms”, *The Review of Economics and Statistics*, 95(3), 946-968.

Sequeira, S., S. Djankov (2010) “An Empirical Study of Corruption in Ports”, https://mpra.ub.uni-muenchen.de/21791/1/MPRA_paper_21791.pdf

Sequeira, S. (2013) “Tariffs and corruption: evidence from a tariff liberalization program”, *Working paper, The London School of Economics and Political Science, London, UK.*

Shleifer, A., R. Vishny (1993) “Corruption”, *Quarterly Journal of Economics*, 108(3), 599-617.

Table 1: Effect of current account liberalization index on firm-level bribe payments
Dependent variable: $\ln(1+\text{bribe})$

	(1)	(2)	(3)	(4)	(5)
<i>Current account liberalization index_lagged</i>	-0.262***	-0.264***	-0.264***	-0.074	-0.681***
	[0.047]	[0.049]	[0.049]	[0.049]	[0.015]
<i>Markup</i>	0.017				
	[0.032]				
<i>Lerner Index</i>		0.026			
		[0.034]			
<i>Adjusted Lerner Index</i>			0.030		
			[0.031]		
<i>Median Lerner Index</i>				0.092	
				[0.127]	
<i>Log(# of firms)</i>					-0.014
					[0.009]
<i>Firm age</i>	-0.001+	-0.001+	-0.001+	-0.001*	-0.001***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
<i>Medium size</i>	-0.010	-0.009	-0.009	-0.006	-0.002
	[0.021]	[0.021]	[0.021]	[0.019]	[0.014]
<i>Large size</i>	-0.060*	-0.060+	-0.058+	-0.069*	-0.072**
	[0.030]	[0.030]	[0.029]	[0.028]	[0.021]
<i>Foreign owner</i>	0.063	0.061	0.061	0.075	0.150**
	[0.062]	[0.062]	[0.062]	[0.059]	[0.049]

<i>Domestic private owner</i>	0.112* [0.048]	0.112* [0.048]	0.112* [0.048]	0.124* [0.046]	0.195*** [0.043]
<i>Bureaucratic quality_lagged</i>	-0.665*** [0.046]	-0.671*** [0.047]	-0.675*** [0.048]	-0.346*** [0.052]	1.641*** [0.053]
<i>Transparency_lagged</i>	-0.220*** [0.021]	-0.213*** [0.023]	-0.212*** [0.021]	-0.273*** [0.069]	0.336*** [0.017]
<i>Law & order_lagged</i>	-1.229*** [0.093]	-1.232*** [0.097]	-1.236*** [0.096]	-0.771*** [0.107]	-0.310*** [0.036]
<i>Log(GDP per capita)</i>	-1.356*** [0.117]	-1.359*** [0.122]	-1.362*** [0.122]	-0.804*** [0.134]	-7.300*** [0.173]
<i>Constant</i>	5.686*** [0.467]	5.647*** [0.478]	5.651*** [0.478]	3.999*** [0.594]	45.583*** [1.022]
<i>N</i>	13950	13941	13941	16234	23993
<i>ll</i>	-15,040.122	-15,013.580	-15,013.411	-17,375.464	-24,765.420
<i>R-squared</i>	0.151	0.153	0.153	0.143	0.146
<i>Adjusted R-squared</i>	0.143	0.145	0.145	0.136	0.140

Note: Robust standard errors in brackets. Standard errors clustered at the country-year level. + p<0.1, * p<0.05, ** p<0.01, *** p<0.001. All regressions control for country, year, industry, country*year and industry*year effects.

Table 2: Effect of trade liberalization index on firm-level bribe payments

	Dependent variable: $\ln(1+\text{bribe})$				
	(1)	(2)	(3)	(4)	(5)
<i>Trade liberalization index_Lagged</i>	0.095*** [0.016]	0.095*** [0.016]	0.096*** [0.016]	0.111*** [0.015]	-0.428*** [0.011]
<i>Markup</i>	0.019 [0.032]				
<i>Lerner Index</i>		0.026 [0.034]			
<i>Adjusted Lerner Index</i>			0.028 [0.030]		
<i>Median Lerner Index</i>				0.104 [0.112]	
<i>Log(# of firms)</i>					-0.010 [0.008]
<i>Firm age</i>	-0.001+ [0.000]	-0.001* [0.000]	-0.001* [0.000]	-0.001* [0.000]	-0.001*** [0.000]
<i>Medium size</i>	-0.011 [0.020]	-0.010 [0.020]	-0.010 [0.020]	-0.006 [0.018]	-0.003 [0.013]
<i>Large size</i>	-0.056* [0.027]	-0.056* [0.028]	-0.054* [0.027]	-0.065* [0.025]	-0.069*** [0.019]
<i>Foreign owner</i>	0.063 [0.057]	0.061 [0.057]	0.061 [0.056]	0.075 [0.053]	0.146** [0.044]
<i>Domestic private owner</i>	0.112* [0.057]	0.112* [0.057]	0.112* [0.056]	0.121** [0.053]	0.196*** [0.044]

	[0.044]	[0.044]	[0.044]	[0.042]	[0.039]
<i>Bureaucratic quality_Lagged</i>	0.087** [0.029]	0.085** [0.028]	0.082** [0.028]	0.068* [0.028]	0.808*** [0.022]
<i>Transparency_Lagged</i>	-0.817*** [0.049]	-0.812*** [0.048]	-0.813*** [0.047]	-0.648*** [0.066]	-0.417*** [0.009]
<i>Law & order_Lagged</i>	-0.737*** [0.026]	-0.735*** [0.029]	-0.739*** [0.025]	-0.621*** [0.055]	0.501*** [0.014]
<i>Log(GDP per capita)</i>	-0.557*** [0.046]	-0.554*** [0.049]	-0.559*** [0.046]	-0.546*** [0.081]	-1.036*** [0.020]
<i>Constant</i>	3.768*** [0.195]	3.712*** [0.208]	3.726*** [0.198]	3.816*** [0.428]	9.335*** [0.162]
<i>N</i>	15298	15286	15286	17818	26285
<i>ll</i>	-16,448.867	-16,418.482	-16,418.380	-19,047.151	-27,151.723
<i>R-squared</i>	0.148	0.149	0.149	0.139	0.141
<i>Adjusted R-squared</i>	0.140	0.142	0.142	0.132	0.136

Note: Robust standard errors in brackets. Standard errors clustered at the country-year level. + p<0.1, * p<0.05, ** p<0.01, *** p<0.001. All regressions control for country, year, industry, country*year and industry*year effects.

Table 3: Effect of agriculture market liberalization index on firm-level bribe payments
 Dependent variable: $\ln(1+\text{bribe})$

	(1)	(2)	(3)	(4)	(5)
<i>Agriculture market liberalization index_Lagged</i>	0.229*** [0.040]	0.228*** [0.041]	0.230*** [0.040]	0.262*** [0.038]	0.018** [0.006]
<i>Markup</i>	0.014 [0.032]				
<i>Lerner Index</i>		0.024 [0.034]			
<i>Adjusted Lerner Index</i>			0.028 [0.030]		
<i>Median Lerner Index</i>				0.118 [0.115]	
<i>Log(# of firms)</i>					-0.010 [0.008]
<i>Firm age</i>	-0.001+ [0.000]	-0.001+ [0.000]	-0.001+ [0.000]	-0.001* [0.000]	-0.001*** [0.000]
<i>Medium size</i>	-0.017 [0.021]	-0.016 [0.021]	-0.016 [0.020]	-0.013 [0.018]	-0.010 [0.013]
<i>Large size</i>	-0.061* [0.028]	-0.060* [0.028]	-0.059* [0.027]	-0.070** [0.026]	-0.075*** [0.020]
<i>Foreign owner</i>	0.059 [0.057]	0.056 [0.056]	0.057 [0.056]	0.074 [0.053]	0.148** [0.044]
<i>Domestic private owner</i>	0.107* [0.057]	0.106* [0.056]	0.106* [0.056]	0.117** [0.053]	0.190*** [0.044]

	[0.043]	[0.043]	[0.043]	[0.041]	[0.039]
<i>Bureaucratic quality_Lagged</i>	0.384***	0.382***	0.381***	0.386***	0.200***
	[0.026]	[0.027]	[0.027]	[0.029]	[0.021]
<i>Transparency_Lagged</i>	-0.259*	-0.255*	-0.252*	-0.155	0.424***
	[0.104]	[0.102]	[0.102]	[0.101]	[0.009]
<i>Law & order_Lagged</i>	0.357**	0.359**	0.363**	0.366**	0.220***
	[0.116]	[0.116]	[0.116]	[0.112]	[0.009]
<i>Log(GDP per capita)</i>	0.550***	0.553***	0.558***	0.529***	-0.787***
	[0.098]	[0.099]	[0.099]	[0.107]	[0.049]
<i>Constant</i>	-0.833+	-0.894*	-0.919*	-0.659	6.182***
	[0.440]	[0.438]	[0.439]	[0.521]	[0.244]
<i>N</i>	15047	15030	15030	17511	26007
<i>ll</i>	-16,243.113	-16,209.318	-16,209.156	-18,794.147	-26,926.935
<i>R-squared</i>	0.146	0.147	0.147	0.137	0.136
<i>Adjusted R-squared</i>	0.138	0.139	0.139	0.130	0.130

Note: Robust standard errors in brackets. Standard errors clustered at the country-year level. + p<0.1, * p<0.05, ** p<0.01, *** p<0.001. All regressions control for country, year, industry, country*year and industry*year effects.

Table 4: Effect of product market liberalization index on firm-level bribe payments

	Dependent variable: $\ln(1+\text{bribe})$				
	(1)	(2)	(3)	(4)	(5)
<i>Product market liberalization_lagged</i>	2.559*** [0.405]	2.548*** [0.416]	2.566*** [0.413]	3.007*** [0.376]	-0.488*** [0.009]
<i>Markup</i>	0.021 [0.033]				
<i>Lerner Index</i>		0.032 [0.034]			
<i>Adjusted Lerner Index</i>			0.033 [0.031]		
<i>Median Lerner Index</i>				0.114 [0.112]	
<i>Log(# of firms)</i>					-0.000+ [0.000]
<i>Firm age</i>	-0.001+ [0.000]	-0.001+ [0.000]	-0.001+ [0.000]	-0.001* [0.000]	-0.001*** [0.000]
<i>Medium size</i>	-0.015 [0.021]	-0.015 [0.021]	-0.014 [0.021]	-0.012 [0.018]	-0.006 [0.013]
<i>Large size</i>	-0.059* [0.028]	-0.058* [0.028]	-0.057* [0.027]	-0.069* [0.026]	-0.071*** [0.020]
<i>Foreign owner</i>	0.068 [0.059]	0.066 [0.059]	0.066 [0.059]	0.083 [0.055]	0.154** [0.045]
<i>Domestic private owner</i>	0.117* [0.046]	0.117* [0.046]	0.117* [0.046]	0.126** [0.043]	0.199*** [0.040]

<i>Bureaucratic quality_Lagged</i>	4.141*** [0.624]	4.124*** [0.642]	4.148*** [0.638]	4.832*** [0.586]	-0.788*** [0.031]
<i>Transparency_Lagged</i>	-4.166*** [0.506]	-4.149*** [0.520]	-4.175*** [0.515]	-4.580*** [0.468]	-0.352*** [0.008]
<i>Law & order_Lagged</i>	-0.979*** [0.048]	-0.975*** [0.051]	-0.983*** [0.047]	-0.903*** [0.063]	0.567*** [0.012]
<i>Log(GDP per capita)</i>	1.047*** [0.228]	1.047*** [0.234]	1.053*** [0.234]	1.342*** [0.232]	-2.940*** [0.064]
<i>Constant</i>	8.318*** [0.837]	8.224*** [0.870]	8.274*** [0.854]	9.144*** [0.842]	15.094*** [0.297]
<i>N</i>	14907	14893	14893	17387	25882
<i>ll</i>	-16,075.477	-16,045.266	-16,045.181	-18,651.417	-26,862.177
<i>R-squared</i>	0.145	0.147	0.147	0.136	0.138
<i>Adjusted R-squared</i>	0.137	0.139	0.139	0.130	0.133

Note: Robust standard errors in brackets. Standard errors clustered at the country-year level. + p<0.1, * p<0.05, ** p<0.01, *** p<0.001. All regressions control for country, year, industry, country*year and industry*year effects.

Table 5: Effect of composite structural reform index on firm-level bribe payments
 Dependent variable: $\ln(1+\text{bribe})$

	(1)	(2)	(3)	(4)	(5)
Composite reform index	0.029+	0.024	0.024	0.067*	-1.074***
	[0.014]	[0.016]	[0.015]	[0.025]	[0.024]
<i>Markup</i>	0.014				
	[0.033]				
<i>Lerner Index</i>		0.022			
		[0.034]			
<i>Adjusted Lerner Index</i>			0.028		
			[0.032]		
<i>Median Lerner Index</i>				0.102	
				[0.137]	
<i>Log(# of firms)</i>					-0.000+
					[0.000]
<i>Firm age</i>	-0.001+	-0.001+	-0.001+	-0.001+	-0.001***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
<i>Medium size</i>	-0.014	-0.013	-0.013	-0.010	-0.007
	[0.022]	[0.022]	[0.022]	[0.019]	[0.014]
<i>Large size</i>	-0.064*	-0.063*	-0.062*	-0.073*	-0.076***
	[0.030]	[0.030]	[0.030]	[0.028]	[0.022]
<i>Foreign owner</i>	0.060	0.057	0.057	0.073	0.148**
	[0.064]	[0.063]	[0.063]	[0.060]	[0.050]
<i>Domestic private owner</i>	0.105*	0.105*	0.105*	0.118*	0.189***
	[0.048]	[0.048]	[0.048]	[0.047]	[0.044]

<i>Bureaucratic quality_Lagged</i>	-0.093** [0.034]	-0.104** [0.034]	-0.107** [0.034]	-0.041 [0.054]	3.285*** [0.076]
<i>Transparency_Lagged</i>	-0.296*** [0.029]	-0.292*** [0.030]	-0.291*** [0.029]	-0.266*** [0.065]	0.215*** [0.017]
<i>Law & order_Lagged</i>	-0.252*** [0.038]	-0.264*** [0.039]	-0.266*** [0.039]	-0.250*** [0.044]	-0.713*** [0.045]
<i>Log(GDP per capita)</i>	-0.223*** [0.044]	-0.234*** [0.047]	-0.234*** [0.046]	-0.244*** [0.049]	-4.696*** [0.140]
<i>Constant</i>	1.804*** [0.179]	1.784*** [0.190]	1.778*** [0.189]	2.163*** [0.327]	35.185*** [0.913]
<i>N</i>	13498	13486	13486	15666	23147
<i>ll</i>	-14,659.501	-14,631.434	-14,631.243	-16,884.696	-24,001.925
<i>R-squared</i>	0.148	0.150	0.150	0.141	0.140
<i>Adjusted R-squared</i>	0.140	0.142	0.142	0.134	0.134

Note: Robust standard errors in brackets. Standard errors clustered at the country-year level. + p<0.1, * p<0.05, ** p<0.01, *** p<0.001. All regressions control for country, year, industry, country*year and industry*year effects.