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Corruption risks in public procurement through the COVID-19 pandemic in Europe

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Summary

The COVID-19 pandemic has been a major emergency globally, requiring rapid responses to protect citizens' health and lives. In order to inform future emergency policies, this paper sets out to track the corruption risk impact of the COVID-19 pandemic and the policies implemented to tackle the pandemic.

We adopt a mixed-methods approach, looking at the impact of COVID-19 on corruption risks in public procurement using both quantitative and qualitative methods. In the quantitative part of the study, we rely on large comprehensive data sets (Big Data) on public procurement contracts from several European countries. Subsequently, we explore four cases which represent different approaches taken by governments in Europe to tackle the challenges posed by the pandemic. These case studies, alongside the quantitative analysis, illustrate the impact of enacted COVID-19 policies on corruption risk outcomes and their interaction with pre-existing risk levels and overall institutional strength.

We found an *immediate* rise in corruption risks in the early stages of the pandemic, as was largely expected given the unprecedented, wide-ranging and fast paced events, as well as the corresponding exceptional spending to acquire medical products as quickly as possible across different categories of products, only some of which were related to fighting the virus. We found that public procurement spending on COVID-19-related goods and services increased across the continent and resulted in an increase in corruption risks, as normal competition and supply mechanisms were largely set aside by both market forces and the implementation of emergency rules. Similarly, we also found evidence that these corruption risks spilled over from COVID-19-specific products to general health-related procurement.

Based on our findings and prior literature on what works in containing corruption in emergency procurement, we outline the following policy recommendations:

- 1. Strengthen ex-post controls of emergency spending.
- 2. Ring-fence emergency responses and the corresponding weakening of corruption controls to specific product groups affected and the period impacted by the crisis.
- 3. Limit the scope of emergency policies to the necessary level.



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1. Introduction

Public procurement as a key area of government spending is heavily regulated in order to ensure value for money, fair competition, and transparency, which enables citizens and stakeholders to monitor the spending of public funds. However, public procurement is also highly vulnerable to corruption risks due to the large amount of money involved, as well as its technical and legal complexity. These pressures may become even stronger in the context of an emergency, which makes hiding corruption easier as spending exceptionally large amounts in a short period of time is often required. Thus, competition, integrity, and transparency may be temporarily weakened during a crisis.

The COVID-19 pandemic has been a major health emergency, requiring rapid responses to protect citizens' health and lives. It is therefore paramount to monitor transparency and integrity trends to assess the impacts of the pandemic and the wide-ranging policies enacted to fight it. In securing emergency medical goods, government responses to the pandemic have been varied, ranging from export restrictions of medical equipment to joint-procurement mechanisms, such as the Joint Procurement Agreement signed by several countries in Europe, and hands-off approaches as was the case in Sweden. Similarly, given the sudden increase in demand for such goods, governments relied on emergency procurement procedures such as single- sourcing and direct awards, thus potentially increasing the risk of corrupt transactions in an already vulnerable sector. However, the effects of this wide range of emergency policies remain yet underresearched – especially when it comes to which policies were effective in containing corruption risks throughout the pandemic.

In order to inform future emergency policies, this paper sets out to track the corruption risk impact of the COVID-19 pandemic on public procurement and the policies implemented to fight the health emergency.

To this end, we develop an innovative methodology for tracking changes in corruption risks in government contracts in Europe. This is made possible by using large-scale public procurement data from publicly available sources such as the EU-wide Tenders Electronic Daily (TED) public procurement portal. The analysis is conducted over a 36-month period, between 01-08-2018 and 01-08-2021. We define the start of the pandemic in the region as February 1st, 2020, and contrast the 18 months prior to this date to those that followed. The paper analyzes public procurement data of politically and economically diverse countries in Europe, in order to track changes in corruption risks before and after the start of the COVID-19 pandemic in a) general procurement, b) health-related procurement, and c) COVID-19-related products. Furthermore, the study assesses the impact of COVID-19 policies on corruption risks in public contracting and offers an analysis of the drivers that allow countries to contain emergency corruption risk to varying degrees. This is made possible by the availability of Big Data on COVID-19 policies (Desvars et. al., 2020) which uses content analysis to track and classify relevant policies implemented by governments during the first stages of the crisis. The quantitative analysis is also supplemented with case studies of corruption risk trends and COVID-19 policies in Europe. We consider the



cases of Poland, France, Denmark, and Sweden; each representing a different approach when dealing with emergency procurement and pandemic-related policy measures. Finally, we outline data-driven policy recommendations for curbing corruption risks in emergency policies.



2. Conceptual framework

The academic literature on the corruption impact of emergencies has identified some key factors which determine whether corruption is contained or increased during an emergency, such as a pandemic (Fazekas et al, 2021, Schultz & Soreide, 2008). Among these, large value spending in a short period of time, weakened procedural controls in public procurement (e.g. direct award of contracts instead of open competitive selection of the supplier), and more broadly weakened democratic constraints (e.g. less room for consulting with stakeholders in the wake of imminent dangers to human lives) stand out. On the other side, emergencies come with greater public scrutiny and the moral imperative of saving human lives may constrain the corrupt.

In this study, we benefit from the fact that a diversity of countries in Europe, with different degrees of corruption control, faced a large emergency at the same time. All these countries have to follow the EU Public Procurement Directives setting a uniform regulatory framework. These Directives already have a range of emergency clauses designed to address emergencies such as the COVID-19 pandemic. In addition, the European Commission issued guidance on how to apply emergency clauses during the COVID-19 pandemic with specific prescriptions on the impacted products such as masks and oxygen for ventilators (Arrowsmith et al, 2021). Hence, public procurement regulations uniformly changed across the European countries we study. What widely differed across countries, however, is the particular spending decisions countries made and the broader institutional context and its changes.

With this in mind, we study the determinants of corruption risks in emergency public procurement divided into two main categories:

- Increased *spending*: large amounts of funds were dedicated for the urgent acquisition of scarce emergency medical products.
- Increased *political control*: broader policy responses to COVID-19 entailed restrictions to civic freedoms (e.g. the right to gather for protests) and limits on democratic checks and balances in a range of countries (e.g. governing by emergency decrees rather than through parliament).

While these 2 sets of policy changes can either decrease or increase corruption during the pandemic, based on widespread corruption scandals in both high and low integrity countries in Europe, we rather expect corruption to increase as a result of these pandemic-responses. First, given that large amounts of funds were devoted to the urgent acquisition of scarce emergency medical products in a short period of time, we hypothesize:

H1 (Spending Policies): corruption risks increase with *the enactment of new spending policies*.

Second, countries all across Europe enacted several policies to help contain the spread of COVID-19 such as special measures for restricting public gatherings, surveillance and modifying



political institutions. These policies may or may not weaken corruption controls, depending on how exactly they are implemented and how strong institutions were pre-pandemic. Countries with stronger control of corruption and stronger political institutions (e.g., free and fair political competition, democratic checks and balances, and independent media) are more likely to exercise extraordinary powers with restraint, that is not increasing corruption risks. Hence, we hypothesize:

H2 (Institutional Policies): Policies centralizing political control during the COVID-19 pandemic increase corruption risks in countries with above-average *pre*-pandemic corruption risks.

Crucially, the COVID-19 pandemic has presented an asymmetric emergency to public procurement systems and countries as a whole. In particular, it impacted on specific health care services and the corresponding products such as masks and ventilators, as evidenced by the emergency guidance of the European Commission applying only to a defined list of products (European Commission, 2020). This means that we may only see increased corruption risks in the procurement of COVID-19 products without having any impact on other public procurement spending. However, prior literature has demonstrated that as emergencies enable corruption there are strong incentives for the corrupt to prolong and extend the scope of emergency rules (Schultz & Soreide, 2008). This implies that we may see corruption risks increasing beyond COVID-19-specific products. Depending on the scope of such spillovers, we may see increased corruption risks in the broader health care public procurement or even beyond that, increased corruption risks across the board, in the whole public procurement system of a country.

Considering the different potential scope from no spillover to full spillover we can classify COVID-19 responses in Europe:

- **Non-intervention**: where corruption risks across the three procurement categories (general, health-related, and COVID-19 related) remain constant before and after the crisis and few COVID-19 policies are enacted. Sweden is considered as a special case.
- **No spillover**: where corruption risks in general and health-related procurement remain constant before and after the crisis and COVID-19 procurement risks go up for a short period, then return to pre-crisis levels.
- Limited spillover: where general procurement risks remain constant but both healthrelated and COVID-19 related procurement risk increase without returning to pre-crisis levels throughout the studied period.
- **Full spillover**: where COVID-19 related procurement increases sharply in the early stages of the crisis and corruption risks spill over to both general and health-related procurement throughout the pandemic period.

Classifying each European country according to these types is highly policy-relevant on its own, moreover, this classification will also enable us to look at which policies prevent spillovers in the case studies. Based on these potential spillover types we formulate the following hypotheses:



H3 (Limited spillover): An increase in corruption risks in COVID-19-related products leads to higher corruption risks in health-related goods with a lag.

H4 (Full spillover): An increase in corruption risks in health-related products leads to higher corruption risks in general public procurement with a lag.



3.Research Design

We adopt a mixed- methods approach, looking at the impact of COVID-19 on corruption risks in public procurement using both quantitative and qualitative methods. In the quantitative part of the study, we rely on large comprehensive data sets (Big Data) on public procurement contracts from several European countries. We calculate an objective measure of corruption risks based on red flags of corrupt behavior – the Corruption Risk Index (CRI) – and identify the trends before and after the onset of the pandemic, as well as the factors that are correlated with changes in corruption risks. Subsequently, we explore four cases which represent different approaches taken by governments in Europe to tackle the challenges posed by the pandemic: a) Poland (full spillover), b) France (limited spillover), c) Denmark (no spillover), and d) Sweden (non-intervention). These case studies, alongside the regression analysis, illustrate the impact of enacted COVID-19 policies on corruption risk outcomes and their interaction with pre-existing risk levels and overall institutional strength.

3.1 Quantitative Analysis

Firstly, we perform a descriptive before-after analysis of trends of red flags of corruption in public contracting and make comparisons across several sectors. We compare the composite CRI scores of *general, health-related,* and *COVID-19 related* public procurement contracts between 01-08-2018 and 01-08-2021 to measure the differences between the *pre* and *post* pandemic period. Subsequently, we identify the countries in which there is a statistically significant difference between *pre* and *post* COVID-19 corruption risks across those three categories. Based on this analysis, we classify countries into one of the following categories: a) *no spillover* if health and general procurement are not higher in the *post* period, b) *limited spillover* general procurement is not higher in the *post* period, c) *full spillover* if general procurement and at least one other category are higher in the *post* period, and d) *other* for cases that do not meet any of these conditions.

Secondly, we conduct two sets of regression analyses to determine which factors are associated with an increased risk of corruption. First, we assess the impact of various COVID-19 policies on procurement risks (measured as CRI scores) across several European countries. Specifically, we trace the use of institutional policies and spending measures (see Table 2) and assess their impact on CRI scores on the contract level. We estimate contract-level OLS regression models where the dependent variables are the CRI scores across three categories of products: a) COVID-19 related, b) health-related, and c) general procurement. The aim is to assess whether new policies are associated with an increase in procurement corruption risks. Building on our hypotheses we expect that the enactment of new spending policies predicts higher CRI scores (H1) and that the interaction between new policies and high pre-pandemic CRI average predicts higher CRI scores (H2).



Next, we analyze the spillover effects that an increase of corruption risks in COVID-19 procurement has on general and health-related goods (H3 and H4). We run contract-level OLS regression models where the dependent variables are the CRI scores of health-related and general public procurement in order to assess if the average COVID-19 CRI score of the prior month for any given country was a good predictor of higher corruption risks at the contract level.

3.2 Case Studies

Once the regression analysis is completed and we have gained a detailed understanding of the impacts that pandemic policies had on corruption risks as well as spillover effects between the three product categories, we turn to case study analysis. We select representative case studies to explore the ways in which policies, institutions and the pandemic interact to impact corruption risks. The case study analysis focuses on how countries with different levels of accountability and transparency were able to contain corruption risks following the rapid increase in the value and volume of pandemic-related procurement. Similarly, we explore a case, Sweden, in which few policies were enacted in order to gain insight into the effects that a non-intervention approach had on corruption risks. The case studies are analyzed based on a combination of in-depth quantitative data and qualitative analysis. We trace notable regulatory changes which can change the control of corruption in the country. In addition, we also look at high-profile scandals uncovering the mechanisms through which corruption materialized over the course of the pandemic in each of the countries.

3.3 Data

The data used in this analysis comes from public procurement in European countries that is reported in the EU's Tenders Electronic Daily (TED). This data contains information related to the purchasing of goods, services, and works by government agencies, public utilities, and other publicly funded organizations. Among the key indicators made available are descriptions of the goods or services being purchased, the suppliers or contractors providing them, the terms of the procurement process (e.g., open, restricted), the value of the contract(s), the number of bidders, among others.

In this study, we categorize contracts into one of the three main procurement categories mentioned above: COVID-19 related, health, and general goods. For example, medical breathing devices are classified as COVID-19 related, whereas dialysis equipment is classified as general health. Goods that are not specified as COVID-19 related or health-related are deemed general goods. Table A1 in the appendix shows a list of the products considered COVID-19 related in this analysis. Contracts are classified by their common procurement vocabulary (CPV) codes and the matching of relevant keywords. We conduct validation rounds in order to ensure that duplicates and ambiguous cases are discarded.



The level of observation is awarded contracts. This allows us to capture a higher degree of variation when compared to country/date averages. However, though the units of observation are contracts, some relevant covariates (e.g., the share of a single supplier, total spending on procurement, number of confirmed cases) are added at the month/country level. This includes the prior- month corruption risk averages used in the spillover analysis and the pre-pandemic corruption risk categories (high or low) for each country.

Based on this data, we calculate the Corruption Risk Index (CRI) which is based on typologies of corruption that are specific to public procurement and detectable with open public procurement data. This considers common corruption risk indicators such as single bidding, the length of the advertisement and decision periods, the incidence of non-open procedure types, and the lack of a call for tender. Furthermore, we also calculate corruption risk indicators specific to the emergency period such as having a supplier with no experience in delivering COVID-19 related products and suppliers that switched markets to supply emergency-related products. These typologies are associated with deviations or non-compliance with rules governing public procurement processes, or the manipulation of outcomes (denoting possible complicity between buyers and suppliers, or among suppliers). They also capture deviations from principles of openness that enable fair competition in public procurement, thus benefiting some to the detriment of others. The result is a CRI score at the contract level which ranges between 0 and 1, with 0 representing no red flags of corruption (e.g., single bidding). Table 1 defines the indicators (red flags) used to calculate the composite CRI score for each contract.



Variable name	Definition
Single bidding	The indicator flags lots which received only one bid during the tendering process. Single bidding is a well-documented corruption risk indicator as it is the result of non- competitive tendering activities.
Use of non-open procedures	The indicator flags contracts awarded through a non-open procedure type as the use of less transparent procedures allows for higher discretion in awarding contracts to preferred suppliers.
Call for tender document not published	The indicator tracks tenders where the call for tender documents were not published. Not publishing the call for tender makes it less likely that eligible bidders notice the bidding opportunity
Length of submission period	The indicator captures corruption risk associated with the length of the submission period. Contracts are flagged if the submission period length is significantly related to higher probability of single bidding.
Length of decision period	The indicator captures corruption risk associated with the length of the decision period. Contracts are flagged if the decision period length is significantly related to higher probability of single bidding.
Benford's law	The indicator flags contracts awarded by procurement authorities whose awarded contract prices are in violation of Benford 's law.
Supplier registered in a tax haven	The indicator flags suppliers registered in a country with a high financial risk – based on the FSI from the Tax justice network.
Buyer dependence on supplier	The indicator is the share of the total amount (based on bid_price) awarded to a specific supplier from a given buyer (i.e. higher the values refer to bigger spending concentration).
Supplier without experience	The indicator tracks suppliers that have no experience in selling COVID products prior to the beginning of the emergency period.
Supplier switched market	The indicator tracks suppliers that didn't primarily supply the health products market before the emergency but switched to primarily supplying COVID products during the emergency period
Composite Risk score	GTI's Composite Risk score – Average of the above risk scores

Table 1: List of procurement corruption risk indicators

In addition to public procurement data, we also utilize data on COVID-19-related policies. We rely on data collected by Desvars et. al. (2020) which uses content analysis to track non-



pharmaceutical interventions implemented by governments during the first stages of the COVID-19 crisis. Specifically, we focus on measures that are related to public procurement such as increases in the availability of PPE and securing future anti-COVID-19 medication as well as changes to regular political processes such as the use of emergency powers.

Institutional Policies	Spending Policies
Activate or establish emergency response	Increase healthcare workforce
Work safety protocols	Enhance laboratory testing capacity
Surveillance	Secure future access to anti-Covid19 medication and vaccine
Police and army interventions	Increase isolation and quarantine facilities
Measures to ensure security of supply	Increase patient capacity
Special measures for certain establishments	Increase in medical supplies and equipment
	Enhance detection system
	Increase availability of PPE
	Provide international help
	Repurpose hospitals

Table 2: Policy Classification

Table 2 describes the policy groups that are classified as institutional changes or spending policies. Other policies measured but not included in the categories below include restrictions and mandatory screenings. We expect that only procurement-relevant policies will have an effect on CRI scores, so we compare the effects that the enactment of either spending or institutional policies have to all other new COVID-19 policies.

Other control variables related to procurement are included in the analysis, such as the prepandemic risk level (above or below average) categorized by broad product group (covid, health or non-health) in a country, total spending per month on broad product groups (covid, health or non-health) in a country, monthly spending growth rate by broad product group (covid, health or non-health) and country, and market concentration in broad product groups (covid, health or non-health) in a country. Additionally, the models include controls at the country-level, such as the vaccination rate of the population, the number of COVID-19 cases and deaths (both logged), log total GDP and log GDP per capita, and the quality of democracy (based on V-Dem).

These variables are predictors of CRI scores, for example, richer and more democratic countries tend to have lower levels of corruption risks. Similarly, indicators on the severity of the pandemic, such as the number of deaths and vaccinations¹, allow us to control for the variation in CRI scores that can be explained by differences in how countries experienced the pandemic over time. For example, countries with a rapidly increasing number of deaths are expected to reduce the time and resources devoted to ensuring that due process is upheld in the purchase of COVID-19 goods when compared to countries with a slower increase in mortality.

¹ This is based on best data systematically available, though the quality of COVID-19 data is a contested matter (Kolias, 2022).



4. Results

4.1 Descriptive Analysis

We found an *immediate* rise in corruption risks in the early stages of the pandemic, as was largely expected given the unprecedented, wide-ranging and fast- paced events, as well as the corresponding, exceptional spending to acquire medical products as quickly as possible. However, we also see that the average CRI has remained higher over the entire study period than during the pre-pandemic period, suggesting a sustained hit to corruption control. Figure 1 shows the average CRI score for three types of products: a) COVID-19 related, b) general health related, and c) all other public contracting between August 2018 and August 2021. COVID-19-related products saw an immediate increase in CRI scores after COVID-19 restrictions in February 2020, and the corruption risk level has remained largely the same since the onset of the pandemic (Figure 1, green line). Similarly, all health-related products (general and COVID-19) saw a steep increase in CRI scores in the immediate period after the onset of the pandemic with risk levels remaining high since, if anything, increasing a little further (Figure 1, blue line). The trendline of corruption risks for the general public procurement market in Europe remained relatively the same in the 18 months before and after the onset of the pandemic (Figure 1, red line).

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Corruption risks in public procurement through the COVID-19 pandemic in Europe



Figure 1: Procurement Corruption Risk in Europe (TED data)

As shown in Figure 2, CRI percentage change between the before and after periods was much higher for health-related than for other procurement across the European continent. These results further strengthen the assessment that higher-than-average corruption risks for medical products have remained even as other effects of the pandemic have subsided. Furthermore, health-related CRI scores increased more substantially in northern and western Europe than in countries with higher pre-pandemic risk levels. This contrasts with non-health related procurement, where 18-month average percentage changes were more subdued and low-risk countries remained relatively so (e.g., Ireland).



Figure 2: Corruption Risk (%) Change comparing 18 months before and after COVID-19









Note: Statistical significance of .1 for one-tailed t test. Sweden is considered a special case of non-intervention

Figure 3 shows the classification of European countries into risk categories. This is calculated by doing a difference of means test² of CRI scores in the *pre* and *post* pandemic period for each of the three procurement categories used (COVID-19, health, general). Cases when there is no statistically significant difference between the *pre* and *post* for the CRI scores of the three

² This is calculated by doing a one tailed t test between the pre and post pandemic periods for each country in the study. Countries with too few data points (e.g. Bulgaria) are omitted.



procurement categories are classified as no spillover. Cases when health and/or COVID-19 procurement CRI scores are higher in the post period are classified as limited spillover (see a full breakdown in table A4 in the appendix). Finally, cases when all three procurement category CRI scores are higher in the post period are classified as full spillover. In the next section, we study the impact that policies have on these corruption risk trends.

4.2 Regression Analysis

4.2.1 Spending and Institutional Policies and Corruption Risks

The study finds that increases in spending (H1) and the level of centralization of political control (H2) are associated with increased corruption risks in COVID-19 related procurement. Figure 3 shows the OLS regression coefficients of key independent variables across three policy classes – new spending policy (blue), new policy (red), and new institutional policy (green) – for the three public procurement categories in the study: general, health-related, and COVID-19 related. In each case, the coefficient comes from a multivariate OLS model where we assess if the enactment of a new policy in a given country affects CRI scores across three categories of goods in the following month (lag).



Figure 4: COVID-19 Policies and Corruption Risks in Europe

Note: Each independent variable (y axis) is run in a model with controls that are expected drivers of CRI scores throughout the period (see Figure A2 for the coefficients of all controls with the main independent variables removed). Each facet represents subsets of CRI scores (dependent variable) across three categories of products, resulting in a total of 9 models.



Across all categories, the enactment of a new *spending* policy in the buyer country in the previous month (lag) is a strong predictor of higher corruption risks, though – expectedly – the effect is greater on COVID-19 (3.2) and health-related procurement (1.1).³ In other words, a new spending policy in country A in time 0 predicts a 0.65% increase in corruption risk scores for country A in time 1 for general procurement, a 3.2% increase for COVID-19 related procurement and 1.1% increase for health-related goods. By contrast, new policies on centralized political control (i.e., institutional changes) are only associated with increased corruption risks in COVID-19 related procurement (by 1.7%) and, to a lesser extent, predict *decreases* in CRI scores across the remaining two procurement categories.

In all the models summarized in Figure 4, we include controls that are typically correlated with increased corruption risks in order to isolate the effect that can be attributed to the enactment of new policies, as discussed in the data section. When holding other relevant factors constant, new spending policies predict higher corruption risks across all product categories, whereas institutional changes (i.e. increased political control) have mixed results. Though new institutional policies are associated with *lower* corruption risks in the case of health and general procurement, we expect that these effects will vary when taking into consideration the pre-pandemic risk levels of each country. In other words, the effects of new policies (spending and institutional) are expected to be more negative in settings where procurement integrity levels were already low.

4.2.2 Interaction Between New Policies and Pre-Pandemic Risks

In this analysis, pre-pandemic risks are calculated using the country-level 18-month average CRI scores for the three procurement categories: COVID-19 related, health, and general goods. Countries are then divided into high-risk and low-risk if their average pre-pandemic CRI is above or below the median for each procurement category. In this interaction analysis, we run OLS models where the dependent variables are CRI scores in the post-pandemic period for the three categories, and the main independent variables are the interaction between new institutional and spending policies enacted and the pre-pandemic country risk level. We expect that the enactment of new spending and institutional policies in high-risk countries is going to predict higher CRI scores (H1 & H2).⁴

Table 3⁵ shows the results of the interaction effects between new spending policies and high-risk countries. Across each of the three categories of procurement, high-risk countries are classified as those that had CRI scores above the European average in the 18 months prior to the start of the pandemic in February 2020 (see table A5 in the appendix). We expect that new spending

³ In addition to spending policies, we also include total spending as a control variable to account for timedisplaced effects of spending on CRI, as well as differences in purchasing capacity by different countries.

⁴ As in the previous analysis, policies are lagged by month, that is, a policy in time 0 is expected to have an effect on CRI scores in time 1.

⁵ Table 3 only shows the coefficients relevant to the interaction, the coefficients of the full fixed-effects model are shown in table A3 in the appendix.



policies enacted in countries that had high pre-pandemic corruption risks will result in a larger increase in CRI scores throughout the pandemic period for both health and COVID-19 related procurement. For both COVID-19 and health related procurement, this interaction is positive and statistically significant, predicting ~7 % higher corruption risks than new policies in low pre-pandemic risk countries. Similarly, for general health related procurement, the interaction between new spending policies and high pre-pandemic risk levels predicts a ~2 % increase in CRI scores. Finally, for non-health procurement, this interaction is associated with a modest *reduction* in corruption risks (.8).

	Dependent variable:		
	Health CRI	Covid CRI	All Non-Health CRI
	(1)	(2)	(3)
Health High-Risk + Spending P.	1.924***		
	(0.234)		
Covid-19 High-Risk + Spending P.		7.304***	
		(1.079)	
General High-Risk + Spending P.			-0.801***
			(0.140)
Constant	1,611.818***	-1,616.729	2,609.641***
	(438.352)	(2,202.715)	(309.668)
Observations	139,925	6,739	254,409
R ²	0.136	0.249	0.186
Adjusted R ²	0.136	0.243	0.186
Residual Std. Error	11.413 (df = 139875)	11.081 (df = 6691)	12.016 (df = 254358)
F Statistic	451.151 ^{***} (df = 49; 139875)	47.077 ^{***} (df = 47; 6691)	1,160.165 ^{***} (df = 50; 254358)
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Table 3: Spending Policy Regressions

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 4⁶ shows the effects of the interaction between new institutional policies (i.e. increases in political control) and pre-pandemic risk levels in Europe. Similar to spending policies, the

⁶ Similarly, table 4 only shows the coefficients relevant to the interaction, the coefficients of the full fixedeffects model are shown in table A4 in the appendix.



interaction with high-risk countries predicts an increase of corruption risks in the case of COVIDrelated procurement of ~3.7 points. However, in the case of general health-related procurement, this interaction predicts a *decrease* in CRI scores. Finally, for the case of non-health related procurement, the interaction is not significant.

- The interaction between high pre-pandemic corruption risks and new spending policies in the previous month results in a predicted increase in CRI of 7.3 % for COVID-19 procurement and 1.9 for non-COVID-19 health purchases.
- The interaction between high pre-pandemic corruption risks and new institutional policies in the previous month results in a predicted increase in CRI of 3.7 % for COVID-19 procurement but a decrease of 1.5 for non-COVID-19 health purchases.

	Dependent variable:			
	Health CRI	Covid CRI	General CRI	
	(1)	(2)	(3)	
Health High-Risk + Inst. Policy	-1.539***			
	(0.217)			
Covid-19 High-Risk + Inst. Policy		3.741***		
		(1.023)		
General High-Risk + Inst. Policy			-0.016	
			(0.128)	
Constant	1,807.407***	-1,703.651	2,797.035***	
	(438.683)	(2,223.197)	(308.484)	
Observations	139,925	6,739	254,409	
R ²	0.136	0.241	0.185	
Adjusted R ²	0.136	0.236	0.185	
Residual Std. Error	11.415 (df = 139875)	11.137 (df = 6691)	12.019 (df = 254358)	
	450.355**** (45.183^{***} (df = 47;	$1,157.496^{***}$ (df = 50;	
F Statistic	df = 49; 139875)	6691)	254358)	

Table 4: Institutional Policy Regressions

Note:

*p<0.1; **p<0.05; ***p<0.01

4.2.3 Spillover Effects



Finally, as shown in table 5⁷, there are some spillover effects of COVID-19 procurement on all other procurement, as average CRI scores of the country/month prior predict an increase of 1.79 points at the contract level. We also find spillover effects of health-related procurement on non-health procurement (4.16 points). However, there is no direct connection in trends between COVID-19 and general health CRI scores.

	Dependent variable:			
-	Health CRI	Covid-19 CRI	All Non-Health CRI	
	(1)	(2)	(3)	
CRI Covid (lag)	1.344**	-3.011		
	(0.651)	(2.533)		
CRI Health (lag)			4.162***	
			(0.482)	
Constant	2,054.948***	982.834	1,043.661***	
	(223.563)	(866.151)	(133.390)	
Observations	215,255	10,795	397,887	
\mathbb{R}^2	0.182	0.185	0.204	
Adjusted R ²	0.182	0.181	0.204	
Residual Std. Error	12.238 (df = 215199)	11.407 (df = 10740)	12.110 (df = 397829)	
F Statistic	872.329 ^{***} (df = 55; 215199)	45.109 ^{***} (df = 54; 10740)	1,787.626 ^{***} (df = 57; 397829)	
			* ~ 1 ** ~ ~ ~ *** ~ ~ ~	

Table 5: Spillover Regressions

Note:

*p<0.1; **p<0.05; ***p<0.01

In sum, we can draw the following conclusions. Overall, we find that spending policies and measures that increase political control (non-pharmaceutical interventions) have been drivers of higher corruption risks throughout the pandemic period.

- We find strong support for H1, new spending policies are associated with increased corruption risks. Evidence for this can be found in figure 4, as well as in table 3.
- We find mixed support for H2, new policies that increase political control are associated with higher CRI scores. Whereas new spending policies increase corruption risks across

⁷ The coefficients of the full fixed-effects model are shown in table A6 in the appendix.



all three procurement categories, new institutional policies only consistently increase CRI scores for COVID-19 related procurement (table 4).

• Regarding H3 and H4, on limited and full spillovers, we find that increases in the CRI of COVID-19 related procurement predicts an increase in CRI in General Health in the following month, and that an increase in General Health CRI is associated with increases in non-health corruption risks also with a one-month lag (table 5).





4.3 Case Studies

In this section, we complement the Europe-wide quantitative analysis with in-depth case studies in four representative cases (Table 6). The selection of cases follows our conceptual framework proposing 3 different degrees of spillovers from the full spillover to no spillover plus one case of limited intervention. The first case, represented by Poland, explores a full spillover scenario, where all risks increase after the onset of the pandemic and remain at higher levels throughout. The second case, represented by France, exemplifies a limited spillover scenario, where main background risks (non-health care) remain the same, but *both general healthcare and COVID-19 products jump in risks* and remain at higher levels throughout the pandemic period. The third case, represented by Denmark, is one of no spillover. In this scenario, it is only COVID-19 products' corruption risks increase, while all other risks remain at their pre-crisis levels. In addition, COVID-19 products' risks quickly return to their pre-crisis risk level, reflecting the time-limited nature of the emergency. The fourth case, demonstrated by Sweden, serves as an example of the evolution of corruption risks in settings with a low level of policy interventions.

Although these case studies only approximate the ideal-type scenarios, they give insight into the effects comparable policies might have across distinct political-economy environments.⁸ We find that corruption risk spillovers are higher where the quality of governance and levels of accountability are lower to start with. As shown in Figure 5, for all three cases, general health and COVID-19 related procurement risks increased after the pandemic began spreading across Europe in early 2020. In Poland, corruption risks across all three categories of public procurement increased following the onset of the pandemic and increased consistently months thereafter. In France, COVID-19 related corruption risks increased after February 2020 and remained at higher levels than before the pandemic. In Denmark, corruption risks of COVID-19 related products increase at the onset of the pandemic, but no other product group sees elevated risks. In Sweden, there is no discernible change in risk patterns before or after the pandemic – at the same time, the country implemented the lowest amount of COVID-19 related policies across all categories in the region.

Country	Spillover Effect	No. of COVID-19	Emergency Rules	Perception of Corruption	
		Policies			
Poland	Full	High	High	High	
France	Limited	Mid	Mid	Medium	
Denmark	None	Mid	Mid	Low	
Sweden	Non-Intervention	Low	Low	Low	

Table 6 Case Study Summary

⁸ Figure A3 in the appendix shows the trends for all countries considered in the study.



Figure 5: Corruption Risks in Case Studies





4.3.1 Poland (Full Spillover)

The Polish government is amongst the least favorably assessed by its citizens when it comes to perceived corruption in Europe. According to a survey by Transparency International, 37% of people in the country thought that corruption increased over the previous 12 months. Similarly, 60% of respondents in Poland reported thinking that their government was doing a bad job in tackling corruption. By comparison, the EU average was 49%. Similarly, the perception of lack of transparency in the government's management of the pandemic was around 60%, with only 17% thinking that the government took their views into account when making decisions (compared to the 30% EU average). Finally, 61% percent of surveyed Polish citizens agreed that the government is controlled by private interests compared to the 53% EU average (Martinez, Kukutschka, et. al., 2021).

Furthermore, throughout the pandemic, there were several scandals involving high-level political figures and back-door deals in the country, fueling the public's perception that the situation was deteriorating. One of the most notable of such cases occurred when Polish Health Minister Lukasz Szumowski resigned from his position on August 18th, 2020 following a corruption scandal in which he was accused of buying thousands of units of PPE from a ski instructor close to his brother.

The deal cost the Polish taxpayer nearly 10 times the pre-pandemic retail price for surgical masks. Public outrage notwithstanding, fellow ministers from the ruling party, including Law and Justice (PiS) leader Jaroslaw Kaczynski and Prime Minister Mateusz Morawiecki initially supported their embattled colleague. A similar case occurred when the government sourced ventilators from Andrzej Izdebski, a former arms dealer, who failed to deliver (Koper, 2020). These developments are also reflected in CRI trends, not just for COVID-19 and health related goods, but across all procurement.

In addition, unlike in the other cases studies, these examples of back-door dealing were accompanied by the increased erosion of the rule of law and democratic backsliding. In the midst of the emergency, PiS parliamentarians passed a series of laws under the pretext of being COVID-19 shields. They were meant to enable a quick response to the rapidly evolving pandemic, while they included provisions that curbed access to information and limited the liability of civil servants and public officials.

These new laws enabled the procurement of services or supplies necessary to counteract COVID-19 to be exempted from the Polish Public Procurement Law of 2004. This meant that in certain cases where public health or the uncontrolled spread of the virus was at stake, bidders were subject to a less strict set of obligations. On 18 April 2020 the original Act was amended, which enabled the "design, construction, reconstruction, overhaul, maintenance and demolition of buildings relating to the maintenance of continuity of essential services" (Zalewski &



Niewiadomska, 2020, pp. 33.), which extended the emergency rules from mainly Covid-related products to both general health and all other product classes. This, combined with the aforementioned properties and characteristics of the Polish system greatly contributed to increased corruption risk in product classes besides Covid-related products (full spillover).

The sudden rise of the number of policies in Poland can be seen in Figure 6. Though some of these laws were eventually repealed, deemed unconstitutional by higher courts, the requests for information issued throughout this period were ignored and few if any officials faced prosecution. Similarly, doctors were temporarily barred from publicly discussing COVID-19 developments in the country.



Figure 6. Number of COVID-related policies and contracts, Poland

In the Polish case, the increased perception of corruption throughout the pandemic was rooted in policy changes, high-profile scandals, and public procurement risk trends. The deteriorating corruption situation was enabled by a concerted effort to restrict access to government information and a deliberate broadening of emergency rules to a diffuse set of purchases. Moreover, the state of emergency was also utilized as a tool to weaken democratic rule in the country. Such a case of full spillover resulted in increasing corruption risks across COVID-19, healthcare and other markets and these risks remained at higher levels for an extended period of time.



4.3.2 France (Limited Spillover)

According to a poll by Transparency International, 29% of French citizens believed that corruption increased over the pandemic. Similarly, 62% of respondents in France reported thinking that corruption in government is a big issue and 56% thought that their government was doing a bad job in tackling corruption (compared to the 49% EU average). Similarly, the perception of lack of transparency in the government's management of the pandemic was around 60%, with only 21% thinking that the government took their views into account when making decisions (compared to the 30% EU average). Finally, 54% percent of surveyed French citizens agreed that the government is controlled by private interests (in line with the 53% EU average) (Martinez, Kukutschka, et. al., 2021).

Overall, the perception of corruption in France during the pandemic period increased, though only slightly above the EU average. These measures of perceived deterioration of integrity in the public sector are, to a limited extent, reflected in procurement data. As shown in Figure 5, corruption risks for health-related and COVID-19 related procurement increased during the pandemic, though non-health related procurement remained unaffected. Nevertheless, the corruption risk levels for both COVID-19 and general health procurement remained higher than pre-pandemic levels months after the onset of the crisis (limited spillover). The number of policies and Covid contracts during the first 11 months of the pandemic can be seen in Figure 7.





Figure 7. Number of COVID-related policies and contracts, France

Cases of suspected corruption reflected citizens' concerns over increased corruption in public contracting and over private interests capturing public institutions. One of the most salient cases of pandemic-related corruption involved large private consulting firms and their ties to Ministry of Health officials (Braun, 2022b). In March of 2022, members of the French Senate presented the findings of an inquiry on the relationship between Ministries and top global consulting firms. According to the report, public sector consulting expenses increased 45% between 2020 and 2021. Furthermore, these firms have been involved in several reform initiatives such as pensions and housing benefits. Though France is not the only country in the EU to turn to consultancy services; the rapid increase in the use of such services caused alarm among members of the opposition to Emmanuel Macron's government (Braun 2021). Moreover, there were numerous cases of low-level corruption that emerged throughout the pandemic. This includes the sale of fake COVID-19 vaccinate certificates and the embezzlement of COVID-19 relief funds by organized crime syndicates.

However, the government was quick to act against criminal cases of corruption, and members of the opposition to the government were equally quick in launching investigations against suspected



high-level abuses of the emergency. In addition, France developed new emergency procurement guidelines specifically to deal with the COVID-19 pandemic. This included an anti-corruption practical guide created by the Anti-Corruption Agency in order to train public officials to detect, prevent and report instances of favoritism or embezzlement (AFA, 2020).

In the French case, these corruption scandals were eventually prosecuted, with some of these processes being ongoing at the time of writing. Despite the perception of increased corruption in the country following the pandemic, many of the more high-profile cases of suspected corruption were politicized and did not lead to criminal prosecution. Despite above-average levels of perceived corruption in the country, the French case exemplifies how strong institutions and accountability frameworks can help mitigate the spillover of corruption risks and, over time, may even reverse their pandemic-era increase.

4.3.3 Denmark (No Spillover)

Denmark is one of the highest achievers in the EU in perceived good governance. According to a survey by Transparency International, only 12% of Danish citizens think that government corruption is a big problem, compared to the EU average of 62%. This makes Denmark the leading EU country in this aspect. Denmark also performed best regarding the question whether their citizens think that their government is doing a bad job at tackling corruption. Only 22% believe that this is the case, while a further 63% believe that their government is doing well at tackling corruption. Moreover, meanwhile more than half of 19 EU Member States' citizens believe that their government is controlled by private interests, Denmark also scored significantly lower (25% of responders share this view) in this matter than the EU average (53%). Finally, all of these are in line with the population's low fear of retaliation for reporting corruption, with only 18% of respondents choosing this option, in comparison to the 45% EU average (Martinez, Kukutschka, et. al., 2021).

The Danish institutional system is often viewed as one of the cleanest in the world. In the latest Corruption Perceptions Index ranking by Transparency International Denmark got ranked highest in accordance with their cleanness in the public sector (Danish CPI, 2021). Both this ranking and the survey falls in line with the general view of the Danish institutional system. However, during the first phase of the pandemic the transparency of the awarded contracts declined in Denmark, as the Danish public procurement laws allowed certain types of procedures targeting Covid-related products to be awarded without publication. This was due to Section 80 (5) in the Danish Public Procurement Act, which enabled this kind of urgent processing as the pandemic outbreak was categorized as a justifiable unforeseeable event (Jørgensen, 2020). Furthermore, mainly in the field of Covid-related products the average case processing also accelerated, contributing to a higher attrition in transparency (Melgaard, 2021). This resulted in 26% of the population believing that corruption increased during the pandemic (Martinez, Kukutschka, et. al., 2021).

While transparency worsened in public procurement cases regarding COVID-19, the observed corruption risks did not increase by a substantial amount for Denmark (as portrayed in Figure 2 and 5). Also, the Danish institutional system successfully kept it in control. There is hardly any



additional increase in general health-related corruption risks, and the slight increase in Covidrelated corruption risks did not have an effect on other product classes' risks (no spillover).

Danish lawmaking focused on protecting Danish companies and private actors from suffering ruinous damages caused by the early pandemic. Firstly, the Danish Parliament adopted a temporary Act in March 2020 regulating public contracting during this period (the Act automatically expired in March 2021). Then an Executive order was issued providing the local authorities additional tools to support the Danish companies (Dueholm, 2020). At the same time public authorities were encouraged to exercise flexibility towards private contractors in terms of deadlines and similar obligations in order to avoid aggravating liquidity problems or even bankruptcy (Cairns & Jørgensen, 2020). The rate of enacting new policies in Denmark and the number of Covid-related contracts during the first 11 months of the pandemic can be seen in Figure 9.





The Danish example provides similar results to the Swedish model's outcome. Opposed to the Polish model, while the government also enacted emergency laws in Denmark in response to the COVID-19 outbreak, the main focus remained on the protection and support of the Danish private sector. Denmark's strong and credible institutional system proved to prevent any perceptible spillover effects to other health-related or non-health related procurement.



4.3.4 Sweden (Non-Intervention)

Unlike the proactive containment approach adopted by most countries in Europe, Sweden opted for a less intrusive strategy based on the objective of flattening the curb through social distancing measures. For example, face masks were not mandated throughout the country until December 18th, 2020. Like in the previous cases, 31% of Swedish citizens believed that there was an increase in corruption during the pandemic. However, only 21% of respondents assessed that corruption in government was a big problem, the third lowest in the EU (62% average). Similarly, 52% of Swedish respondents reported believing that their government was doing well in tackling corruption, ten points above the EU average. Alongside Denmark and Finland, Sweden has the lowest percentage (1%) of public service users who admitted to paying a bribe to get a service in the previous 12 months. 44% of Swedish citizens think that their government takes their views into account when making decisions, compared to the 30% EU average. Finally, it ranked the lowest in the EU in the perception that the government is run by a few big interests looking out for themselves (20% for Sweden, 53% EU average).

These relatively benign perceptions of corruption overall interacted with a low number of COVID-19 policies enacted in the country during the first stages of the pandemic. Fewer opportunities for corrupt transactions were created in a setting with high public integrity levels. Unlike in France and Poland, there were few high-profile corruption scandals involving political leaders and healthrelated public contracting.





Figure 8. Number of COVID-related policies and contracts, Sweden

Swedish unwillingness in making major changes in regulation was observable regarding public procurement as well. During the first year of the pandemic, procurement was still regulated by the Swedish Public Procurement Act. However, the system integrated certain exceptions when the regulations showed some limited flexibility. The acquisition of COVID-related medical equipment was considered as such an exceptional measure, which in turn became exempted from the rules. This was in accordance with Chapter 19 or Chapter 6 Section 15 of the Swedish Public Procurement Act, as the pandemic was an unforeseeable and uncontrollable external factor and the acquisition of these products were crucial to the contracting authorities (Lindberg & Lorentzon, 2020). This resulted in most cases being investigated individually with no guarantee that this kind of operation would last as long as the pandemic itself. The Swedish attitude towards COVID-19 related measures relied on making use of these exceptions rather than making new regulatory laws.

In line with a mostly non-interventionist approach to the pandemic, Sweden enacted few COVID-19 related policies overall, and even less so in the case of institutional change or spending-related policies. In line with the results in the spillover analysis detailed in the cross-country analysis section, the absence of policies enacted resulted in no discernible change in procurement risk



trends across general health-related, COVID-19-related or non-health procurement. This case serves as a benchmark which suggests that, in the absence of institutional or healthcare spending policies, procurement risk trends would remain the same as in the pre-pandemic period.



5. Conclusions and Policy Lessons

Throughout the pandemic, governments in Europe and around the world were faced with the immense challenges of the COVID-19 pandemic. In addressing them, they mobilized large amounts of resources in a short time. This was necessary to save lives, but it also created opportunities for corrupt transactions. Accordingly, we identify an increase in corruption risks across different categories of products, only some of which were related to fighting the virus. First, public procurement spending on COVID-19-related goods and services increased across the continent as governments attempted to secure access to key products such as masks, vaccines, and other forms of personal protective equipment. Unsurprisingly, this surge in spending also resulted in an increase in corruption risks as normal competition and supply mechanisms were largely set aside.

Second, and a lot more surprisingly, we also found evidence that these corruption risks spilled over from COVID-19-specific products to general health related procurement. This spillover was stronger in countries with weaker institutional frameworks, that is countries which had struggled with controlling corruption in public procurement prior to the pandemic. Third, in some cases, such as Poland or Italy, we also found evidence that there was a spillover to non-health public procurement. In other words, as the opportunities for corrupt transactions increased due to the pressing need to acquire vital goods as rapidly as possible, other types of goods were also affected. This was a bigger problem in countries already characterized by low levels of integrity in public procurement as well as low (or declining) levels of accountability and transparency. In countries with strong institutions, the risks of corruption were mostly contained, that is limited to the healthcare sector. By contrast, countries with weak institutions witnessed not only an increase in corruption risks, but in some cases a deterioration of the mechanisms and frameworks meant to contain them.

Part of this variation in corruption risks can be attributed to the nature and number of COVID-19related policies implemented by European countries. We find that, in addition to spending increments, policies that centralized political control and temporarily suspended accountability mechanisms were associated with higher risk levels across all categories when compared to their pre-pandemic levels. In Poland, spending and institutional policies combined with pre-pandemic democratic backsliding resulted in an increase in corruption risks across all product types after the start of the pandemic. In France, risks increased for medical goods, but non-healthcare related procurement remained largely unaffected. In Sweden, a generally muted policy response to COVID-19 (i.e., few extraordinary policies targeting the pandemic) was also mirrored in the lack of impact on corruption risk trends before and after the crisis.

Based on our findings and prior literature on what works in containing corruption in emergency procurement, we outline the following policy lessons:

1. Strengthen ex-post controls of emergency spending. The pandemic necessitated quick action in a highly competitive market and with asymmetrical and imperfect



information for public actors involved. However, the need for quick spending should not prevent public buyers from keeping adequate records of key decisions (e.g. grounds for selecting a company for direct award procedure) and transactions (e.g. contracts and payment records).

- a. Ex post controls of these purchase records following a publicly announced and transparent mechanism should be put in place to assess compliance with emergency rules.
- b. After emergency contracts have been completed, there should be a thorough review process to assess the results, such as the quality of the goods delivered, whether the correct quantity was provided, and whether there were any failures in fulfilling the contract terms. This assessment is crucial even if it is expected that emergency situations might lead to a higher rate of errors or issues.
- c. Keeping comprehensive and accurate records of all transactions, along with implementing reliable checks and reviews after the transactions have taken place, will keep the costs and risks associated with engaging in corruption high. This, in turn, will help discourage corruption and ensure that emergency procurement processes remain as transparent and accountable as possible.
- 2. Ring-fence emergency responses and the corresponding weakening of corruption controls to specific product groups affected and the period impacted by the crisis. While it may be generally hard to avoid the increase of corruption risks in emergency procurement spending, it should be imperative and feasible to precisely define and guard the application area of emergency rules, in terms of products and time periods. Anticorruption actors should strive to stop the abuse of emergency rules both in product markets having nothing to do with fighting the emergency and also in periods when the emergency has already ebbed. The former can be achieved by making governments precisely defining which products are specifically needed for fighting the emergency and monitoring the application of emergency rules to unrelated products. The latter can be achieved by making governments precisely setting out the criteria for the emergency situation to end from a procurement perspective. For example, the normalization of market conditions can be defined through the availability of adequate supplies and increased bidder readiness to compete for public contracts.

Procurement authorities may also provide detailed guidance on appropriate buying levels in emergency contexts, taking into account factors such as staffing levels needed to operate equipment and the ability to distribute resources effectively. While dynamism is required in emergency settings, this guidance can serve as a benchmark for monitoring spending levels.

3. Limit the scope of emergency policies to the necessary level. Excessive public intervention under the pressures of fighting emergencies, such as overspending on



Government Transparency Institute

Corruption risks in public procurement through the COVID-19 pandemic in Europe

otherwise needed products is a major avenue to exploit emergency situations. Knowing the exact quantities of emergency response products and services needed are hard and pre-emptively over-purchasing critical products is a diligent strategy in fast moving crisis situations. Similarly, conferring exceptional powers to governments fighting the emergency may be needed for fast and effective response. Nevertheless, it is possible to identify clear cases of unnecessary purchases or emergency policies serving the interests of corrupt groups rather than any reasonable emergency response. These cases become visible, for example when the order of magnitude of purchases far surpass crisis demands (e.g. ventilators bought in quantities multiple times the number of doctors capable of operating them). Similarly, shutting down parliamentary debate completely in the name of fast decision making represents abuse rather than an effective response. Such cases can be monitored by civil society using real-time procurement data and a frequent review of emergency policies published.



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Appendix

Table A1: COVID-19 Contract Classification Keywords

CDV Carla	Be and at last	
CPVCode	Description	
45215142	Intensive-care unit construction work	
33631600	Antiseptics and disinfectants	
33191000	Sterilization, disinfection, and hygiene	
	devices	
33191100	Sterilizer	
33191110	Autoclaves	
33192120	Hospital beds	
33157000	Gas-therapy and respiratory devices	
33157100	Medical gas masks	
33157110	Oxygen mask	
33157200	Oxygen kits	
33157300	Oxygen tents	
33157400	Medical breathing devices	
33157500	Hyperbaric chambers	
33157700	Blow bottle	
33157800	Oxygen administration unit	
33157810	Oxygen therapy unit	
39330000	Disinfection equipment	
35113400	Protective and safety clothing	
33157110	Oxygen mask	
33157400	Medical breathing devices	
33694000	Diagnostic agents	
33141420	Surgical gloves	
33195110	Respiratory monitors	
33670000	Medicinal products for the respiratory	
33070000	system	
33673000	Medicinal products for obstructive	
33073000	airway diseases	
33674000	Cough and cold preparations	
33675000	Antihistamines for systemic use	
18143000	Protective gear	
18424300	Disposable gloves	



Table A2: Variable Definitions

Variable Name	Range	Definition	Source
cri	0 - 100	composite Corruption Risk Index	GTI calculations with TED data
hh_risk_pre	low-mid-high	pre-pandemic 18-month average cri scores (health-related)	GTI calculations with TED data
covid_risk_pre	low-mid-high	pre-pandemic 18-month average cri scores (covid-related)	GTI calculations with TED data
other_risk_pre	low-mid-high	pre-pandemic 18-month average cri scores (all non-health)	GTI calculations with TED data
new_policy +	binary	1 if there was a new policy in a given month/country	Desvars-Larrive, A., et al. (2020)
inst_policy +	binary	1 if there was a new institutional policy in a given month/country	Desvars-Larrive, A., et al. (2020)
spending_policy +	binary	1 if there was a new spending policy in a given month/country	Desvars-Larrive, A., et al. (2020)
sum_policies	0 - 361	cumulative sum of policies in a given month/country	Desvars-Larrive, A., et al. (2020)
sum_spending_policies	0 - 65	cumulative sum of spending policies in a given month/country	Desvars-Larrive, A., et al. (2020)
sum_inst_policies	0 - 42	cumulative sum of institutional policies in a given month/country	Desvars-Larrive, A., et al. (2020)
PopulationVaccinated +	0 - 100	percentage of population vaccinated at month's end	Oxford Covid-19 Government Response Tracker
price_covid *	11.9 - 23.2	log of total spending (country/month) on covid-19 procurement	GTI calculations with TED data
price_hh *	12.14 - 28.11	log of total spending (country/month) on other health procurement	GTI calculations with TED data
price_other *	12.74 - 26.94	log of total spending (country/month) on non-health procurement	GTI calculations with TED data
concentration_covid *	0 - 100	share of single supplier (country/month) on covid-19 procurement	GTI calculations with TED data
concentration_hh *	0 - 100	share of single supplier (country/month) on health procurement	GTI calculations with TED data
concentration_other *	0 - 100	share of single supplier (country/month) on non-health procurement	GTI calculations with TED data
log_gdp_wb	23.8 - 29.07	log of gross domestic product	World Bank Development Indicators
log_gdp_pc	9.03 - 11.81	log of gross domestic product per capita	World Bank Development Indicators
log_cases +	0 - 16.9	log confirmed covid cases at month's end	Oxford Covid-19 Government Response Tracker
log_deaths +	0 - 12.1	log of confirmed covid deaths at month's end	Oxford Covid-19 Government Response Tracker
vdem_lib100	0 - 100	both electoral and liberal aspects of democracy	V-Dem project

Note: * variables include the suffix _growth to indicate montly growth rates Note: + variables include the suffix _lag to indicate monthly lagged values



	Health CRI (1)	Covid CRI (2)	All Non-Health CRI (3)
h_risk_preHigh	-103.904*** (30.616)		
ovid_risk_preHigh		158.395 (197.313)	
ther_risk_preHigh			-371.567××× (49.692)
ag_spend_policy	0.861××× (0.118)	2.433××× (0.482)	0.889××× (0.079)
rice_hh	-1.016××× (0.048)		
rice_hh_growth	0.076*** (0.007)		
oncentration_hh	0.087×× (0.036)		
rice_covid_growth		0.087××× (0.024)	
rice_covid		-0.278 (0.233)	
oncentration_covid		-0.066** (0.030)	
rice_other_growth			-0.010 (0.009)
rice_other			0.173××× (0.060)
oncentration_other			0.615*** (0.171)
эд_дqb_мр	-93.989××× (22.344)	155.596 (135.608)	-147.323××× (18.902)
og_gdp_pc	93.994××× (18.179)	-229.887× (135.663)	126.645××× (18.636)
opulationUaccinated	0.671 (0.528)	-1.751 (2.412)	-1.032××× (0.291)
dem_lib100	-0.129××× (0.041)	-0.580*** (0.212)	-0.205××× (0.040)
og_cases	-0.666*** (0.063)	-0.654** (0.292)	-0.461××× (0.047)
og_deaths_lag	0.595××× (0.056)	1.731××× (0.247)	0.002 (0.031)
h_risk_preHigh:lag_spend_policy	2.044××× (0.224)		
ovid_risk_preHigh:lag_spend_policy		7.304*** (1.079)	
ther_risk_preHigh:lag_spend_policy			-0.801××× (0.140)
onstant	1,546.875××× (415.032)	-1,616.729 (2,202.715)	2,609.641××× (309.668)
bservations 2	146,928 0.139	6,739 0,249	254,409 ρ 186
djusted R2	0.139	0.243	0.186

Table A3: Spending Policy Regressions (all features)



	Dependent variable:				
	Health CRI (1)	Covid CRI (2)	All Non-Health CRI (3)		
h_risk_preHigh	-104.142××× (30.637)				
ovid_risk_preHigh		159.666 (199.172)			
ther_risk_preHigh			-409.788××× (49.497)		
ag_inst_policy	-0.528*** (0.107)	1.302*** (0.471)	-0.279*** (0.077)		
rice_hh_growth	0.071××× (0.007)				
rice_hh	-1.008××× (0.048)				
oncentration_hh	0.072** (0.036)				
rice_covid_growth		0.085××× (0.024)			
rice_covid		-0.277 (0.232)			
oncentration_covid		-0.087*** (0.030)			
rice_other_growth			-0.007 (0.009)		
rice_other			0.146×× (0.060)		
oncentration_other			0.617××× (0.171)		
og_gdp_wb	-93.206*** (22.365)	149.215 (136.924)	-160.616*** (18.828)		
og_gdp_pc	91.581××× (18.198)	-205.387 (136.947)	142.215××× (18.576)		
opulationVaccinated	-0.001 (0.525)	-1.588 (2.431)	-0.220 (0.286)		
dem_lib100	-0.107*** (0.041)	-0.643××× (0.213)	-0.176××× (0.040)		
og_cases	-0.533*** (0.062)	-0.798*** (0.293)	-0.586××× (0.046)		
og_deaths_lag	0.621××× (0.056)	1.797*** (0.259)	-0.033 (0.032)		
h_risk_preHigh:lag_inst_policy	-1.108*** (0.208)				
ovid_risk_preHigh:lag_inst_polic	y	3.741××× (1.023)			
ther_risk_preHigh:lag_inst_polic	y		-0.016 (0.128)		
onstant	1,551.403××× (415.289)	-1,703.651 (2,223.197)	2,797.035××× (308.484)		
bservations 2	146,928 0.132	6,739 0,241	254,409 ຄ.125		
z djusted R2 esidual Std. Error Statistic	0.138 0.138 11.425 (df = 146878) 481.031××× (df = 49; 146878)	0.236 11.137 (df = 6691) 45.183××× (df = 47; 6691)	0.185 0.185 12.019 (df = 254358) 1,157.496××× (df = 50; 2543		

Table A4: Institutional Policy Regressions (all features)



		Dependent variable:	
	Health CRI (1)	All Non-Health CRI (2)	All Non-Health CRI (3)
cri_covid_lag	0.945 (0.630)	1.794××× (0.331)	
price_hh_growth	0.080××× (0.007)		
price_hh	-0.445××× (0.046)		
concentration_hh	0.172*** (0.034)		
cri_hh_lag			4.162*** (0.482)
price_other_growth		0.068××× (0.007)	0.073*** (0.007)
orice_other		-0.666××× (0.046)	-0.768××× (0.042)
concentration_other		6.298××× (0.325)	0.666*** (0.107)
log_gdp_wb	-99.506××× (11.518)	-106.492*** (8.737)	⁻64.582××× (8.083)
log_gdp_pc	42.653*** (9.445)	117.618*** (8.562)	68.699*** (7.910)
PopulationVaccinated	0.003 (0.011)	0.006 (0.007)	-0.002 (0.006)
udem_lib100	-0.308*** (0.024)	-0.197*** (0.020)	-0.278*** (0.020)
log_cases	-0.638××× (0.067)	-0.368*** (0.044)	-0.441*** (0.042)
log_deaths_lag	0.599*** (0.057)	-0.145*** (0.031)	-0.090*** (0.029)
Constant	2,251.770 ××× (213.655)	1,628.544××× (144.024)	1,043.661××× (133.390)
Dbservations R2 Rdjusted R2 Residual Std. Error	226,047 0.177 0.177 12.238 (df = 225991)	370,830 0.205 0.205 12.066 (df = 370772)	397,887 0.204 0.204 12.110 (df = 397829)
F Statistic 885 Note:	.155××× (df = 55; 225991)	1,675.086××× (df = 57; 370772)	1,787.626*** (df = 57; 397829 *p<0.1: **p<0.05: ***p<0.0

Table A5: Spillover Regressions (all features)



Figure A1: Correlogram (all independent variables)







Figure A2: Control variable coefficients on CRI scores by procurement type

Significance Levels: * p < .1; ** p < .5; *** p < .01 Std. Error in parenthesis. Bars represent 95% conf. interval.





Figure A3: Procurement Corruption Risk Trends (TED data)



Table A4: Classification of Countries

Country	COVID	Health	General	Classification
AUT	1	1	1	Full Spillover
BEL	1	1	0	Limited Spillover
BGR	0	0	1	NA
CHE	1	1	0	Limited Spillover
CZE	1	1	0	Limited Spillover
DEU	1	1	0	Limited Spillover
DNK	0	0	0	No Spillover
ESP	1	1	1	Full Spillover
EST	0	1	1	Full Spillover
FIN	1	1	1	Full Spillover
FRA	1	1	0	Limited Spillover
GBR	1	1	1	Full Spillover
GRC	1	1	1	Full Spillover
HRV	1	1	1	Full Spillover
HUN	1	1	1	Full Spillover
IRL	1	1	0	Limited Spillover
ITA	1	1	1	Full Spillover
LTU	0	1	0	Limited Spillover
LVA	0	0	0	No Spillover
NLD	1	1	0	Limited Spillover
NOR	1	1	1	Full Spillover
POL	1	1	1	Full Spillover
PRT	0	1	0	Limited Spillover
ROU	1	1	1	Full Spillover
SVK	1	1	1	Full Spillover
SVN	0	1	0	Limited Spillover



Country	Health Risk	Covid Risk	General Risk
AUT	Low	Low	Low
BEL	Low	Low	Low
BGR	High	High	High
СНЕ	Low	Low	Low
CZE	High	High	High
DEU	Low	Low	Low
DNK	High	Low	High
ESP	Low	Low	High
EST	Low	Low	Low
FIN	Low	Low	Low
FRA	Low	Low	Low
GBR	Low	Low	Low
GRC	High	High	High
HRV	Low	Low	High
HUN	High	High	High
IRL	Low	Low	Low
ISL	Low	Low	Low
ITA	High	Low	High
LTU	High	High	High
LUX	High	High	High
LVA	Low	High	Low
NLD	Low	Low	Low
NOR	Low	Low	Low
POL	Low	Low	Low
PRT	Low	Low	Low
ROU	Low	Low	Low
SVK	Low	Low	Low
SVN	Low	High	Low
SWE	Low	Low	Low

Table A5: Country Risk Classifications