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The Nexus between Corruption and Academic Freedom: An International Examination Using Mediation Analysis

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The Nexus between Corruption and Academic Freedom: An International Examination Using Mediation Analysis

Abstract

Studying a relatively under-researched aspect in economics, this paper examines the nexus between corruption and academic freedom. Our main hypothesis is that greater corruption undermines academic freedom and we test this hypothesis using cross-national data for 104 nations over the years 2012 to 2018. Our results support the main hypothesis, and this finding also generally holds across alternative aspects of academic freedom. Another contribution of this work lies in dissecting the direct and indirect (through corruption) effects of various drivers of academic freedom. Finally, additional insights are gained via considering different dimensions of academic freedom and how they are (qualitatively and quantitatively) impacted by corruption.

JEL-Codes: K420, H520, I210.

Keywords: academic freedom, corruption, government, education, democracy, mediation analysis.

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The data that support the findings of this study are available from the corresponding author upon reasonable request.

1. Introduction

Corruption is an indicator of a weakness in institutional quality. Due to its various possible impacts, involving corrupt bureaucrats and/or politicians as one of the parties in a corrupt transaction, the costs and benefits of various contractual relations can be altered in a corrupt society. For instance, corrupt deals can increase potential gains when they provide favors out of turn, and they can reduce potential costs when they undermine expected punishment or the probability of detection of illegal acts.

Along another important socio-economic dimension, academic freedom continues to be important in political/social discourse, especially given many instances of legislative and other institutional changes that seek to limit academic expression.¹ A recent example is the change in political leadership in the Philippines and its potential impacts on academic freedom.²

This research focuses on the corruption-academic freedom nexus. Academic freedom in a nation can have some elements of press freedom, an aspect that has received considerable attention in its relationship with corruption (Brunetti and Weder (2003), Chowdhury (2004), Dutta and Roy (2016), Freille et al. (2007), Goel and Nelson (2005), Kalenborn and Lessmann (2013), Themudo (2013)). However, the intent behind academic freedom is somewhat broader - it protects the generation and dissemination of ideas and concepts in academics, without fear of retribution by academics. According to Fuchs (1963, p. 431), “Academic freedom is that freedom of members of the academic community, assembled in colleges and universities, which underlies the effective performance of their functions of teaching, learning, practice of the arts, and research”, (also see Altbach (2001); <https://www.insidehighered.com/views/2010/12/21/defining-academic-freedom>; <https://u15.ca/what-we-are-thinking/what-academic-freedom-and-why-it-important>).

As such, corruption can undermine academic freedom, when laws and mandates guaranteeing academic freedom are flaunted by corrupt individuals. The presence of corruption might also increase the prevalence of plagiarism. Further, the presence of corruption might embolden the generation and dissemination of false theories and claims, clouding serious, legitimate academic discourse (Altbach (2005), Reisberg (2021)).

Corruption can impact academic freedom indirectly via its interactions with institutions. Our use of mediation analysis will uniquely shed light on both the direct impact of corruption on academic freedom as well as corruption’s role in mediating the effects of other determinants of academic freedom (such as education spending). This would also be instructive for policy formulation as effective policies to compact adverse corruption spillovers require a consideration (addressing) of both direct and indirect effects.

Key questions addressed in this research are:

¹ See: <https://www.thefire.org/late-amendment-to-arizona-bill-targets-academic-freedom-in-teacher-preparation-programs/>; <https://theconversation.com/what-is-quebecs-bill-32-on-academic-freedom-and-why-does-it-matter-183122>; <https://www.nationalreview.com/2022/05/academic-freedom-under-threat-at-princeton/>

² <https://www.voanews.com/a/preserve-the-truth-historical-books-documents-in-danger-as-marcos-family-returns-to-power-6613037.html>; <https://www.theguardian.com/world/2022/jun/07/archivists-rush-to-preserve-records-of-atrocities-under-ferdinand-marcos-sr-philippines>

- What is the impact of corruption on academic freedom?
- Are different dimensions of academic freedom equally impacted by corruption?
- How does corruption mediate the effects of other factors in impacting academic freedom?

If it turns out that greater corruption inhibits academic freedom, this can have long-term implications for the production and diffusion of knowledge. Among other things, knowledge diffusion is linked to innovation and economic growth.

Our main results, using data for over 100 nations over seven recent years, support our hypothesis that corruption undermines academic freedom. The influence of corruption is further examined via the use of corruption as a mediator to uniquely determine how corruption can act as an indirect channel in the impact of other factors that influence academic freedom in a nation. In short, among other results, we find that corruption mediates approximately 30% of education spending's effect on academic freedom. This identifies a likely overlooked channel of education spending's influence on academic freedom that has potential policy relevance.

The structure of the rest of the paper includes the background and the model in the next section, followed by a discussion of the data and estimation, results, and conclusions.

2. Background and model

2.1 Background

As a background, this work can be tied to the research on the effects of corruption (see Dimant and Tosato (2018) for a related review, and to the literature on the drivers of academic freedom (Altbach (2001, 2005), Fuchs (1963), Reisberg (2021)). Given the various causes and effects of corruption (for examples, see Bentzen (2012), Gillanders and Parviainen (2018), Hodge et al. (2011)), we uniquely employ mediation analysis to dissect how corruption might indirectly interact with the other drivers of academic freedom. For instance, academic freedom and democracy might be related (Bryden and Mittenzwei (2013)), while democracy might be related to corruption (Chowdhury (2004), Kalenborn and Lessmann (2013)), with democracy also including elements of press freedom that have also been shown to impact corruption (Brunetti and Weder (2003), Dutta and Roy (2016), Freille et al. (2007), Goel and Nelson (2005)). Further, the interactions of government spending with institutions and other socio-economic aspects have been studied (de Vaal and Ebben (2011), Goel and Nelson (2021)), as have the different dimensions of enforcement and their relative effects on corrupt activity (Capasso et al. (2019)).

Early work on the importance of academic freedom in academic discourse and knowledge growth/flow seems to have emerged, not surprisingly, in the field of education (see Fuchs (1963)). Over time, there has been recognition of the influence of institutions in impacting academic freedom (Tierney and Corwin (2007)), and of corruption in particular (Altbach (2005), Minerva (2014)). However, formal analyses linking corruption with academic freedom have been missing, partly due to the lack of a comparable cross-country measure of academic freedom.

Along a related dimension, Berggren and Bjørnskov (2022a) study the impact of political institutions on academic freedom, using a sample of 64 nations, over the years 1960-2017. They find that political institutions matter in terms of their impact on political freedom, but the relationship is complicated. We consider various political institutions in terms of their direct and indirect impacts on academic freedom, including democracy, border democracy, and whether the democratic system in a nation is presidential (as opposed to parliamentary democracies). Our focus on cross-national corruption and its impact on academic freedom is not only novel but especially revealing when the mediation analysis will allow us to discern the direct and indirect influences of the various drivers of academic freedom.

In another work, Berggren and Bjørnskov (2022b) consider the effects of academic freedom on a large sample of nations. The authors use data on 127 countries for the years 1960–2015, and their results show that greater academic freedom positively impacts labor and total factor productivity growth.

Overall, we see that the issue of academic freedom, including its causes and effects, is beginning to draw the attention of economists and other scientists. However, the nexus of academic freedom with corruption that is being formally examined in this work appears to be unique.

2.2 Model

Borrowing from the discussion above, our main hypothesis is the following:

H1: Greater corruption reduces academic freedom, *ceteris paribus*.

Generally speaking, greater corruption lowers the costs of abusing academic freedom and increases potential benefits (at least in the short term).

The general form of the estimated equation to test hypothesis H1, using the variables defined in Table 1, is the following:

$$\text{AcademicFREE}_i = f(\text{Corruption (CORR)}, \text{Education spending (EDUsp)}, \text{Government spending (GOVTsp)}, \text{Economic prosperity (LnGDP)}, \text{Enforcement}_j, \text{Democracy}_k, \text{Internet}, \text{Globalization}, \text{Ethnic tension (EthnicTEN)}, \text{Population (LnPOP)}) \dots(1)$$

Where

i = AcademicFREE1, AcademicFREE2, AcademicFREE3, AcademicFREE4

j = RuleLAW, LAWorder

k = DEM, DEMspatial, PRESIDENTIAL

The dependent variable is the degree of academic freedom. Since academic freedom is a rather broad concept, with qualitatively different dimensions, we consider four measures:

AcademicFREE1, AcademicFREE2, AcademicFREE3, AcademicFREE4. Table 2B reports the pairwise correlations between these different measures of academic freedom. Corruption is strongly negatively correlated with AcademicFREE1, AcademicFREE2, and AcademicFREE3

and only weakly correlated with AcademicFREE4. All four measures of academic freedom are positively correlated with each other.³

The main explanatory variable of interest is the prevalence of corruption in a nation, captured via the corruption perceptions index (Table 1). Although inherently difficult to measure, we employ a widely used cross-national index of corruption perceptions that are comparable across nations and over time (see Table 1). A negative and statistically significant sign on the resulting coefficient would provide support for Hypothesis H1.

Given the underlying relation between education spending and academic freedom, we separate government spending (as a percent of GDP) into education spending (EDUsp) and other government spending (GOVTsp). We would expect a positive relationship between education spending and academic freedom (also see Uslaner and Rothstein (2016)). On the other hand, the effects of other government spending could have positive spillovers on academic freedom, or it might crowd out complementary services that facilitate academic freedom. Are education spending and other government spending complementary in terms of their impacts on academic freedom?

The level of economic prosperity (LnGDP) is included to account for the economic sentiment, and the capacity of a nation to support and build institutions, related to academic freedom or otherwise (see Tierney and Corwin (2007), for an example; also see Leschke (2000)). Further, two dimensions of enforcement, related to the protection of intellectual property that would be crucial in fostering and rewarding academic discourse are included in the form of the rule of law (RuleLAW) and an index of law and order (LAWorder). Given the potential overlap between RuleLAW and LAWorder, we include them in separate models in Table 3.

Democratic institutions, with their support of due legal process and freedoms of assembly and press, can crucially support academic freedom (Berggren and Bjørnskov (2022a)).⁴ Conversely, academic freedom would generally be stifled in autocratic or authoritarian regimes. Accordingly, we consider three dimensions: DEM is a variable identifying democratic nations; DEMspatial captures related spillovers by identifying democracies in a nation's bordering nations (e.g., the Arab Spring); and the variable PRESIDENTIAL accounts for qualitative distinctions within democracies by identifying presidential democracies (as opposed to parliamentary democracies). Presidential democracies have been generally considered to be more stable and somewhat legislatively more efficient than parliamentary democracies (Gerring et al. (2009), Horowitz (1990), Kaminsky (1997)).

The Internet and the degree of globalization impact knowledge flows and the ability of nation-states to effectively control information.⁵ They are included (alternatively) to gauge their impact on academic freedom (see Minerva (2014), Zeleza (2003)). Additionally, ethnic tensions

³ Note, however, that AcademicFREE4, identifying nations with constitutional provisions for the protections of academic freedom, is somewhat qualitatively different from the other three measures of academic freedom. In particular, AcademicFREE2 and AcademicFREE3 are used in the construction of the aggregate academic freedom index, AcademicFREE1 (see Table 1 for details).

⁴ Over time, academic freedom would be important in sustaining democracies (Bryden and Mittenzwei (2013)).

⁵ Freedom of information can impact bureaucratic efficiency (see Vadlamannati and Cooray (2016)).

(EthnicTEN) in a nation likely inhibit the free flow of ideas and thus their expected influence on academic freedom would be negative.

Finally, population captures country size. The prevalence and monitoring of academic freedom in larger nations might be more challenging than in smaller nations, *ceteris paribus*. Next, we turn to a discussion of the data used and the estimation procedure employed.

3. Data and estimation

3.1 Data

The data used to estimate the model in equation (1) is a panel of 104 countries observed annually from 2012 to 2018—see Table 1 for variable details and Table 2 for summary statistics.

The main variable of interest is the degree of academic freedom (AcademicFREE1) observed in a particular country. Academic freedom is defined as “the right of academics, without constriction by prescribed doctrine, to freedom of teaching and discussion, freedom in carrying out research and disseminating and publishing the results thereof, freedom to express freely their opinion about the institution or system in which they work, freedom from institutional censorship and freedom to participate in professional or representative academic bodies (UNESCO 1997 Recommendation concerning the Status of Higher-Education Teaching Personnel; <https://en.unesco.org/news/protecting-academic-freedom-relevant-ever>).”

To measure academic freedom, we use the aggregate academic freedom index from Spannagel et al. (2020) and Pemstein et al. (2021), which captures the degree of academic freedom and autonomy of higher education institutions. This index is measured on a scale from 0 to 1, with higher values denoting more academic freedom and is constructed using Bayesian factor analysis based on the following variables: freedom to research and teach, freedom of academic exchange and dissemination, institutional autonomy, campus integrity, freedom of academic and cultural expression. According to this measure, the average degree of academic freedom in the sample is 0.73, with Poland (0.98) possessing the most academic freedom and Bahrain (0.04) the least.

We also consider three other dimensions of academic freedom including the freedom of academic and cultural expression (AcademicFREE2), which is based on the question “Is there academic freedom of cultural expression related to political issues?”; freedom of academic exchange and dissemination (AcademicFREE3), which is based on the question “To what extent are scholars free to exchange and communicate research ideas and findings?”; and constitutional protection for academic freedom (AcademicFREE4), which is based on the question “Do constitutional provisions for the protection of academic freedom exist?” Based on the correlations in Table 2B, AcademicFREE2 and AcademicFREE3 are highly (positively) correlated with AcademicFREE1, however, AcademicFREE4 is only weakly correlated with AcademicFREE1.

The main independent variable is the Corruption Perceptions Index (CPI) collected from Transparency International. The CPI measures the perceived levels of corruption in the public sector based on a combined 13 surveys and assessments from businesspeople and experts. The

index is measured on a scale from 0 to 100 and is re-scaled so that higher numbers denote greater perceived corruption. Because this index has better time-series comparability starting in 2012, the data set starts with this year. According to this index, the average corruption score is 54, where Haiti (83) is the most corrupt country in the sample, and Denmark (8) is the least corrupt country.

The remaining variables come from reputed international sources. From the World Bank's World Development Indicators, we collected the percent of GDP that is spent on education (EDUsp), the percent of GDP that is on non-educational government final consumption expenditures (GOVTsp), the log of real GDP per capita (LnGDP), the percent of the population that has access to the internet (Internet), and the log of total population (LnPOP).

To capture enforcement, we use two indices, including the law and order (International Country Risk Guide) and the Rule of Law (World Governance Indicators). We also consider three measures for democracy collected from Bjørnskov and Rode (2020). Democracy (DEM) is a binary variable with 1 denoting a democracy and 0 for autocracy, while spatial democracy (DEMspatial) measures the weighted average of neighboring countries' democracy. In addition, we use an indicator variable equal to 1 for presidential democracies (PRESIDENTIAL).

The final two variables include the degree of overall globalization (Globalization) from Gygli et al. (2019) and an index of ethnic tension (EthnicTEN) obtained from The PRS Group's International Country Risk Guide. The next section discusses the estimation strategy.

3.2 Estimation

To estimate the model we employ mediation analysis. Figure 1 shows the direct effect of the treatment variable on academic freedom (Path A) and the potential indirect effect of each treatment variable on academic freedom that is mediated through its effect on corruption (Paths B and C). Mediation analysis allows us to estimate the direct and indirect effects of several treatment variables on the degree of academic freedom (Baron and Kenny (1986), VanderWeele (2016)).

While the baseline model given in equation (1) provides an estimate of the direct effect of the treatment variable on academic freedom, mediation analysis is used to estimate and test the indirect impact (Paths B and C) of each treatment variable mediated through its impact on corruption. In other words, it tests the hypothesis that corruption is the mechanism (either partially or fully) through which the treatment influences academic freedom.

To carry out mediation analysis we first estimate the relationship between each treatment variable and corruption (mediator) given in the following equation:

$$CORR_{it} = \alpha_0 + \alpha_1 Treatment_{it} + \theta' X_{it} + \mu_{ai} + \varepsilon_{ait} \quad (2)$$

where the variables are the same as those described in equation (1) and the treatment variables include EDUsp, GOVTsp, LnGDP, RuleLAW, LAWorder, DEM, DEMspatial, PRESIDENTIAL Internet, Globalization, EthnicTEN, LnPOP. A necessary condition for

mediation is that α_1 , which measures the impact of the treatment on corruption corresponding to Path B in Figure 1, is statistically significant.

The next equation estimates the direct impact of a treatment variable on academic freedom by controlling for the influence of the mediator corruption:

$$\text{AcademicFREE1}_{it} = \gamma_0 + \gamma_1 \text{Treatment}_{it} + \gamma_2 \text{CORR}_{it} + \delta' X_{it} + \mu_{bi} + \varepsilon_{bit} \quad (3)$$

where γ_1 is the direct effect of the treatment variable on academic freedom (Path A in Figure 1).

The total effect of the treatment on academic freedom is $\beta_1 = \gamma_1 + \alpha_1 * \gamma_2$, where γ_1 is the direct impact (Path A) and $\alpha_1 * \gamma_2$ is the indirect impact (Paths B and C). Equations (2) and (3) are estimated using a simultaneous equations model estimated via Maximum Likelihood with cluster-robust standard errors.⁶ A discussion of our findings follows.

4. Results

4.1 The direct impact of corruption on academic freedom: Baseline models

The baseline models, using Maximum Likelihood estimation (see details in Section 3.2 above), are reported in Table 3.

Turning first to the main variable of interest and the title of the paper, our results show overwhelming support for Hypothesis H1 - the coefficient on CORR is negative in all cases and statistically significant in seven of the eight models estimated. Greater corruption undermines academic freedom. However, as the reader might expect, there may be other effects of corruption, some direct and others indirect, and to those, we turn in the following section. In the context of the literature, while the relevance of good institutions in promoting academic freedom has been considered (Berggren and Bjørnskov (2022a)), the nexus between corruption and academic freedom has not been formally studied.

The following other main points may be noted from the results reported in Table 3. First, both education spending (EDUsp) and other government spending (GOVTsp) are complementary in their positive effects on academic freedom.⁷ The other government spending may be related to institutions and infrastructure that strengthen/support the payoffs from education.

Second, wealthier nations seem somewhat challenged in promoting academic freedom - the coefficient on LnGDP is negative and statistically significant in a majority of the cases (albeit at the 10 percent level in many instances). An explanation for this might be that greater prosperity enables affordability of some of the means to undermine academic freedom. Alternately, it might be easier for those who abuse academic freedom to find alternate employment (opportunity cost) in wealthier nations.

⁶ For details see <https://stats.oarc.ucla.edu/stata/faq/how-can-i-do-mediation-analysis-with-the-sem-command/>

⁷ Relatively speaking, the statistical support for EDUsp is greater than for the estimated coefficients on GOVTsp.

Third, interesting differences emerge with respect to the influence of the alternate democracy measures considered. As expected, democracy in a nation enhances academic freedom. These effects of own democracy are reinforced via positive spillovers (demonstration effects) of border democracies (DEMspatial, Model 3.3). However, the qualitative distinction about the type of democracy, captured by including an identifier PRESIDENTIAL for presidential forms of democracies (e.g., France, United States), shows that such nations were no different from others when it came to academic freedom (Model 3.2).

Fourth, comparing the two variables to account for enforcement, we find that while strengthened law and order, LAWorder, (note that in this index, higher values imply worse outcomes - Table 1), promotes academic freedom, the index of rule of law, (RuleLAW), fails to have a significant influence (Model 3.4).

Fifth, another interesting finding is that it is the diffusion of the internet, rather than the degree of globalization, that significantly impacts academic freedom. We find that greater internet diffusion undermines academic freedom. This finding is consistent with the notion of the relative inability of nations to effectively guard/police the internet, which opens opportunities for abuse.

Finally, the effects of ethnic tensions (EthnicTEN) and country size (via LnPOP), while of the expected negative sign, were statistically insignificant. Large nations and nations with heightened ethnic tensions seem no different from others when it comes to academic freedom.

4.2 The direct and indirect impacts on academic freedom: Mediation analysis

Since corruption has various causes and effects (Dimant and Tosato (2018), Treisman (2007)) and given that the academic freedom-corruption nexus is the central theme of this work, we examine the influence of the different factors considered in Table 3 in terms of their direct effects on academic freedom and their indirect effects (through corruption). The mediation analysis enables us to dissect the direct and indirect effects (see Goel and Nelson (2021) for an alternative application of the mediation analysis; also see Ezcurra and Zuazu (2022)).

The results from the mediation analysis, showing the total effects, direct effects, and indirect effects (through corruption), are provided in Table 4.⁸ Generally, the percentage influence of the direct effects exceeds that of the corresponding indirect effects, with LnGDP being a notable exception.⁹ This larger indirect effect of GDP may be seen as consistent with the notion that economic prosperity impacts almost all economic activity.

The Internet, especially with the onset of the online newspapers and blogs, might be seen as capturing aspects of press freedom, which has been linked to corruption (Brunetti and Weder (2003), Dutta and Roy (2016), Freille et al. (2007), Goel and Nelson (2005)). Table 4 shows that the indirect effects of the Internet on academic freedom are relatively small in magnitude and

⁸ Note that the direct and indirect effects in some instances do not sum to 100% due to rounding, and that the individual effects might exceed 100%, depending on the sign of the indirect and direct effects (see Table 4).

⁹ The effects of PRESIDENTIAL are statistically insignificant and are not discussed here.

statistically insignificant. This is also the case for DEM and DEMspatial, where the indirect effects are statistically insignificant.

Turning to the effects of government education and non-education spending, we find evidence that corruption mediates the relationship between education spending, but not non-education spending. In particular, roughly 71% of education spending's effect on academic freedom is direct, while 29% of its effect is mediated through corruption. One could think of education's indirect effects through corruption having a positive impact on academic freedom when corruption enables the overcoming of some bottlenecks (via a "greasing effect") that increase the positive spillovers of education on academic freedom.

Further, the indirect effects of education spending are greater than the indirect effects of other government spending, supporting the usual notion of the positive social spillovers from education. This finding has potential policy value – given the greater indirect effects of education spending, voters might be less willing to fund/approve increases in education spending than some other types of government spending.

In some instances, e.g., LnGDP, LAWorder, and EthnicTEN, the signs of the direct and the corresponding indirect effects are not alike, implying that one effect is countering the influence of the other effect.¹⁰ For instance, law and order is partly capturing legal institutions and bottlenecks that might impact many other factors as well.

Finally, all the effects (including total, direct, and indirect effects) of PRESIDENTIAL, Globalization, EthnicTEN, and LnPOP are all insignificant, as in Table 3. In other words, these factors do not appear to impact academic freedom via direct or indirect channels.

Overall, the mediation analysis enables us to uniquely dissect the nexus between corruption and academic freedom by showing the direct and indirect influences. Besides adding to the literature, a revelation of these different channels of influences can aid policymakers in identifying specific avenues to target in their efforts to promote academic freedom.

4.3 Additional considerations: Considering alternate measures of academic freedom

Since academic freedom is a rather broad concept, with many qualitatively different aspects, in Table 5 we consider the influence of corruption on specific aspects of academic freedom. Are the effects of corruption similar across dimensions of academic freedom? Besides shedding light on this question, the current exercise also provides a robustness check of the baseline findings in Table 3.

Before discussing related results, it seems useful to revisit the distinctions across the measures of academic freedom considered here. AcademicFREE2 (capturing cultural expression related to political issues), and AcademicFREE3 (addressing free academic exchange) are indices (see Table 1), while AcademicFREE4 is a dichotomous variable related to whether a country has constitutional guarantees for academic freedom.

¹⁰ Capasso et al. (2019) consider how alternate dimensions of enforcement might be effective in checking corruption across nations.

The results in Table 5, following the format of Model 3.1 from Table 3 for comparability, show that AcademicFREE2 and AcademicFREE3, consistent with the findings in Table 3 for AcademicFREE1, increase when corruption goes down. On the other hand, consistent with intuition, nations with constitutional guarantees for academic freedom, on average, have greater academic freedom. Constitutional guarantees are fixed and less negotiable in the short term, and they send strong signals to the public. All these factors, in this context, would facilitate academic freedom.

The results for the other variables are similar to what was reported earlier (with, expectedly, results for AcademicFREE4 in Model 5.3 somewhat different from the other cases).

4.4 Comparing the relative magnitudes of effects

It seems useful to compare the relative effects of corruption on the different aspects of academic freedom.

The relative elasticities of the different dimensions of academic freedom with respect to corruption are (all elasticities are evaluated at the respective means (Table 2):

- (i) $E_{\text{AcademicFREE1}, \text{CORR}} = -0.42$ (Model 3.1)
- (ii) $E_{\text{AcademicFREE2}, \text{CORR}} = -1.61$ (Model 5.1)
- (iii) $E_{\text{AcademicFREE3}, \text{CORR}} = -1.23$ (Model 5.2)
- (iv) $E_{\text{AcademicFREE4}, \text{CORR}} = 0.71$ (Model 5.3)

We see that AcademicFREE2, capturing academic freedom/cultural expression related to political issues, is relatively most responsive to changes in corruption, while the broad index of academic freedom, AcademicFREE1, is least responsive. Furthermore, unlike the other three elasticities, the elasticity with respect to AcademicFREE4, which is a dummy variable capturing constitutional provisions with respect to academic freedom, is positive.

It is also potentially relevant, especially for policymaking, to compare the returns to government education spending (EDUsp) and other government spending (GOVTsp). Using Model 3.1 from Table 3, we see that the respective elasticities are quite similar: the elasticity of AcademicFREE1 with respect to EDUsp is 0.16, while that with respect to GOVTsp is 0.15. While education spending is directly related to the supply of academics and their immediate audience (students) and infrastructure (schools, universities), the other government spending can be seen as funding supporting institutions (e.g., communications and transportation networks that facilitate the dissemination/potential payoffs from academia). This finding is useful for policymakers in deciding where to prioritize scarce government funding. The concluding section follows.

5. Conclusions

This paper focuses on a relatively under-researched topic by studying the nexus between corruption and academic freedom. In recent years, numerous empirical studies have been

conducted on the causes and effects of international corruption (Dimant and Tosato (2018), Treisman (2007)), however, the corruption-academic freedom link has been ignored. Academic freedom has implications for knowledge growth and governance in a nation. At a broader level, academic freedom can be seen as tied to overall freedom of information, and that relates to bureaucratic performance (Vadlamannati and Cooray (2016)). On the other hand, corruption is widely prevalent worldwide, and is an indicator of the weakness in institutional quality.

Our main hypothesis is that greater corruption undermines academic freedom and we test this hypothesis using cross-national data for 104 nations over the period 2012 to 2018. Results support the main hypothesis, and this support also holds across specific dimensions of academic freedom (AcademicFREE2 and AcademicFREE3 in Table 5). A ten percent increase in corruption in a nation (keeping in mind the well-known issues with the inability to accurately capture the true extent of corrupt activity), would lower academic freedom by about four percent according to a broad measure of academic freedom (AcademicFREE1, Model 3.1 in Table 3). One implication of the negative effect of corruption on academic freedom would be that, in very corrupt nations, stifled academic freedom might jeopardize/undermine research on the causes and effects of corruption itself. This would perpetuate/entrench corruption, possibly leading to a vicious circle of corruption.

Another contribution of this work lies in accounting for the mediating role of corruption and dissecting the direct and indirect (through corruption) effects on various drivers of academic freedom. We uniquely find differences in the magnitudes and signs of the direct and indirect channels of influence on academic freedom. This is potentially informative for policymakers trying to enhance academic freedom as they know precisely which channel to affect through policies.

Finally, additional insights are gained via considering different dimensions of academic freedom and how they are (qualitatively and quantitatively) impacted by corruption. Specifically, we find that not all dimensions of academic freedom are negatively impacted by corruption, and that the greater impact of corruption (in terms of magnitude) is on academic freedom related to cultural expression with regard to political issues. As corruption in a nation goes up, this aspect of academic freedom would be especially compromised.

Circling back to the questions posed in the Introduction, we can now provide the following answers based on the analysis:

- What is the impact of corruption on academic freedom?
Corruption negatively impacts academic freedom. This finding is consistent with the notion that corruption undermines institutions and credibility or trust that might be keys to fostering academic freedom.
- Are different dimensions of academic freedom equally impacted by corruption?
Different dimensions of academic freedom are not equally impacted by corruption. While most aspects of academic freedom decrease when corruption goes up, it is not true for a

measure of academic freedom which captures related constitutional provisions (AcademicFREE4).

- How does corruption mediate the effects of other factors in impacting academic freedom? Corruption acts in different ways as a mediator, both qualitatively and quantitatively. Some intermediate effects are positive, while others are negative, with significant differences in the relative magnitudes.

From a policy perspective, whereas there seems worldwide recognition of the benefits of corruption control, it is not clear whether the payoffs on academic freedom are recognized by policymakers. Nations looking to enhance academic freedom and discourse should consider paying greater attention to controlling corruption. This is also true for the positive spillovers from better enforcement. Further, the efforts by governments to increase internet access and reduce the digital divide should also consider the possible adverse impacts on academic freedom. The democracies in nations, or the structure of governments, changes rarely and very slowly, so the results with regard to the effects of democracy do not hold much policy value, at least in the short- and medium terms. Additionally, it is the diffusion of the internet, rather than overall globalization, that significantly impacts academic freedom. Finally, the relatively similar positive academic freedom dividends from education and non-education government spending should somewhat welcome (and unexpected) news for resource-constrained policymakers looking for fungibility in public spending.

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Table 1: Variable definitions and data sources

Variable	Description	Source
AcademicFREE1	Academic freedom index, measuring the extent to which academic freedom is respected in a country. The index is measured on a scale from 0 (low) to 1 (high).	Coppedge et al. (2021); V-Dem Project
AcademicFREE2	Academic freedom index, measuring the extent of academic freedom of cultural expression related to political issues; scale -5 to +5	Coppedge et al. (2021); V-Dem Project
AcademicFREE3	Academic freedom index, measuring the extent to which scholars are free to exchange and communicate their research ideas and findings. Free academic exchange includes uncensored access to research material, unhindered participation in national or international academic conferences, and the uncensored publication of academic material. Free dissemination refers to the unrestricted possibility for scholars to share and explain research findings in their field of expertise to non-academic audiences through media engagement or public lectures.; scale -5 to +5.	Coppedge et al. (2021); V-Dem Project
AcademicFREE4	Dummy variable equal to one if there are constitutional provisions for the protection of academic freedom, and zero otherwise.	Coppedge et al. (2021); V-Dem Project
CORR	Corruption Perceptions Index, measuring perceived levels of public corruption. The index is measured on a scale from 0 to 100 and rescaled so that higher numbers denote greater corruption.	Transparency International (2021)
EDUsp	Government expenditures on education (% of GDP).	The World Bank (2020)
GOVTsp	Government final consumption expenditures minus expenditures on education (% of GDP).	The World Bank (2020)
LnGDP	Log of per capita real GDP, in constant 2010 US dollars (lagged one period).	The World Bank (2020)
RuleLAW	Index of the rule of law, measuring the extent to which individuals have confidence in and abide by the rules of the society. The index is measured on a scale from -2.5 to +2.5 with higher numbers denoting better outcomes.	Kaufmann et al. (2010)
LAWorder	Law and order index, measuring the extent of the strength and impartiality of the legal system and observance of the law. The index is measured on a 6-point scale with higher numbers denoting worse outcomes.	International Country Risk Guide (ICRG) (2020)
DEM	A dummy variable equal to one if the country is democratic, and zero if autocratic.	Bjørnskov and Rode (2020)
DEMspatial	Spatial democracy, measured as the average of a nation's geographical neighbors' DEM score.	Bjørnskov and Rode (2020)
PRESIDENTIAL	A dummy variable equal to one if the political system is presidential and zero otherwise.	Bjørnskov and Rode (2020)
Internet	The percent of the population that is using the Internet.	The World Bank (2020)
Globalization	Globalization index, measuring the degree of economic, social, and political aspects of globalization. The index is measured on a scale from 0 to 100 with higher values denoting greater globalization.	Gygli et al. (2019)

EthnicTEN	Index of ethnic tension, measuring the extent of tension within a country attributable to racial, nationality, or language divisions. The index is measured on a 6-point scale with higher numbers denoting worse outcomes.	International Country Risk Guide (ICRG) (2020)
LnPOP	Log of the total population.	The World Bank (2020)
<i>Notes: All data are annual, by country, over the years 2012 to 2018.</i>		

Table 2: Summary statistics

Variable	Observations	Mean	Standard deviation	max	min
AcademicFREE1	490	0.733	0.248	0.982	0.0390
AcademicFREE2	490	1.472	1.258	3.633	-2.425
AcademicFREE3	490	1.271	1.192	3.009	-2.115
AcademicFREE4	458	0.511	0.500	1	0
CORR	490	54.19	19.85	83	8
EDUsp	490	4.524	1.487	8.494	1.455
GOVTsp	490	11.00	3.837	23.14	0.394
LnGDP	490	8.665	1.560	11.59	5.907
RuleLAW	490	0.101	1.014	2.100	-1.690
LAWorder	490	3.586	1.320	6	1
DEM	490	0.684	0.466	1	0
DEMspatial	490	0.642	0.348	1	0
PRESIDENTIAL	490	0.631	0.483	1	0
Internet	464	50.32	30.15	98.24	1.050
Globalization	454	68.04	13.41	91.31	36.43
EthnicTEN	490	3.883	1.227	6	1
LnPOP	490	16.37	1.432	20.97	12.68
<i>Notes: See Table 1 for variable details.</i>					

Table 2B: Correlation matrix of key variables

	CORR	AcademicFREE1	AcademicFREE2	AcademicFREE3	AcademicFREE4
CORR	1				
AcademicFREE1	-0.501 [0.000]	1			
AcademicFREE2	-0.605 [0.000]	0.871 [0.000]	1		
AcademicFREE3	-0.568 [0.000]	0.959 [0.000]	0.846 [0.000]	1	
AcademicFREE4	-0.082 [0.079]	0.315 [0.000]	0.252 [0.000]	0.337 [0.000]	1

Notes: See Table 1 for variable details.

N=458.

Listwise deletion used. Brackets denote probability values.

Table 3
The direct impact of corruption on academic freedom: Baseline models
Dependent variable: AcademicFREE1

	(3.1)	(3.2)	(3.3)	(3.4)	(3.5)	(3.6)	(3.7)	(3.8)
CORR	-0.00673*** (0.00172)	-0.00883*** (0.00235)	-0.00653*** (0.00173)	-0.000686 (0.00325)	-0.00678*** (0.00167)	-0.00682*** (0.00172)	-0.00674*** (0.00173)	-0.00664*** (0.00171)
EDUsp	0.0254** (0.0122)	0.0456*** (0.0147)	0.0262** (0.0120)	0.0133 (0.0134)	0.0233* (0.0126)	0.0211* (0.0119)	0.0255** (0.0122)	0.0247** (0.0124)
GOVTsp	0.00970** (0.00458)	0.00784* (0.00471)	0.00754* (0.00445)	6.42e-05 (0.00165)	0.0104** (0.00458)	0.00879* (0.00492)	0.00970** (0.00460)	0.00928** (0.00455)
LnGDP	-0.0362* (0.0214)	-0.0148 (0.0235)	-0.0411** (0.0200)	-0.0119 (0.0266)	0.0190 (0.0304)	-0.0593* (0.0306)	-0.0351* (0.0210)	-0.0362* (0.0216)
LAWorder	-0.0522*** (0.0167)	-0.0806*** (0.0229)	-0.0482*** (0.0171)		-0.0452*** (0.0169)	-0.0582*** (0.0169)	-0.0525*** (0.0167)	-0.0534*** (0.0167)
DEM	0.281*** (0.0446)		0.248*** (0.0471)	0.318*** (0.0473)	0.279*** (0.0450)	0.272*** (0.0462)	0.280*** (0.0442)	0.281*** (0.0450)
PRESIDENTIAL		-0.000392 (0.0496)						
DEMspatial			0.132** (0.0531)					
RuleLAW				0.0596 (0.0572)				
Internet					-0.00325** (0.00151)			
Globalization						0.00389 (0.00372)		
EthnicTEN							-0.00302 (0.0115)	
LnPOP								-0.0109 (0.00988)
Observations	490	490	490	600	464	454	490	490
R ²	0.588	0.836	0.614	0.516	0.613	0.603	0.588	0.592

*Notes: See Tables 1 and 2 for variable details. Constant is included in each model, but not reported. Each variable is time-demeaned to remove the country-specific fixed effect. Parentheses denote clustered (at country level) standard errors and brackets denote probability values. Asterisks denote the following significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.*

Table 4
The direct and indirect impact of corruption on academic freedom: Mediation Analysis
Dependent variable: AcademicFREE1
Mediator variable: CORR

	Total Effect	Direct Effect	Indirect Effect	Direct Effect (%)	Indirect Effect (%)
EDUsp	0.0359*** (0.0130)	0.0254** (0.0122)	0.0106*** (0.0040)	70.7%	29.4%
GOVTsp	0.0109** (0.0054)	0.0097** (0.0046)	0.0012 (0.0019)	88.6%	11.3%
LnGDP	0.0030 (0.0179)	-0.0362* (0.0214)	0.0392*** (0.0124)	-1218.2%	1318.3%
LAWorder	-0.0120 (0.0128)	-0.0522*** (0.0167)	0.0403*** (0.0110)	435.8%	-336.2%
DEM	0.3050*** (0.0514)	0.2810*** (0.0446)	0.0239 (0.0165)	92.1%	7.8%
PRESIDENTIAL	-0.0055 (0.0527)	-0.0004 (0.0496)	-0.0051 (0.0190)	7.2%	92.8%
DEMspatial	0.1402** (0.0555)	0.1320** (0.0531)	0.0087 (0.0179)	94.2%	6.2%
RuleLAW	0.0723** (0.0364)	0.0596 (0.0572)	0.0127 (0.0600)	82.4%	17.6%
Internet	-0.0034** (0.0016)	-0.00325** (0.0015)	-0.0002 (0.0006)	94.3%	5.8%
Globalization	0.0045 (0.0041)	0.0039 (0.0037)	0.0006 (0.0012)	85.7%	14.3%
EthnicTEN	-0.0020 (0.0116)	-0.0030 (0.0115)	0.0010 (0.0047)	151.6%	-51.7%
LnPOP	-0.0131 (0.0107)	-0.0109 (0.0099)	-0.0022 (0.0039)	83.1%	17.1%

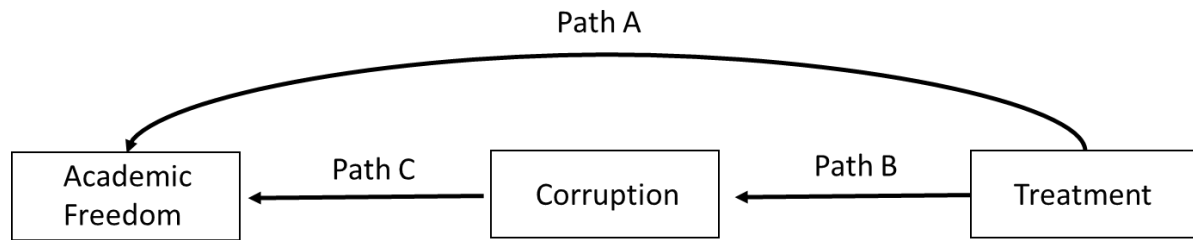
Notes: See Tables 1 and 2 for variable details and Section 3.2 for details on the mediation analysis. The number of observations for each system of equations is given in Table 3 and the overall R^2 is at least 0.84 for each model.

Table 5
The direct impact of corruption on academic freedom:
Alternate measures of academic freedom

Dependent variable:	(5.1) AcademicFREE2	(5.2) AcademicFREE3	(5.3) AcademicFREE4
CORR	-0.0516*** (0.00752)	-0.0342*** (0.00876)	0.00793* (0.00481)
EDUsp	0.157** (0.0636)	0.0968* (0.0535)	-0.0151 (0.0348)
GOVTsp	0.0496** (0.0228)	0.0427** (0.0213)	0.0390*** (0.0123)
LnGDP	-0.225** (0.0913)	-0.148 (0.105)	0.163*** (0.0491)
LAWorder	-0.369*** (0.0840)	-0.205*** (0.0760)	-0.120** (0.0544)
DEM	0.880*** (0.209)	1.244*** (0.197)	0.285*** (0.103)
Observations	496	490	464
R ²	0.573	0.577	0.260

*Notes: See Tables 1 and 2 for variable details. Constants are included in each model, but not reported. Each variable is time-demeaned to remove the country-specific fixed effect. Parentheses denote clustered (at country level) standard errors and brackets denote probability values. Asterisks denote the following significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.*

Figure 1: Mediation analysis: Corruption as a mediator



Notes: Path A = Direct effect; Paths B and C = Indirect effect.

See Section 3.2 for details on the mediation analysis.