The Adoption of International Financial Report Standards and Corruption

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Huan Li

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Advisor: Yannis M. Ioannides

Enrico Spolaore

Abstract

Corruption can be defined as the act in which the power of the public office is misused for personal gain in a manner that contravenes the rules of the game. According to data from World Bank, about $1 trillion is paid in bribes each year, while the total size of the world's economy is only $30 trillion. This makes research on the causes and impacts of corruption very valuable.

In this thesis, I use both OLS regression and three-stage least square regression to test the hypothesis that adopting International Financial Report Standards (IFRS) and improving accounting quality will decrease the corruption level and discuss the heterogeneity of the adoption effects.

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The Adoption of International Financial Report Standards and Corruption

Chapter 1

Introduction

Corruption can be defined as the act in which the power of the public office is misused for personal gain in a manner that contravenes the rules of the game (Hodgson & Jiang, 2007). According to data from World Bank, about $1 trillion is paid in bribes each year, while the total size of the world's economy is only $30 trillion. This makes research on the causes and impacts of corruption very valuable.

In this thesis, I test the hypothesis that adopting International Financial Report Standards (IFRS) and improving accounting quality will decrease the corruption level and discuss the heterogeneity of the adoption effects.

In this thesis, I compile a database of IFRS adoption from 2005 to 2020. While previous research often uses data from short periods such as 3-5 years, this database cover 15 years and thus is less susceptible to the short-term fluctuation in corruption data. Also, my identification strategy for IFRS adoption uses three-stage least square regressions to identify the treatment effect of IFRS adoption.

Literature review

Corruption and rent-seeking have a long research history, and part of the reason why corruption research can be traced back to 30 or 40 years ago is that the impact of corruption is vast.

The empirical research started with one challenge: How to define corruption? There have been debates on several definitions, and even though it is hard to agree on a precise definition, one of the commonly agreed ones that both include political corruption and bureaucratical corruption is as follows:

Corruption refers to the act in which the power of the public office is used for personal gain in a manner that contravenes the rules of the game (Hodgson and Jiang, 2007).

In the review of corruption research, three types of corruption are identified. Among these three types of corruption, "Grand corruption" refers to corruption at the policymaker level (Lambsdorff, 1999). As known to all, one aim of policies is reallocating public resources. Suppose a corrupt politician claims that the adopted policy has a long-term benefit or simply has a preference for the interest of a given group. In that case, it will be hard to verify whether this is a corrupt administrative policy. Take tobacco as an example. If the tobacco corporations bribed the governor, it is easy for the governor to ease the restriction on tobacco in exchange for more taxation for government spending. This will not be deemed corrupt behavior unless evidence of bribes is found, which is far from easy. This could be even harder nowadays as many virtual currencies are untraceable and can be used in money laundering. This type of corruption has a tremendous impact as it undermines the fairness of resource reallocation.

Besides "Grand corruption", other corruptions are named "petty corruption" and "Legislative corruption" (Lambsdorff, 1999). Petty corruption is also known as bureaucratic corruption. It refers to corruption acts among the appointed bureaucrats. The bureaucrats would deliberately slow down or suspend some administrative procedure and ask directly or

indirectly for bribery to continue or speed up the procedure.

In some cases, the corrupt official may provide services that are not supposed to be available. Usually, the amount of bribes is small, but petty corruption may have a disproportionate impact on poor people. According to the World Bank's World Development Report for 2000/01: Attacking Poverty, "The burden of petty corruption falls disproportionately on poor people …Petty corruption in public health or police services can have debilitating consequences."

The last type of corruption is recognized as Legislative corruption (Lambsdorff, 1999). It refers to corruption at the legislative level. To be specific, corruptors would bribe the legislator to enact legislation in favor of their own interest.

Another difficulty in corruption research is that corruption is hard to measure. The property that corruption behavior is usually covered with secrecy hinders both the identification of corruption and studies based on corruption facts. Goel and Nelson (1998) used the number of public officials convicted for abuse of public office as an indicator of the corruption level. This measurement is far from perfect since one region discovered with more corrupted cases or officials is probably a region with a more effective judiciary system instead of a higher corruption level. If the local judiciary system is weak or even corrupted, then the number of convicted officials may not necessarily have a correlation with the actual corruption level. This significantly undermines the validity of using convicted officials as an indicator of the actual level of corruption and casts a shadow on all experimental-based measures of corruption level.

The alternative method to measure corruption is the perceived level of corruption. Instead

of investigating corruption behaviors, the perceived level of corruption relies on subjective surveys and the opinions of experts to evaluate the corruption level in one country. Furthermore, although adopted quite early in corruption research, this method is backed by later research. Benjamin (2009) conducted an experiment in Indonesia. He found that villagers not only have a broadly speaking correct perception of the actual level of corruption indicated by the missing expenditure, but also are sophisticated enough to tell the difference between general corruption at the local level and specific corruption in one given road project. This is proof that survey data on corruption issues can reveal factual information about corruption levels to a certain degree. Theoretically, this also makes sense as the definition of corruption specifies that the political power is abused for personal gain sacrificing the public interest, so the perceived corruption should generally be matched with the actual corruption level. For the above reasons, perceived corruption has been used to proxy actual corruption. In this thesis, I will also adopt perceived corruption as the proxy for the actual corruption level.

Among all the corruption indices, the most commonly used one is the Corruption Perception Index (CPI) compiled by Transparency International (TI). This is a composite index including many other sources. Other data sources include the World Bank, the University of Basel (WB/UB), and the World Economic Forum (WEF). Most of these indices are highly correlated as some share the same sources. However, the difference in compilation makes them useful in robustness tests. Houqe and Monem (2016) used the Control of Corruption Index (CCI) compiled by the World Bank and used CPI as one of their methods of robustness test.

Of course, the CPI is not perfect either. According to Treisman (2007), there is a certain degree of difference in perceived corruption level and the experience-based corruption convictions where experience-based measures use the number of corruption behavior experienced by the interviewee instead of corruption perception. This is a warning sign that the experts who took the surveys that are used to compile the indexes might be limited to their perception and suffer from the detachment between perception and facts. Also, it is possible that these experts can have political or sociological biases. This subjectivity is one of the unsolved issues in perception data.

Nevertheless, this is broadly offset by the fact that almost all the perceived corruption data have a strong correlation with each other. Take the Control of Corruption Index and the Corruption Perception Index as an example. The correlation between CPI and CCI is 0.98. Furthermore, the pure perception of corruption, even if it has a certain degree of distance from the corruption facts, is worthy of research as just perception itself can have a significant impact. Mauro (1995) found that perceived corruption reduced growth via its effect on investment. Other studies have confirmed that higher perceived corruption reduces foreign direct investment. Soares (2004) found that high perceived corruption discourages victims from reporting crimes to the police. Most of the cross-country corruption analyses are based on perceived corruption data.

A critical question concerning panel analysis using compiled indexes is the year-to-year comparison issue. Despite the fact that the CPI index is compiled utilizing different data sources each year, it is reported from 0 to 10 for each year, while 10 means the lowest corruption perception level and 0 means the highest. The compilation of the index also made

efforts to maintain the relative ranking of the countries despite the difference in sources of data and the number of observations. Since the index is compiled with roughly 15 sources, these sources might use different scales of measurement. The first thing that comes to the compilation is standardizing the data from various sources. Through comparison of CPI last year and the rank in new sources, they used a matching percentile method. In the process of including new sources, the cardinal information is not processed, and only the ordinal information provided by a source is included in the index. This may cause an issue of tapering off effect, where the effect of the effort to promote a clean government will taper off for those countries that already have a sound reputation for being less corrupt as they are already close to the upper bound of 10. However, when the horizon of the research is long, then the short-term fluctuation is overwhelmed by long-term trends. In general, the benefit of more information in the panel data outweighs the cost of variation caused by year-to-year compilation.

The impact of corruption becomes the next question. Historically, there have been two general attitudes towards corruption. One regards corruption as a lubricant that will "grease the wheel". This view is backed by the fact that corruption does give the investor the possibility to accelerate or even bypass some bureaucratic procedure, and this can be beneficial to the investment. Méon and Weill (2008) argued that corruption might actually be advantageous in some circumstances. Corruption may produce efficient outcomes where excessive government regulation is detrimental to growth-enhancing activity. Thus bribing officials to cut through red tape may act as a form of deregulation enabling people to operate more efficiently. This so-called "speed money" helps to encourage underpaid and

unmotivated government officials to perform their job properly (Hobbs 2005).

However, the other attitude is that corruption will "sand the wheel" as corruption will lower the security of property rights, and the misallocation of resources can be a severe problem for economic development. Furthermore, corruption is considered detrimental to the economy not only for the policies that interfere with the optimal resource distribution but also because it undermines the environment where a good policy might work.

The debate on these two attitudes reached a turning point as empirical research was conducted by Kaufman (1997). Using data from WEF and WB/UB, his work showed that corruption is positively associated with two subjective indicators. The first indicator measures the degree to which "government regulations impose a heavy burden on business competitiveness", and the second indicator measures the degree to which the "government regulations are vague and lax." Kaufman (1997) also reached a very clear conclusion: corruption is not effective even for countries with a high level of "red tape" based on a case study of Ukraine. Nowadays, the prevailing view is that corruption is a pure impediment to economic development, and that is the reason why so many anti-corruption mechanisms are developed, and anti-corruption policies are given high priority in many countries.

The influence of corruption is shown in many aspects. Some of them are verified by previous research, and the potential mechanisms behind the impact are shown in the following paragraphs.

As mentioned before, corruption has a positive relationship with poverty. There are two possible channels for this. One is that petty corruption will have a disproportionate impact on poor people. The other is that corruption at the policymaker level will make the resource

allocation policy more beneficial to some particular income group, thus worsening the income inequality. Mogens and Christian (2014) showed that poor people are more vulnerable to corruption with micro-level data, which holds in all 18 countries covered in their research. However, reverse causality is discovered as well. Erich and Martin (2008) showed that the country gets more corrupted once it is poorer with the help of instrumental variables.

Corruption can also interfere with foreign trade and foreign investment. The starter empirical research of corruption is usually based on reports of independent organizations aiming at investigating the business environment in a country or a region. Previous studies by Mauro (1995) showed that corruption reduces foreign direct investment and, through this channel, negatively impacts economic growth. When making a transnational investment decision, it is common to take corruption costs into consideration. If the corruption level in a country is very high, not only does the corporation have to waste time and money dealing with corruption, but also has to worry about the political risk. All these factors are becoming barriers for corrupted countries to get foreign trade and foreign investment.

A prevailing theory is that corruption will reduce economic growth based on such research. However, it is not in an average way for different fields. Empirical research showed that the education and public health sector suffer the most from the damage done by corruption. And this is certainly not surprising. Since corruption in the upper level will decide the rule of allocating the limited resource in a country or community, those who pay for the bribery get more in this reallocation. As a result, aspects concerning social benefit take greater hits in corruption behaviors.

However, the correlation could be interpreted in the other way that it is good education that leads to less corruption. Edward and Raven (2005) showed that more educated states have less corruption, even after using Congregationalism in 1890 as an instrument for education. This result supports the view that the correlation between development and good political outcomes occurs because education improves political institutions. They discovered that the share of church members in the state that are Congregationalists is positively correlated with the educational level of the state as the Congregationalists are generally associated with elites and their commitment to education. Using this share of Congregationalists as IV, their conclusion showed that education could be beneficial to corruption control.

Corruption also increases and distorts public investment and decreases public expenditures for the operation and maintenance of investments (Mauro, 1995). Further, corruption reduces revenue generated through taxation (Aghion et al., 2016), contributing to the inability of some governments to function properly. Finally, corruption has been credited with eroding trust in the political system and reducing interpersonal trust in society (Seligson, 2006).

However, we must recognize that all these factors are not dependent on the corruption level. Instead, they can influence the corruption level as well as be influenced by the corruption level. Take income inequality as an example. Corrupted policies will undoubtedly have an impact on income distribution. Nevertheless, income inequality also has a say on corruption in the sense that income inequality is involved in the shaping of the social environment. Moreover, by shaping the social environment, this level of inequality

will further decide the society's acceptance of corruption.

There are many important factors that influence corruption. The political will to fight corruption, power and diligence of the legal system, and governance can affect the corruption level. Most of these influence factors are exposed to the endogeneity issue in the same way as income inequality. This endogeneity issue is confirmed in the Dynamic General Equilibrium model created by Blackburn (2006), indicating that economic development can affect corruption and vice versa. The model presented a negative relationship between economic growth and corruption level.

There has been plenty of research on the mechanism of corruption. Many models are very detailed and have already included many factors that explain the corruption level. By understanding the determinants of corruption, society can better understand how to combat and deter corruption. Recent research has provided evidence that many factors correlate with the level of corruption, including the level of Protestantism, a history of British rule, level of economic development, level of imports, use of a federal system of government (Treisman, 2000), accessibility of information (DiRienzo et al., 2007), inequality of income distribution and government size, Hofstede's cultural values (Husted, 1999; Davis and Ruhe, 2003; DiRienzo et al., 2007), economic freedom (Goel and Nelson, 2005), and competition (Ades and Di Tella, 1999). These studies do provide a set of variables that are worthy of further research.

However, the causal impact of most of these factors has not been studied with rigorous empirical methods. Some studies have indeed used instrumental variables (IV), but the instruments' exogeneity and/or excludability have often been open to criticism. Treisman

(2007) listed some previous studies that include the usage of IV and commented on the endogeneity issue. A more recent study has better choices on IV that suffer less exogeneity. Chandan (2014) showed that Facebook penetration helps deal with corruption. The IV they used is the Historical Adoption of Technology Index. However, IV concerning accounting quality is still not well developed.

Besides empirical research, theoretical models that explain how corruption happens are developed in the meantime when empirical research thrives. One of the prevailing models considers corruption a crime defined as crimes by public officials for personal gain (Rose-Ackerman, 1975). The theoretical models that are developed for crime should apply to corruption as well (Becker, 1968). In that case, the choice of corruption is based on a cost-benefit analysis, and country or regional factors can influence the cost or/and benefit of corruption behavior and thus influence the corruption level. Taking accounting quality as an example, a well-developed accounting and auditing system can help detect corruption behavior and thus increase the cost of corruption. Now that one is more likely to be caught, the willingness to corruption is reduced. A similar mechanism of jurisdiction deterrence can affect corruption and has been confirmed by various studies (Treisman, 2000; Edward and Raven, 2005).

The United Nations Office on Drugs and Crime also has a summary of the main theoretical models that explain corruption. The summary mentioned four theories, namely Principal-agent theory, Collective action theory, Institutional theory and Game theory. Though no single theory can explain the complexity of the corruption phenomenon, each theory contributes to our previous understanding of corruption and future research. In this

thesis, the Principal-agent theory matters the most as each firm suffers from Principal-agent issues that the agents of firms may not act in the way that maximizes the principal's utility and attach more importance to personal gains.

This thesis will investigate the correlation between accounting quality and corruption level. Accounting is widely adopted by most firms regardless of size and is required by law for listed firms in most countries. The purpose of accounting is to disclose relevant information to shareholders and improve the decision-making process by recording economic transactions.

Notwithstanding all its potential benefits for the firm, accounting is subject to the risk of collusion and financial fraud by accountants and auditors because of the greedy nature of human beings, even in firms with a sound internal control system. News on accounting fraud is not scarce. So for the reliability of the accounting information, many firms will hire outside auditing firms to supervise their accounting activities and evaluate their financial report. In many countries, this auditing for financial reports is required by law for listed firms. Moreover, organizations are required to disclose information in ways that create transparent, accurate, and comparable financial information.

However, even with the auditing procedure, the quality of financial reports varies from firm to firm. News that auditing firms are colluding with the firms or insufficient due diligence is not rare. One of the famous examples of financial fraud is the fall of Enron. So, it is a reasonable assumption that accounting quality is a non-stationary variable for different firms in different countries.

Accounting's inherent focus on efficiency, control, and disclosure (Everett, Neu, &

Rahaman, 2007) suggests that accounting can be highly useful in fighting corruption and how society perceives corruption. Many factors determine accounting quality. Corporate governance and the accounting standard adopted by the country are all vital determinants for accounting quality.

A central challenge when we add accounting quality into a corruption model is how to measure accounting quality. One way of measuring accounting quality is in terms of perception. The World Economic Forum has a survey for entrepreneurs about perceived accounting quality1. However, this dataset is questionable not only because it is a purely subjective result but also because it is possible that the entrepreneur is not exposed to the real accounting quality in their enterprise. In this thesis, I will use disclosure level as the one of the proxies for accounting quality. This is an index developed by the World Bank, with 0 indicating the least disclosed and 10 the most disclosed. As a guidance or law requirement of what should be included in the financial report, disclosure level measures the amount of information that should be exposed to shareholders and/or the public. Using the perceived level of accounting quality, Malagueño et al. (2010) showed that disclosure level is highly correlated with perceived accounting quality.

Despite the scarcity of previous research that linked accounting with corruption, some papers have used empirical data and arrived at plausible results. Kimbro (2002) explored the role of accounting and financial statement quality for corruption while including the cultural, economic and monitoring institutions. The study used an intriguing variable as the proxy for accounting quality: accountant per capita. This was also used as one of the Instrumental

[1] I can't find this dataset in WEF website at https://www.weforum.org/. The data is used by several cross-section studies but is not suitable for panel research.

variables in later research. Their result, even though not considering the endogeneity issue, showed that accounting quality is negatively correlated with corruption level.

Similarly, using the perceived accounting quality from the World Economic Forum, Malagueño et al. (2010) also showed that accounting quality is inversely correlated with corruption. On the firm level, Wu (2005a) found that the percentage of sales not reported in the companies' books is positively associated with both the incidence of bribery and the amounts of bribe payments. These all point out the connection between corruption, no matter perceived corruption or actual bribery, and the accounting quality.

Another proxy used in this thesis is the adoption of International Financial Report Standards (IFRS in the rest of this thesis). IFRS are a set of accounting rules for the financial statements of public companies that are intended to make them consistent, transparent, and easily comparable around the world. The IFRS are issued by the International Accounting Standards Board (IASB in the rest of this thesis).

The IFRS system is sometimes confused with International Accounting Standards (IAS), which are the older standards that IFRS replaced in 2001. Also, for small and medium Enterprises, IASB developed a tailored version of IFRS, which is known as IFRS for SME standards. The IFRS for SMEs Standard reflects several simplifications from complete IFRS Standards. Some topics in IFRS are not covered in SME standards as they are typically irrelevant to small and medium enterprises, and the language is more plain and understandable in the SME standards.

IFRS provides guidance on one question: what does a good financial report look like? It is an updated version of IAS while IAS is still functioning. IASB, the Board of IAS, decided to

keep the old IAS and rename the new standard IFRS. There are 15 IFRS so far; many are just simple modifications based on IAS.

Previous studies by Barth (2008) showed that applying International Accounting Standards (IAS) is associated with higher accounting quality. Firms applying IAS generally evidence an improvement in accounting quality between the pre-and post-adoption periods. Although it cannot be sure that this effect is attributable to the change in the financial reporting system rather than to changes in firms' incentives and the economic environment, the author put effort into mitigating the effects of these two factors. With the effect of IAS adoption detected by Barth (2008), it is reasonable to assume that adopting IFRS can improve the general accounting quality in the similar manner. Thus in this thesis, IFRS adoption is considered as the second proxy for accounting quality.

Previous research on the identification of IFRS adoption mainly focused on the openness of the candidate country, where openness is defined as the ratio of the sum of imports and exports to GDP. Theoretically, countries with a higher openness index are expected to have more connections with other countries economically. This connectedness may create incentives to adopt a globally accepted accounting system—IFRS. In searching for the identification strategy of IFRS, among all the significant factors, the openness of a country is considered positively related to the probability of adopting IFRS.

However, openness might influence corruption through other channels. Take Customs as an example. According to Shimelis (2005), Customs corruption is severe in many countries. And, by definition, openness is highly correlated with the goods that require Customs services. Mauro (1995) stated that the opportunity window of corruption decides the

corruption level by nature. Thus, in addition to the potential influence on the accounting standard that one country adopts, openness can also lead to more opportunities for Customs to be corrupted. Furthermore, openness by definition means more trade with foreign countries. Moreover, this trade often leads to the interchange of different cultures, and culture is generally considered an essential factor that influences the corruption level of a country. As a result, using openness as the instrumental variable is not perfect and is probably biased. The result can only be interpreted as a strong correlation between the accounting standard and corruption level instead of a causal relationship.

In sum, we expect that the accounting environment in a country can be helpful in detecting corruption by promoting financial disclosure and establishing accountability. To be more specific, adopting IFRS will be helpful for developing countries as they can significantly improve their accounting environment by mandatory adoption of IFRS and enhanced corporate disclosure. This may have a taper off effect on the developed countries, suggesting a potential heterogeneous effect for different countries. In addition to improving financial disclosure, the adoption of IFRS is more than just one single decision. Instead, it requires both the government’s and the private sector's effort, which may become a signal to the whole society that can affect the perceived corruption.

Furthermore, it is worth considering the mechanism of why accounting quality can affect the corruption level, while many papers on the relationship between information disclosure and corruption can be of great help. Generally, higher accounting quality can lead to a better situation with transparent information and reliable disclosure. This leads to less financial fraud and corruption.

To better understand the mechanism behind this influence, some previous research on the development of the anti-corruption method is helpful. McCusker (2006) stated that the implementation of any successful Anti-Corruption strategy requires not only a focal point, but also the coordination of a number of disparate agencies and various approaches. It relies heavily on the engagement of a wide range of participants. The business sector might be the most important one. Since, in many cases, the business sector provides incentives for corrupt acts. Globally, the business sector is the 5th most corrupt sector. In higher-income and lower-income countries, lack of control, supervision, and auditing is the second most important cause of corruption. That can support the point that accounting quality can have a significant impact on the corruption levels.

Chapter 2

Data

The dependent variable is the perceived corruption level. In this thesis, I used two data sources. One is the Corruption Perception Index (CPI) developed by Transparency International (TI), and the other one is the Control of Corruption Index (CCI) developed by Kaufmann et al. (2012) as part of the Worldwide Governance Indicators (WGI) project. Both CPI and CCI combined different data sources from experts' estimation and evaluation of corruption levels. Both have been used for previous empirical research and are highly correlated. CPI ranges from 0 to 100, and the higher CPI stands for better corruption control and less perceived corruption. CCI ranged from -2.5 to 2.5.

The independent variables include adoption time of IFRS, adoption time of IFRS for SMEs, internet usage coverage, GDP growth, and disclosure level. The adoption time of IFRS data and IFRS for SME data come from the IFRS official websites, where all records are kept. Internet usage, which is defined as the percentage of the population with internet access across the country, comes from the World Bank database. GDP growth data also comes from the World Bank database. The disclosure level, which measures how well small shareholders are protected, comes from the World Bank's "Doing Business" reports. Ten stands for the most disclosed, and zero stands for the least disclosed country.

The number of adjacent countries comes from the GeoDataSource website. The website is listed in the references.

The number of ports in a country comes from the World Ports Source (WPS). The website is listed in the references.

Sample size

The initial data on IFRS adoption time includes 159 countries, though 3 of them are dropped during the merging process due to missing data on other variables. In the end, the final sample size of all data is 156 from 2005 to 2020. The data includes both the adoption time of IFRS and IFRS for SMEs. In most cases, the adoption time of IFRS for SMEs is later than the adoption time of IFRS. The definition of major variables and their descriptive statistics are listed below. Table 1 is the table for the definition of major variables, and Table 2 is the table for summary statistics.

Table 1: Variables definition

Variable	Definition
CPI score	The CPI score compiled by the Transparency International, it ranges from 0 to 100 where 100 is the least corrupted and 0 is the most corrupted
Disclosure level	The legal required disclosure level of the firms to stakeholders. It ranges from 0 to 10 and 10 means the most disclosed.
CCI	Control of Corruption Index in the WGI, ranges from -2.5 to 2.5. The higher index means less corruption level.
Internet usage	The share of population that has internet access.
lnGDP	Natural log of GDP
Openness index	The level of openness and trade of the country. It is defined by the ratio of sum of imports and exports to GDP
PVE	Political Stability and Absence of Violence/Terrorism Estimates. It is one of the World Governance Indicators (WGI)
RLE	Rule of Law Estimate. It is one of the World Governance Indicators (WGI)
RQE	Regulatory Quality Estimate. It is one of the World Governance Indicators (WGI)
GEE	Government Effectiveness Estimate. It is one of the World Governance Indicators (WGI)
Number of ports	The number of ports inside the country
Adjacent countries	The number of adjacent countries of a given country

Table 2: Descriptive Statistics

Variables	Mean	Std. Dev.	Min	Max
CPI score	42.39	20.541	8	97
Disclosure level	5.532	2.483	0	10
CCI	-.072	1.025	-1.816	2.47
Internet usage	40.483	31.019	.065	100
Openness	88.02	56.421	.785	442.62
Number of ports	35.135	85.88	0	587
Number of adjacent countries	3.622	2.642	0	16

Number of Observations: 2496

Method

Firstly, I use ordinary linear regressions (OLS) and test whether IFRS adoption time has a significant influence on corruption level when controlling for ln GDP and internet usage level.

The model is as follows:

$$CPI_{it} = \beta_1 \ IFRS\_time_{it} + \alpha \ X_{it} + u_t + \varepsilon_{it,} \quad (1)$$

where $IFRS\_time_{it}$ refers to the length of time since country i has adopted IFRS as their national accounting standards for listed firms at time t. X_{it} are control variables for this baseline model, including internet usage and lnGDP. u_t measures the year fixed effect, ε_{it} is the error term and is assumed to be independent and identically distributed (i.i.d.) with an expectation of zero.

Then also in the framework of OLS, I test the impact of IFRS adoption on corruption level while taking governance indicators into consideration. In this part, I use the Hausman test to test whether use year fixed effects or random effects.

The model is as follows:

$$CPI_{it} = \beta_2 \ IFRS\_time_{it} + \alpha \ X_{it} + u_t + \varepsilon_{it.} \quad (2)$$

X_{it} are control variables for this baseline model, including disclosure level, internet usage, lnGDP and four governance indicators from WGI.

I discuss the heterogeneity with respect to IFRS adoption based on the length of adoption time, the GDP and the corruption level. The results and analysis are shown in Chapter 3.

One major commonly faced challenge in previous research with regard to corruption research is the lack of good instrumental variables. Malagueño (2010) used four instrumental variables for accounting quality. However, the author acknowledges that all four instrumental variables might have endogeneity issues. In this thesis, instead of using the measurement of accounting quality, I use the measurement of IFRS adoption time as an indicator of accounting-related issues. However, clearly the adoption of IFRS is not exogenous.

Previous research on the identification of IFRS adoption mainly focused on the openness of the country, where openness is defined as the ratio of the sum of imports and exports to GDP. Theoretically, countries with a higher openness index are expected to have more economic connections with other countries. This connectedness may create incentives to adopt a globally accepted accounting system—IFRS. In searching for the identification strategy of IFRS, among all the significant factors, the openness of a country is considered positively related to the probability of the adoption of IFRS.

However, openness might influence corruption through other channels. As mentioned by Larraín et al. (2000), openness itself has an impact on corruption. To mitigate this problem, I will adopt the three-stage least square regression method in this thesis. In the first stage, I use the number of adjacent countries, the number of ports and lnGDP to predict the openness level of the country, while in the second stage, I adopt openness as the instrumental variable for the adoption of IFRS. The first two stages are cross-section regressions, while the third stage is a panel regression based on the predicted IFRS adoption time from the first two stages.

To be specific, the first stage is:

$$\text{Openness}_i = \beta_1 \text{Ports}_i + \beta_2 \text{Adjacent}_{i+} \text{lnGDP}_i + u_i; \quad (3)$$

Openness_i is the openness index of country i. Port_i is the number of ports in country i. Adjacent_i is the number of adjacent countries of country i. u_i is the error term and is assumed to be i.i.d. with an expectation of zero.

The second stage is:

$$\text{IFRS\_adoption}_i = \beta_3 \text{ openness}_i + \varepsilon_i; \quad (4)$$

$IFRS\_adoption_i$ is the year when IFRS is adopted in country i.

ε_i is the error term and is assumed to be i.i.d. with an expectation of zero.

And the third stage is:

$$CPI_{it} = \beta_4 \, IFRS\_time_{it} + \alpha \, X_{it} + u_t + \varepsilon_{it}, \quad (5)$$

$IFRS\_time_{it}$ is the time since country i adopted IFRS at time t. X_{it} refers to the control variables of country i in time t. Many of the WGI data are included, namely Voice and Accountability Index, Political Stability and Absence of Violence/Terrorism index, Government Effectiveness index, Regulatory Quality index and Rule of Law index. The third stage of the regression is a panel regression, while the first two stages are cross-sectional regression. ε_i is the error term and is assumed to be i.i.d. with an expectation of zero.

Chapter 3

Results

Firstly, I conducted a Hausman test to test whether or not to use year fixed effects, and the result of the Hausman test rejected the null hypothesis that we should use random effects. The result is robust at a 1% level of confidence.

For the following regressions, year fixed effects will always be included. The details of the fixed effect and random effect regression are shown in Table 3.

Table 3: RE and FE results

VARIABLES	(Fixed Effect) CPI score	(Random effect) CPI score
IFRS adoption time	0.473***	0.255***
	(0.0632)	(0.0629)
IFRS for SME adoption	0.192	-0.558
	(0.703)	(0.722)
lnGDP	4.819***	7.071***
	(0.365)	(0.330)
Internet usage	0.337***	0.203***
	(0.0197)	(0.0174)
Constant	-13.98***	-27.00***
	(2.469)	(2.326)
Observations	2,219	2,219
R-squared	0.686	
Number of years	16	16

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

After testing for fixed effects, I run an OLS regression using the baseline model together with a series of OLS regressions with various controls and year fixed effects. The results are shown in Table 4.

Table 4: OLS results with various controls

VARIABLES	(1) CPI score	(2) CPI score	(3) CPI score	(4) CPI score	(5) CPI score
IFRS adoption time	0.473***	-0.281***	-0.297***	0.447***	-0.343***
	(0.0632)	(0.0335)	(0.0346)	(0.0651)	(0.0366)
IFRS for SME adoption	0.192	0.0878	0.152	0.252	0.560
	(0.703)	(0.357)	(0.366)	(0.717)	(0.381)
Disclosure level index			0.0107	0.448***	-0.00875
			(0.0575)	(0.107)	(0.0575)
lnGDP	4.819***	0.232	0.185	4.738***	0.239
	(0.365)	(0.195)	(0.201)	(0.373)	(0.200)
Internet usage	0.337***	0.00415	0.00533	0.329***	0.00665
	(0.0197)	(0.0110)	(0.0114)	(0.0204)	(0.0113)
PVE		1.068***	1.115***		1.126***
		(0.213)	(0.220)		(0.219)
GEE		5.424***	5.596***		6.070***
		(0.520)	(0.533)		(0.546)
RQE		-2.237***	-2.352***		-2.220***
		(0.406)	(0.429)		(0.429)
RLE		16.13***	16.08***		15.38***
		(0.518)	(0.529)		(0.559)
Fixed effect					Regional
Constant	-13.98***	42.58***	42.90***	-15.06***	41.39***
	(2.469)	(1.469)	(1.555)	(2.578)	(1.601)
Observations	2,219	2,219	2,148	2,148	2,148
R-squared	0.686	0.921	0.921	0.688	0.922
Number of years	16	16	15	15	15

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The first column is the result without controlling for governance indicators and disclosure level. The result showed that the adoption of IFRS indeed has a significantly positive effect on the corruption level, while the impact of IFRS for SME adoption is only insignificant on a 1% level.

This result is robust even after controlling for disclosure level as shown in column 4. The

IFRS adoption has a slightly lower positive impact on corruption level and the impact is still significant at a 1% level, while the impact of IFRS for SME adoption is still statistically insignificant. The interpretation of the result is that even given the same level of firm-level disclosure, a country that adopted IFRS for one more year will experience roughly 0.45 more points in the CPI. Given that the average adoption year is roughly located in 2012, the roughly average adoption time is 8 years in this research. Moreover, this means the average benefit of adopting IFRS with regard to corruption level is a 3.6 increase in CPI, even with the same firm-level disclosure level. Also, I noted that after adding the disclosure level as a control, the R-squared of the regression increased from 0.686 to 0.688, suggesting that this could lead to a slight increase in the explaining power of the regression.

However, the result changed after controlling for governance indicators, namely Political Stability and Absence of Violence/Terrorism Estimate (PVE), Government Effectiveness Estimate (GEE), Regulatory Quality Estimate (RQE) and Rule of Law Estimate (RLE). The constant of the OLS regression has a considerable increase, and the coefficient for IFRS adoption became negative. The negative impact is statistically significant at a 5% level and is robust even when controlled for disclosure level and regional fixed effect.

This result is not consistent with the theory that the adoption of IFRS would increase the accounting quality of a given country and thus improve the corruption level. Besides the inconsistent sign of the coefficient for IFRS adoption time, when controlling for governance indicators, the coefficient for lnGDP and disclosure level also became insignificant even at the 10% level, suggesting that a country's development level and disclosure level do not have any significant impact on corruption level. This is clearly in contrast with Mauro (1995)'s

research on how the development of one country can affect the corruption level.

In general, I think the regressions with control on the governance index do not reflect the real impact of IFRS adoption for the following reasons:

Firstly, as mentioned in the literature review, the compilation of CPI used many sources, and some of the expert opinions might be influenced by these governance indicators. In fact, one of the governance indices from WGI is the Control of Corruption Index.

Secondly, the regression with governance indicators faces substantial endogeneity issues. Intuitively, one country's governance indicators level and corruption level can be shaped by culture and history and controlling for governance indicators might not be revealing the actual treatment effect of IFRS adoption time.

For these reasons, I dig into the identification of IFRS and perform three-stage linear regressions. The design of the three-stage regression has been shown in the Method part, and the results for the three-stage regression are shown in Table 5 as follows:

Table 5: Three-stage least square regressions

VARIABLES	(1) Open index	(2) IFRS adoption time	(3) CPI score	(4) CPI score	(5) CPI score
IFRS time predicted			0.223**	0.294***	15.31***
			(0.108)	(0.108)	(3.982)
IFRS for SME adoption			-0.903**	-2.057***	0.586*
			(0.352)	(0.364)	(0.343)
lnGDP	17.47***		0.0139	0.365*	-11.94***
	(0.725)		(0.211)	(0.218)	(3.736)
Internet usage			0.00300	0.0370***	0.0164
			(0.0112)	(0.0117)	(0.0102)
PVE			0.841***	0.517**	-0.140
			(0.221)	(0.234)	(0.291)
GEE			5.866***	6.622***	6.402***
			(0.528)	(0.539)	(0.621)
RQE			-2.682***	-2.828***	1.171*
			(0.411)	(0.421)	(0.598)
RLE			15.70***	15.11***	4.197***
			(0.524)	(0.562)	(0.754)
Adjacent countries	-3.698***				
	(0.374)				
Number of ports	-0.245***				
	(0.0124)				
Open index prediction		0.0523***			
		(0.00309)			
Fixed effect			null	region	country
Constant	-39.16***	-0.462	42.59***	39.01***	74.92***
	(6.499)	(0.541)	(1.502)	(1.744)	(14.67)
Observations	2,436	2,474	2,219	2,219	2,219
R-squared	0.277		0.919	0.924	0.974
Number of years		16	16	16	16

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The result showed that with a three-stage least square regression, the impact of IFRS adoption on corruption level is statistically significant even after controlling for disclosure level, which is consistent with the notion that the adoption of IFRS and IFRS for SMEs will

improve the accounting quality and further reduce the corruption level. All results are robust in terms of the F-test at a 1% confidence level. Furthermore, the coefficient for the adoption of IFRS for SMEs is statistically significant and is negative, indicating that the adoption of IFRS for SMEs is increasing a country's corruption level.

This is not surprising because the IFRS for SMEs is a much more simplified version of IFRS specifically designed for small and medium enterprises. As it is simplified for easier applications, the standard has less regulatory power against corruption. Thus the adoption of IFRS for SMEs might increase the opportunity window for small and medium firms to conduct "petty corruption" and thus increase the perceived corruption level.

Furthermore, the fit, as measured by the regression R-squared, will improve by adding fixed effects, either at the regional or country level. This will increase the explanatory power of the regression. And after considering the country fixed effects, the R-square reached 0.974, suggesting that only a tiny portion of the variance is not explained by the regression. Moreover, even before adding any fixed effects, the R-square already reached 0.919 after controlling for WGI governance indicators. This can be considered proof of the robustness of the regression.

One thing that is worth noticing is that cultural factors are not included in this regression. This happens due to the limitation of data. One commonly used data on cultural factors is Hofstede with his 6 dimensions. However, these dimensions are time-invariant and thus are not suitable for panel analysis. Other potential survey data include World Value Survey and General Preference Survey. These two data sources indeed have many time-variant variables, but the frequency of the data is far too low such that it is not applicable in panel data analysis.

Both of the surveys are not conducted on yearly bases. Instead, they use survey data that are described in waves. And generally, the time between each wave varies from 5 to 10 years. In my research, the sample included 15 years of data, which means I can only take advantage of 2 or 3 waves of data. This is far from enough to elaborate on the changes in cultural factors.

To address this issue, I tried using country fixed effects as a control for cultural factors. The result showed that IFRS adoption time is still having a positive impact on corruption level, and this impact is statistically significant at a 1% level. However, the scales of almost all the coefficients are changed in a substantial way, suggesting that the country fixed effects are the dominant factor in corruption level. In columns 3 and 4, the coefficient for the yearly IFRS adoption effect changed from 0.294 to 15.31. Though both coefficients are statistically significant, clearly the structure of the regression changed in a huge way. Furthermore, the coefficient for lnGDP became negative, indicating that more prosperous and more developed countries suffer more from corruption, giving all else equal. This contradicts Mauro (1995)'s theory. Combining these two concerning facts, I think the control of country fixed effects actually absorbs too much of the variation in corruption level and might even reduce the precision of the regression. The impact of cultural factors on corruption is thus not included in the control variables due to the limitation of data.

Then, I dug into the heterogeneity effect of IFRS adoption time. Firstly, I studied how different lengths of time of IFRS adoption can have heterogeneous effects on the corruption level. For simplicity, I categorized IFRS adoption time into Early, Late, Medium and Never, where Early stands for countries that adopt IFRS in the Early stage and have an IFRS adoption time longer than or equal to 15 years, Late stands for countries that adopt IFRS in

Late-stage and have an IFRS adoption time shorter than or equal to 5 years. The Middle stands for countries that adopt IFRS in the Medium stage and have an IFRS adoption time shorter than 15 years and larger than 5 years. Lastly, there are countries in the sample that never adopted IFRS, and these countries are marked as Never. Using the Never group as the control group, the result for the heterogeneity effect is shown in Table 6 as follows:

Table 6: OLS Results for heterogeneity of IFRS adoption time

VARIABLES	(1) CPI score	(2) CPI score	(3) CPI score
Early	6.308***	4.537***	-3.919***
	(1.380)	(1.504)	(0.767)
Late	0.754	0.724	-0.235
	(0.682)	(0.691)	(0.349)
Middle	3.729***	3.883***	-2.736***
	(0.924)	(0.939)	(0.482)
SME	1.398**	1.379*	-0.577
	(0.701)	(0.714)	(0.365)
Disclosure level index		0.444***	0.0135
		(0.108)	(0.0579)
lnGDP	4.950***	4.879***	0.189
	(0.367)	(0.375)	(0.202)
Internet usage	0.351***	0.342***	2.60e-05
	(0.0198)	(0.0205)	(0.0114)
PVE			1.005***
			(0.221)
GEE			5.798***
			(0.535)
RQE			-2.596***
			(0.429)
RLE			15.93***
			(0.532)
Constant	-14.84***	-15.95***	42.51***
	(2.481)	(2.589)	(1.563)
Observations	2,219	2,148	2,148
R-squared	0.682	0.685	0.920
Number of years	16	15	15

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The result showed very clearly that heterogeneity does exist, and those countries that adopt IFRS early will have a significant improvement in corruption level, while those that adopted IFRS late did not show a statistically significant impact on corruption level. This could be due to the gap between the implementation of IFRS and the change in perceived corruption level. Even when the IFRS is adopted and the accounting quality is improved, it still takes time for the impact of the adoption to be realized. This is one of the limitations of perceived corruption measurement.

Then I studied how the impact of one more year of IFRS adoption affects corruption level within these time length groups. The results for this heterogeneity effect with and without control of governance indicators from WGI are shown in Table 7 and Table 8 as follows.

Table 7: OLS results for heterogeneous effect without WGI

VARIABLES	(Late) CPI score	(Medium) CPI score	(Early) CPI score
IFRS adoption time	-1.615**	0.243	0.856*
	(0.729)	(0.607)	(0.459)
IFRS for SME adoption	-5.392	0.0993	2.858**
	(3.316)	(1.957)	(1.404)
Disclosure level	-0.717	-0.232	0.923***
	(0.589)	(0.371)	(0.259)
lnGDP	12.39***	12.36***	4.838***
	(2.422)	(1.389)	(0.992)
Internet usage	-0.148	-0.0241	0.335***
	(0.137)	(0.0754)	(0.0483)
Constant	-18.32	-61.40***	-19.86***
	(22.71)	(11.91)	(7.206)
Observations	77	229	423
R-squared	0.685	0.647	0.597
Number of years	9	14	15

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8: OLS results for heterogeneous effect with WGI

VARIABLES	(Late) CPI score	(Medium) CPI score	(Early) CPI score
IFRS adoption time	-1.207***	-0.440	0.188
	(0.349)	(0.293)	(0.224)
IFRS for SME adoption	-3.450**	0.401	1.759**
	(1.576)	(0.969)	(0.689)
Disclosure level	-0.0102	-0.0859	0.0163
	(0.283)	(0.184)	(0.138)
lnGDP	-0.467	0.325	-0.743
	(1.539)	(0.844)	(0.511)
Internet usage	0.00762	-0.0434	0.0361
	(0.0630)	(0.0396)	(0.0250)
PVE	0.901	1.410	0.389
	(1.196)	(0.955)	(0.585)
GEE	9.244***	2.721	10.56***
	(3.428)	(2.158)	(1.263)
RQE	-4.260	1.790	-3.341***
	(3.311)	(1.559)	(0.981)
RLE	15.46***	16.79***	14.32***
	(2.658)	(1.696)	(1.251)
Constant	66.85***	46.45***	46.70***
	(13.78)	(7.171)	(4.042)
Observations	77	229	423
R-squared	0.941	0.923	0.907
Number of years	9	14	15

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Both the results showed that the yearly IFRS adoption effect is more significant for the early groups, indicating that it takes time for IFRS adoption to release its benefit with regard to corruption control. This is consistent with the result using the dummy for different adoption times.

After considering the heterogeneity in IFRS adoption time, I dug further into the heterogeneity of the countries' GDP level. Based on the tapering off effect in the measurement of CPI, there should be a difference between more developed countries and

developing countries. Similar to what we performed in the heterogeneity of IFRS adoption time, we first generate dummies for lnGDP in different quantiles. Those countries with lnGDP in the first quantile ranging from 5.02 to 7.28 are marked as First, the countries with lnGDP in the second quantile ranging from 7.28 to 8.53 are marked as Second. The third and fourth quantiles are marked in the same way, with the third ranging from 8.53 to 9.70 and the fourth ranging from 9.70 to 11.69.

In the OLS regression with these dummies, the result is shown as follows:

Table 9: OLS results for regressions with lnGDP group dummies

VARIABLES	(1) CPI score	(2) CPI score	(3) CPI score
First	6.109***	5.932***	5.541***
	(2.182)	(2.216)	(1.223)
Second	-4.194***	-3.862**	1.578*
	(1.513)	(1.543)	(0.859)
Third	-10.48***	-10.45***	-1.848***
	(1.009)	(1.026)	(0.588)
SME	3.829***	3.874***	-0.0872
	(0.603)	(0.615)	(0.347)
lnGDP	7.757***	7.648***	2.002***
	(0.591)	(0.603)	(0.344)
Disclosure level		0.482***	0.101*
		(0.0971)	(0.0569)
Internet usage	0.291***	0.283***	0.00552
	(0.0179)	(0.0185)	(0.0112)
PVE			1.396***
			(0.219)
GEE			6.527***
			(0.528)
RQE			-2.386***
			(0.421)
RLE			13.31***
			(0.559)
Constant	-33.93***	-35.25***	24.31***
	(5.805)	(5.951)	(3.422)
Observations	2,219	2,148	2,148
R-squared	0.748	0.749	0.924
Number of years	16	16	16

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The result is consistent with the tapering off effect, and all of the First, Second and Third quantiles are having a negative effect on the corruption level. To be specific, this tapering off effect comes from two sources. One is that in the compilation of both CPI and CCI, In order to take advantage of various data sources with different scales of measurement, the data from each source is firstly standardized. Then only the ordinal information is taken, namely the

ranking from the data source. In this process, the numerical information is not fully represented in the final compiled result of CPI, and the countries in the upper rank actually are subject to this tapering off effect. The other source of the tapering off effect lies in the fact that the more developed countries typically have more robust institutions, and this has a positive correlation with a higher level of corruption control. With these institutions already in place, the marginal benefits of adopting an international accounting standards system and the control of corruption on the firm level will be lower than in developing countries.

Then I studied the specific yearly IFRS adoption effect on corruption level for each given group. The result is shown in the following tables. The first is the heterogeneous effect on GDP without controlling for WGI governance indicators, while the second one added the controls on WGI governance indicators.

Table 10: lnGDP OLS results without WGI

VARIABLES	(First) CPI score	(Second) CPI score	(Third) CPI score	(Fourth) CPI score
IFRS adoption time	-0.224*	0.460***	0.755***	0.232**
	(0.136)	(0.118)	(0.133)	(0.0957)
IFRS for SME adoption	8.374***	-3.019**	6.070***	-0.142
	(1.267)	(1.267)	(1.251)	(1.349)
Disclosure level	0.644***	0.326**	0.419**	0.721***
	(0.167)	(0.158)	(0.192)	(0.180)
lnGDP	1.386*	3.380***	7.627***	12.54***
	(0.793)	(1.180)	(1.637)	(1.097)
Internet usage	0.139**	0.0757**	0.218***	0.573***
	(0.0667)	(0.0300)	(0.0369)	(0.0341)
Constant	12.77**	1.415	-46.01***	-111.6***
	(5.102)	(9.054)	(14.32)	(10.49)
Observations	527	504	545	572
R-squared	0.143	0.113	0.303	0.638
Number of years	15	15	15	15

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We can see that the First quantile shows a negative effect on the yearly IFRS adoption effect, which contradicts the previous result that less developed countries with lower GDP should have a more significant increase in the perceived corruption index. To address this issue, I added regional fixed effect and WGI governance indicators as control. The region is categorized according to the CPI database, in which they divided the sample into six regions, namely Sub-Saharan Africa (SSA), Western Europe/ European Union (WE/EU), Middle East/North Africa (MENA), Asia-Pacific (AP), Africa and Middle East (AME) and Europe & Central Asia (ECA). The result is shown as follows:

Table 11: lnGDP OLS results with WGI

VARIABLES	(First) CPI score	(Second) CPI score	(Third) CPI score	(Fourth) CPI score
IFRS adoption time	0.442***	-0.181***	-0.0836	-0.232***
	(0.0851)	(0.0691)	(0.0694)	(0.0718)
IFRS for SME adoption	2.348***	-0.364	-0.726	1.796**
	(0.813)	(0.725)	(0.621)	(0.852)
Disclosure level	0.0684	-0.446***	0.122	0.505***
	(0.111)	(0.0969)	(0.102)	(0.112)
lnGDP	0.200	2.034***	0.657	2.604***
	(0.513)	(0.671)	(0.755)	(0.698)
Internet usage	0.0735*	-0.0439**	-0.0470**	0.104***
	(0.0415)	(0.0173)	(0.0188)	(0.0245)
PVE	0.966***	0.879**	1.571***	4.619***
	(0.293)	(0.344)	(0.455)	(0.536)
GEE	5.157***	5.637***	2.995***	9.837***
	(0.829)	(0.948)	(0.908)	(1.221)
RQE	-1.976***	0.536	-3.597***	-2.174*
	(0.689)	(0.625)	(0.726)	(1.237)
RLE	8.879***	11.40***	18.39***	10.42***
	(0.888)	(0.971)	(1.046)	(1.429)
Constant	32.72***	27.67***	40.25***	6.245
	(3.679)	(5.238)	(6.731)	(6.859)
Observations	527	504	545	572
R-squared	0.688	0.728	0.860	0.889
Number of years	15	15	15	15

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Except for the first column, where countries with less GDP have a significantly positive yearly IFRS adoption effect on corruption level, all other three quantiles have a negative yearly IFRS adoption effect. This result is indeed consistent with the theory that countries that are more developed have better institutions and are thus benefited less from IFRS adoption. However, for the other three quantiles, the reason why these coefficients are negative could be due to the overcontrol of WGI governance indicators.

To address this over-control issue, I used three-stage least square regressions as before.

The result is shown as follows:

Table 12: lnGDP three-stage least square regressions

VARIABLES	(First) CPI score	(Second) CPI score	(Third) CPI score	(Fourth) CPI score
IFRS adoption time prediction	1.624***	0.109	-0.00759	0.301**
	(0.492)	(0.363)	(0.246)	(0.135)
IFRS for SME adoption	-0.259	-1.456**	-1.008*	0.738
	(0.632)	(0.605)	(0.579)	(0.885)
Disclosure level	0.142	-0.403***	0.114	0.490***
	(0.111)	(0.105)	(0.104)	(0.113)
lnGDP	-1.039	1.770**	0.573	3.196***
	(0.639)	(0.746)	(0.756)	(0.682)
Internet usage	0.0498	-0.0453***	-0.0480**	0.107***
	(0.0433)	(0.0175)	(0.0188)	(0.0246)
PVE	0.704**	0.878**	1.443***	3.886***
	(0.314)	(0.351)	(0.448)	(0.570)
GEE	5.045***	5.831***	2.917***	10.50***
	(0.858)	(0.990)	(0.928)	(1.208)
RQE	-2.030***	0.296	-3.638***	-3.266***
	(0.700)	(0.630)	(0.733)	(1.226)
RLE	9.266***	10.97***	18.47***	10.62***
	(0.897)	(0.989)	(1.053)	(1.457)
Constant	36.01***	28.75***	41.05***	-0.889
	(3.920)	(5.348)	(6.739)	(6.749)
Observations	527	504	545	572
R-squared	0.678	0.724	0.860	0.887
Number of years	15	15	15	15

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

We can see that with three-stage OLS regressions, even with the WGI governance indicator added as control variables and with regional fixed effect included, the yearly IFRS adoption for the First quantile is still positive and significant at a 1% confidence level. Moreover, the Second and Third quantiles have statistically insignificant yearly IFRS adoption effects. This is consistent with the tapering off theory that the upper quantile might

have less improvement in corruption level due to the adoption of IFRS. However, the indecisive sign of the yearly adoption effect is not exactly what I expected. For the Fourth quantile, the yearly IFRS adoption effect is significantly positive at a 5% confidence level. And the yearly adoption effect of the Fourth quantile is only roughly one-fourth of the yearly adoption effect of the First quantile, indicating a considerable tapering off effect.

One concerning fact is that the coefficients for some control variables changed signs. In table 12, the coefficient of lnGDP turned insignificantly negative for the First quantile countries. The coefficients of disclosure level and internet usage turned negative for the Second quantile countries. The coefficients of internet usage also turn negative for the Third quantile countries. In my opinion, this is due to the sampling error. With the decreasing number of observations in each quantile compared to the whole sample with 156 countries, the sampling error can be substantial in this case. Especially all the coefficients of internet usage and disclosure level are not large in scale even in regressions where they are positive as expected. This turn in signs probably is caused by the shrinking sample size.

The aggregate GDP does not only concern the development level of one country but also concerns the size of a nation. To look specifically into the heterogeneous effect of one country's development level, I use the Human Development Index (HDI) as a further indicator of the given country's development level.

The HDI is developed by United Nations' development program and is presented in Human Development Report as a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living. By generating the geometric mean of normalized indices for each

of the three dimensions, namely life expectancy at birth, a combination of expected years of schooling and mean years of schooling, and the Gross National Income (GNI) per capita, HDI can represent one countries' development level. Especially though there is no universally agreed standard on development country, one widely used standard is HDI. So, I used HDI as the further indicator of heterogeneous effects in this case.

According to the definition in the Human Development Report, countries with HDI higher than 0.796 are categorized as Very High, countries with HDI ranging from 0.796 to 0.703 are categorized as High, countries with HDI ranging from 0.703 to 0.554 are categorized as Medium, and countries with HDI lower than 0.554 are categorized as Low. Following this definition, I created dummies for each group and adopted a similar analysis with GDP level.

Firstly, I run an OLS regression with the created dummies for HDI with different controls. The result is shown as follows:

Table 13: OLS results for regressions with HDI group dummies

VARIABLES	(1) CPI score	(2) CPI score	(3) CPI score
Very High	0.255	-0.702	-8.171***
	(1.239)	(1.255)	(0.648)
High	-10.32***	-10.75***	-6.588***
	(0.906)	(0.917)	(0.477)
Medium	-3.416***	-3.186***	-2.708***
	(0.848)	(0.843)	(0.431)
IFRS for SME adoption	2.918***	3.071***	-0.879**
	(0.664)	(0.673)	(0.342)
Disclosure level		0.487***	0.0944*
		(0.107)	(0.0558)
Internet usage	0.566***	0.570***	0.0909***
	(0.0175)	(0.0178)	(0.0108)
PVE			1.483***
			(0.214)
GEE			7.577***
			(0.529)
RQE			-2.446***
			(0.410)
RLE			13.56***
			(0.535)
Constant	22.56***	20.47***	44.96***
	(0.619)	(0.807)	(0.538)
Observations	2,229	2,154	2,154
R-squared	0.690	0.696	0.926
Number of years	16	16	16

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results showed similar heterogeneous effects of IFRS adoption in different countries. Except for the insignificant coefficient of Very High, High HDI countries has lower CPI score even after controlling for disclosure level with a year fixed effect. The result is more significant after controlling for WGI governance indicators, showing that Very High HDI countries have the most reduction in CPI score compared to countries with low HDI, and the coefficient of this reduction is significant even at a 1% confidence level. This is consistent

with the notion that more developed countries will be subject to the tapering off effect.

Similarly to lnGDP, I studied the specific yearly IFRS adoption effect on corruption level for each HDI categorization. The result is shown in the following tables. The first is the heterogeneous effect on HDI without controlling for WGI governance indicators, while the second one added the controls on WGI governance indicators.

Table 14: HDI OLS results without WGI

VARIABLES	(Very High) CPI score	(High) CPI score	(Medium) CPI score	(Low) CPI score
IFRS adoption time predicted	0.361***	0.704***	-0.132	-0.104
	(0.104)	(0.108)	(0.177)	(0.190)
IFRS for SME adoption	1.747	2.102**	2.776	7.797***
	(1.185)	(1.056)	(1.872)	(1.559)
Disclosure level	0.522***	0.534***	-0.0492	0.269
	(0.152)	(0.137)	(0.259)	(0.229)
lnGDP	11.18***	2.884***	1.366*	1.142
	(0.727)	(0.710)	(0.732)	(0.853)
Internet usage	0.467***	0.0108	0.234***	0.183**
	(0.0335)	(0.0307)	(0.0506)	(0.0728)
Constant	-84.55***	0.697	15.09***	1.679
	(5.797)	(5.825)	(5.560)	(5.622)
Observations	884	512	376	376
R-squared	0.693	0.240	0.101	0.321
Number of years	16	16	16	16

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 15: HDI OLS results with WGI

VARIABLES	(Very High) CPI score	(High) CPI score	(Medium) CPI score	(Low) CPI score
IFRS adoption time predicted	-0.310***	0.0949	-0.343***	-0.431***
	(0.0573)	(0.0603)	(0.0960)	(0.119)
IFRS for SME adoption		0.399	1.165	3.807***
		(0.556)	(1.017)	(0.991)
Disclosure level	0.394***	-0.144	-0.407***	0.200
	(0.0893)	(0.0876)	(0.143)	(0.165)
lnGDP	1.244***	2.432***	0.258	0.509
	(0.451)	(0.375)	(0.395)	(0.559)
Internet usage	0.0768***	-0.0278*	-0.00628	0.0751
	(0.0203)	(0.0168)	(0.0287)	(0.0462)
PVE	3.288***	0.811**	2.137***	1.271***
	(0.440)	(0.322)	(0.395)	(0.365)
GEE	9.053***	4.479***	8.271***	7.455***
	(0.943)	(0.740)	(1.233)	(1.028)
RQE	-2.339***	-0.571	-3.490***	-1.525
	(0.886)	(0.651)	(0.752)	(1.148)
RLE	13.07***	12.40***	9.521***	6.735***
	(1.065)	(0.866)	(1.106)	(1.237)
Constant	24.81***	20.69***	40.14***	33.01***
	(4.002)	(3.135)	(3.099)	(3.924)
Observations	884	512	376	376
R-squared	0.912	0.795	0.757	0.741
Number of years	16	16	16	16

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Both the results are inconsistent with the previous conjecture that more developed countries should benefit less from the IFRS adoption. Instead, the first result showed that despite High HDI countries benefit more from IFRS adoption in a statistically significant manner, the coefficients of yearly IFRS adoption effects for Medium and Low HDI countries are statistically insignificant. And for the second result with WGI governance indicators, Very High, Medium and Low HDI countries share similar yearly IFRS adoption effects, while

High HDI countries have an insignificant yearly IFRS adoption effect.

The reasons for this inconsistency can be explained by the endogeneity of IFRS adoption and possibly the shrinking sample size due to the categorization. To address this issue, I use similar three-stage least square regression. The result is shown as follows:

Table 16: HDI Three-stage least square regressions

VARIABLES	(Very High) CPI score	(High) CPI score	(Medium) CPI score	(Low) CPI score
IFRS adoption time predicted	0.339***	-0.571**	3.989***	1.198*
	(0.129)	(0.223)	(0.648)	(0.637)
IFRS for SME adoption	-2.208***	0.884*	-0.917	1.161*
	(0.662)	(0.494)	(0.711)	(0.686)
Disclosure level	0.344***	-0.260***	-0.351**	0.282*
	(0.0898)	(0.0912)	(0.139)	(0.166)
lnGDP	1.162**	2.742***	3.253***	0.416
	(0.456)	(0.398)	(0.681)	(0.759)
Internet usage	0.0857***	-0.0256	-0.0241	0.0792
	(0.0204)	(0.0167)	(0.0280)	(0.0482)
PVE	2.531***	0.879***	1.325***	1.025***
	(0.461)	(0.321)	(0.413)	(0.392)
GEE	9.737***	4.012***	9.324***	7.496***
	(0.947)	(0.765)	(1.210)	(1.054)
RQE	-2.457***	0.119	-3.803***	-1.249
	(0.901)	(0.664)	(0.730)	(1.179)
RLE	12.48***	12.42***	9.518***	6.595***
	(1.070)	(0.862)	(1.068)	(1.259)
Constant	24.17***	20.96***	51.58***	35.00***
	(4.070)	(3.098)	(3.529)	(4.313)
Observations	884	512	376	376
R-squared	0.911	0.797	0.773	0.734
Number of years	16	16	16	16

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Despite the surprising negative coefficient of yearly IFRS adoption effects for High HDI countries, results for the other three categories are consistent with the tapering off effect. The

coefficient for Medium countries is even roughly 12 times the coefficient for Very High countries. This is quite a large difference considering the length of IFRS adoption is long enough.

However, this result is flawed by the fact that one of the coefficients for ln GDP is insignificant, and two of the coefficients for disclosure level are negative. This is not intuitively the case and is not consistent with previous aggregated results. I personally attribute this inconsistency to the shrinking sample size, while the missing of cultural control variables can be another potential reason.

Robustness tests

The first robustness test used the Control of Corruption Index. The results are almost identical to the result of using CPI. The result is shown in the following table. However, the effectiveness of this robustness test is yet to be considered strongly convincing, as CPI and CCI are highly correlated to each other - the correlation between CCI and CPI is 0.98. The result of this test is shown in the table below.

Table 17: OLS results with CCI

VARIABLES	(1) CCI	(2) CCI	(3) CCI	(4) CCI	(5) CPI score
IFRS adoption time	0.0281***	0.0264***	-0.0116***	-0.0127***	-0.343***
	(0.00321)	(0.00330)	(0.00154)	(0.00158)	(0.0366)
IFRS for SME adoption	0.0133	0.0145	0.0106	0.00965	0.560
	(0.0355)	(0.0361)	(0.0163)	(0.0166)	(0.381)
Disclosure level		0.0146***		-0.00802***	-0.00875
		(0.00539)		(0.00260)	(0.0575)
lnGDP	0.232***	0.229***	-0.0123	-0.0135	0.239
	(0.0183)	(0.0187)	(0.00890)	(0.00909)	(0.200)
Internet usage	0.0165***	0.0162***	-0.000882*	-0.000753	0.00665
	(0.000994)	(0.00103)	(0.000503)	(0.000515)	(0.0113)
PVE			0.0639***	0.0637***	1.126***
			(0.00973)	(0.00998)	(0.219)
GEE			0.290***	0.303***	6.070***
			(0.0238)	(0.0242)	(0.546)
RQE			-0.112***	-0.112***	-2.220***
			(0.0186)	(0.0195)	(0.429)
RLE			0.833***	0.822***	15.38***
			(0.0236)	(0.0240)	(0.559)
Constant	-2.800***	-2.819***	0.192***	0.246***	41.39***
	(0.124)	(0.129)	(0.0670)	(0.0705)	(1.601)
Observations	2,253	2,182	2,252	2,181	2,148
R-squared	0.671	0.673	0.932	0.933	0.922
Number of years	16	16	16	16	16

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 18: Three-stage least square regressions with CCI

VARIABLES	(1) open	(2) IFRS adoption time	(3) CCI	(4) CCI
Adjacent countries	-3.698***			
	(0.374)			
Number of ports	-0.245***			
	(0.0124)			
Open index prediction		0.0523***		
		(0.00309)		
IFRS adoption time prediction			0.0187***	0.253*
			(0.00510)	(0.149)
IFRS for SME adoption			-0.0950***	-0.0179
			(0.0167)	(0.0121)
Disclosure level			-0.00298	0.00725**
			(0.00277)	(0.00308)
lnGDP	17.47***		-0.0189*	-0.175
	(0.725)		(0.0101)	(0.140)
Internet usage			0.000105	-0.00114***
			(0.000547)	(0.000370)
PVE			0.0356***	-0.0188*
			(0.0108)	(0.0103)
GEE			0.362***	0.234***
			(0.0248)	(0.0224)
RQE			-0.167***	0.121***
			(0.0207)	(0.0212)
RLE			0.816***	0.325***
			(0.0259)	(0.0264)
			(0.0231)	
Fixed effect			Region	Country
Constant	-39.16***	-0.462	0.224***	0.101
	(6.499)	(0.541)	(0.0798)	(0.556)
Observations	2,436	2,474	2,181	2,181
R-squared	0.277		0.936	0.987
Number of years			16	16

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The second robustness test is a placebo test. I generated randomized numbers ranging from

2000 to 2020 in two ways. One way is the uniform distribution, and the other is the normal distribution. Then I used this generated number to conduct the previous research process as if it were the actual year of IFRS adoption.

The results for uniform distribution are as follows.

Table 19: Uniform distribution placebo OLS results.

VARIABLES	(1) CPI score	(2) CPI score	(3) CPI score
Uniformly generated IFRS adoption time	-0.0119	-0.00635	-0.00805
	(0.0597)	(0.0615)	(0.0616)
IFRS adoption for SME	-0.777**	-0.791**	-0.747**
	(0.348)	(0.356)	(0.363)
Disclosure level		0.0471	0.0450
		(0.0585)	(0.0586)
lnGDP	0.162	0.147	0.155
	(0.198)	(0.204)	(0.204)
Internet usage	0.00374	0.00281	0.00298
	(0.0112)	(0.0116)	(0.0116)
PVE	0.949***	1.031***	1.032***
	(0.217)	(0.224)	(0.224)
GEE	5.780***	5.930***	6.018***
	(0.527)	(0.541)	(0.558)
RQE	-2.616***	-2.809***	-2.798***
	(0.412)	(0.433)	(0.434)
RLE	15.62***	15.61***	15.48***
	(0.530)	(0.541)	(0.578)
Constant	42.24***	42.16***	41.89***
	(1.502)	(1.585)	(1.637)
Observations	2,219	2,148	2,148
R-squared	0.918	0.918	0.918
Number of years	16	16	16

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As shown in the above table, the coefficient of IFRS adoption is not significant no matter what control variables we include. In conclusion, the result is robust for the random adoption

year generated by the uniform distribution.

Then I tested the result for a random adoption year generated by the normal distribution. The result is shown as follows:

Table 20: Normal distribution placebo OLS results

VARIABLES	(1) CPI score	(2) CPI score	(3) CPI score
Normally generate IFRS adoption time	-0.0347	-0.0331	-0.0347
	(0.0273)	(0.0282)	(0.0282)
IFRS for SME adoption	-0.781**	-0.795**	-0.746**
	(0.347)	(0.355)	(0.361)
Disclosure level		0.0469	0.0443
		(0.0583)	(0.0584)
lnGDP	0.181	0.168	0.178
	(0.199)	(0.205)	(0.205)
Internet usage	0.00319	0.00212	0.00226
	(0.0112)	(0.0116)	(0.0116)
PVE	0.953***	1.040***	1.040***
	(0.216)	(0.223)	(0.223)
GEE	5.751***	5.910***	6.007***
	(0.527)	(0.541)	(0.557)
RQE	-2.624***	-2.821***	-2.809***
	(0.410)	(0.432)	(0.433)
RLE	15.64***	15.61***	15.47***
	(0.523)	(0.535)	(0.571)
Constant	42.23***	42.13***	41.83***
	(1.491)	(1.578)	(1.633)
Observations	2,219	2,148	2,148
R-squared	0.919	0.918	0.918
Number of years	16	16	16

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results also show that the coefficient for normal distributed IFRS adoption year is insignificant and thus confirms the result robust.

Furthermore, since Stata generates random variables with seeds and it is not a truly random

process, I used 10 different seeds. The results all showed that under the randomized IFRS adoption time framework, the impact of randomized IFRS adoption is not statistically significant.

Besides the robustness test, I tested one of the heterogeneous effects of IFRS adoption. In the previous result, I showed how Early adoption of IFRS can be disproportionally beneficial to the adopting country. Instead of using the dummy for Early, Medium, Late and Never, I added lag of IFRS adoption and other key variables. The results are consistent with previous results in general.

Firstly, I added lag terms to the OLS regression without controlling for WGI governance indicators. A year fixed effect is included. The process of testing for optimal lag terms for control variables is not shown due to the length of the tables, but the testing process for our key variables, namely IFRS adoption time and IFRS for SME adoption, is shown. In table A2, IFRS_timehat refers to the IFRS adoption time predicted, and SME refers to IFRS for SME adoption dummy. Both Tables are shown in Appendix

The results in Table A1 show that for IFRS, the ninth lagged term is statistically significant, indicating that the decision to adopt IFRS can have an impact that passes on to nine years later. This is consistent with the previous result that Early adoption of IFRS has a disproportional benefit.

Similarly, I added the lag term to the three-stage regression without showing the detailed process of testing lag length for control variables. In the table, IFRS_timehat refers to the IFRS adoption time predicted, and SME refers to IFRS for SME adoption dummy. The results are shown in Table A2 in appendix.

The results in Table A2 show a very similar lagged effect of yearly IFRS adoption. In this case, the optimal lag length for yearly IFRS adoption effects is seven, while the optimal lag length for SME adoption remains four. Generally speaking, it takes some time for the benefits of IFRS adoption to release, and that can be one of the explanations why adopting IFRS in Early-stage can be much more beneficial than in Late-stage.

Conclusion

Based on the results reported here, it can be inferred that IFRS adoption indeed improves a country's corruption level. The effect is heterogeneous both on the time length of IFRS adoption, where countries that adopted IFRS for a longer time have a more substantial benefit from IFRS adoption, and the GDP level of a country, where the more developed countries with higher GDP actually benefit less from adopting IFRS. The result is robust in terms of two robustness tests. This implies that developing countries should be more apt to adopt IFRS. Besides the baseline IFRS, the adoption of IFRS for SMEs has no significant impact in some studies and has a negative impact on the corruption level, suggesting that the adoption of this more simplified version of IFRS should be handled with extra care.

Discussion

One limitation of this research comes from the limitation of available data. The limitation of cross-country penal analysis comes both from the scarcity of different kinds of data and the

approachable instruments. In future research, one substantial improvement of this study will be the inclusion of yearly time-varying cultural data.

Another limitation of this research is the lack of general inferences on the three-stage least square regressions. It would be more convincing if a general test statistic for this three-stage least square regression is developed. The tradeoff between exogeneity and precision is not yet well understood, though all the regressions in different stages are robust by the F-test at a 1% level, and the results are consistent with both the notion and OLS results.

Furthermore, instead of simply adopting a reduced form of research that is subject to endogeneity issues and limitations of data, constructing a theoretical model based on firm reaction to international accounting standards will be very helpful. Also, it would be helpful to combine the existing theories that explain corruption with the impact of IFRS adoption.

Also, this study will make more sense if the experimental based corruption level data can be available and provide evidence of how IFRS adoption can improve corruption level—both factual corruption acts and perceived corruption. I believe if country aggregated data on firm and individual level factual corruption is available, the result based on my previous method might be able to back the perceived corruption result.

Another possible future research is to estimate the effect of GAAP compared to IFRS. GAAP is short for Generally Accepted Accounting Principles, and it is currently adopted by the United States. Japan previously also adopted GAAP, while the Japanese government decided to adopt IFRS as well. That being said, it is still legal for some firms to use GAAP as their accounting standards. The role GAAP is performing in the fight against corruption could be an interesting topic. Given the fact that IFRS is more widely adopted, the ideal method of

studying this topic would be the synthetic control method, where the rest of the world that adopted IFRS can be the pool of control and construct the counterfactual United States with the same value of various control variables.

However, one concerning issue would be that the size of a country is essential in the development of a country (Alesina & Spolaore, 1997) and the synthetic control method is constructing the counterfactual United States using many countries of various sizes. And this could lead to biased results if the synthetic control method takes too many smaller countries such that the weighted average, even with the same variables on many other controls, might still fail to be a solid counterfactual. Though there are not clear conclusion on whether the size of a country matters in related research, US, China, and Russia are intuitively different from small countries and this cast a shadow on the robustness of the synthetic control method.

Furthermore, using a synthetic control method, more analysis can address concerning the heterogeneous regional effect of IFRS adoption. For example, most EU countries adopted IFRS in the same year—2002, but not all of them, as some of the current EU countries joined the EU after 2002 and the IFRS adoption time will be the date of their joining. Similar to the United States, those who joined the EU after 2002 can be the target of the synthetic control method, while the control pool consists of all countries that joined the EU before 2002. This could be more promising than the US synthetic control analysis as the cultural background of EU countries are much more similar to each other, and the size of countries are more diverse.

Besides specific countries, it would be interesting to take EU countries as a group in the research. In the identification of IFRS adoption by Ramanna and Sletten (2009), the EU countries are excluded. In future research, more analysis on the treatment effect of IFRS in

EU and non-EU countries and their difference could be expected.

Moreover, as identified in the result section, the yearly IFRS adoption effect has heterogeneity not only in the length of adoption but also in the adopting countries' economic development. The intriguing part is that the result showed that more developed countries actually benefit less from the adoption of IFRS. However, given that most of the countries that adopted IFRS early are more developed countries, the intersection between these two heterogeneous effects could be addressed in future analysis.

For the ambiguity of the impact of IFRS for SME, further research with respect to the sectoral structure might be an intriguing topic. As its name suggests, IFRS for SME is designed for small and medium-sized enterprises. And there might exist certain relationship between the sectoral structure and the impact of IFRS for SME adoption. Also, the difference between general IFRS and IFRS for SME could be helpful for understanding the ambiguity of IFRS for SME adoption.

In future research, the method of case study can be set higher priority. It is the most straight forward way to understand why corruption is prevailing in some countries while some other countries are doing a good job in corruption control. This can be a good supplement to the heterogeneity effect in terms of GDP and HDI index. It would make sense to investigate the reason why the countries with top 5 CPI score succeed in corruption control and similarly, why the countries with bottom 5 CPI score failed in corruption control. Moreover, countries with the most improvement in CPI score worth extra attention. Case studies should include important aspect, namely cultural factors, governance level, industrial structure, richness of natural resources and so on.

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Appendix

Table A1: Lagged OLS result

VARIABLES	(1) CPI score	(2) CPI score	(3) CPI score	(4) CPI score	(5) CPI score	(6) CPI score
L.IFRS_time	0.120	-0.990	-0.973	-0.958	-0.958	-0.960
	(1.112)	(1.020)	(1.021)	(1.021)	(1.021)	(1.023)
L2.IFRS_time	-2.657**	-1.870*	-1.838*	-1.797*	-1.797*	-1.756*
	(1.062)	(1.040)	(1.041)	(1.041)	(1.041)	(1.039)
L3.IFRS_time	0.972	1.095	1.088	1.035	1.035	1.077
	(1.022)	(1.001)	(1.001)	(1.001)	(1.001)	(0.995)
L4.IFRS_time	-0.0752	-0.351	-0.398	-0.486	-0.486	-0.670
	(1.043)	(0.984)	(0.980)	(0.977)	(0.977)	(0.967)
L5.IFRS_time	-0.752	-0.497	-0.506	-0.389	-0.389	-0.0998
	(1.056)	(1.003)	(0.969)	(0.964)	(0.964)	(0.936)
L6.IFRS_time	0.643	0.820	1.148	1.112	1.112	0.989
	(0.991)	(0.992)	(0.943)	(0.943)	(0.943)	(0.925)
L7.IFRS_time	-0.522	-0.518	-0.901	-0.896	-0.896	-0.937
	(1.014)	(0.982)	(0.930)	(0.930)	(0.930)	(0.919)
L8.IFRS_time	-0.216	-0.979	-0.542	-0.562	-0.562	-0.548
	(1.065)	(1.044)	(1.003)	(1.004)	(1.004)	(0.990)
L9.IFRS_time	-0.118	1.428**	1.129*	1.144*	1.144*	1.150**
	(1.152)	(0.607)	(0.585)	(0.585)	(0.585)	(0.580)
L10.IFRS_time	0.940					
	(0.654)					
IFRS_time	1.328**	1.605***	1.570***	1.581***	1.581***	1.659***
	(0.672)	(0.594)	(0.594)	(0.594)	(0.594)	(0.593)
L.SME	0.577	-0.0799	-0.0614	-0.0468	-0.0468	0.0227
	(0.881)	(0.846)	(0.846)	(0.846)	(0.846)	(0.839)
L2.SME	-0.914	-0.0250	-0.0330	-0.0814	-0.0814	-0.0374
	(0.855)	(0.802)	(0.801)	(0.801)	(0.801)	(0.783)
L3.SME	1.034	-0.0159	-0.108	-0.119	-0.119	-0.246
	(0.801)	(0.695)	(0.692)	(0.692)	(0.692)	(0.678)
L4.SME	-1.240	-1.265*	-1.120**	-1.108**	-1.108**	-0.963*
	(0.755)	(0.644)	(0.545)	(0.545)	(0.545)	(0.525)
L5.SME	0.0432	-0.211				
	(0.647)	(0.671)				
L6.SME	0.994	0.794				
	(0.661)	(0.693)				
L7.SME	-0.282	-0.431				
	(0.762)	(0.789)				
L8.SME	1.441*	1.441*				
	(0.820)	(0.864)				
SME	-1.559*	-1.046	-1.053	-1.104	-1.104	-1.065
	(0.823)	(0.754)	(0.755)	(0.754)	(0.754)	(0.754)
L.lnGDP	-0.873	-0.703	-0.620	-0.926	-0.926	-1.505

	(1.448)	(1.436)	(1.433)	(1.410)	(1.410)	(1.378)
L2.lnGDP	1.516	1.177	1.190	1.639	1.639	1.736
	(1.457)	(1.406)	(1.404)	(1.353)	(1.353)	(1.264)
L3.lnGDP	0.532	0.721	0.737	0.812	0.812	0.183
	(1.439)	(1.415)	(1.414)	(1.413)	(1.413)	(1.152)
L4.lnGDP	-0.828	-0.0844	-0.211	-0.597	-0.597	-0.434
	(1.519)	(1.472)	(1.467)	(1.432)	(1.432)	(1.104)
L5.lnGDP	1.098	-0.531	-0.530	0.0363	0.0363	-0.176
	(1.621)	(1.373)	(1.370)	(1.286)	(1.286)	(1.033)
L6.lnGDP	-1.237	-0.435	-0.341	-0.574	-0.574	-0.464
	(1.469)	(1.099)	(1.094)	(1.077)	(1.077)	(0.901)
L7.lnGDP	2.657**	2.024*	2.188**	2.855***	2.855***	3.256***
	(1.133)	(1.076)	(1.072)	(0.917)	(0.917)	(0.843)
L8.lnGDP	-0.175	1.103	1.066			
	(0.956)	(0.893)	(0.891)			
lnGDP	0.789	1.307	1.310	1.151	1.151	1.520
	(1.263)	(1.130)	(1.129)	(1.121)	(1.121)	(1.078)
L.Internet usage	-0.00143	0.00326	0.00671	0.00630	0.00630	
	(0.0359)	(0.0355)	(0.0354)	(0.0355)	(0.0355)	
L2. Internet usage	-0.0146	-0.0434	-0.0407	-0.0385	-0.0385	
	(0.0366)	(0.0356)	(0.0354)	(0.0354)	(0.0354)	
L3. Internet usage	-0.0613	-0.0169	-0.00957	-0.00824	-0.00824	
	(0.0412)	(0.0395)	(0.0393)	(0.0393)	(0.0393)	
L4. Internet usage	0.0927**	0.0389	0.0385	0.0371	0.0371	
	(0.0438)	(0.0416)	(0.0414)	(0.0414)	(0.0414)	
L5. Internet usage	-0.0227	-0.0136	-0.0109	-0.0113	-0.0113	
	(0.0430)	(0.0422)	(0.0421)	(0.0421)	(0.0421)	
L6. Internet usage	-0.0588	-0.00123	-0.0112	-0.0110	-0.0110	
	(0.0427)	(0.0427)	(0.0425)	(0.0425)	(0.0425)	
L7. Internet usage	0.0886**	0.0436	0.0479	0.0502	0.0502	
	(0.0431)	(0.0423)	(0.0423)	(0.0423)	(0.0423)	
L8. Internet usage	0.0247	0.0135	0.00830	0.00891	0.00891	
	(0.0344)	(0.0321)	(0.0320)	(0.0320)	(0.0320)	
Internet usage	0.00522	0.00887	0.00200	0.00564	0.00564	0.000549
	(0.0280)	(0.0277)	(0.0274)	(0.0272)	(0.0272)	(0.0157)
Constant	16.52	7.464	5.583	8.487	8.487	10.92
	(15.18)	(11.90)	(11.84)	(11.59)	(11.59)	(10.95)
Observations	704	846	846	846	846	873
R-squared	0.147	0.137	0.131	0.129	0.129	0.109
Number of years	16	16	16	16	16	16

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A2: Lagged three-stage results

VARIABLES	(1) CPIscore	(2) CPIscore	(3) CPIscore	(4) CPIscore	(5) CPIscore
L.IFRS_timehat	-1.038	-1.916	-1.355	-1.339	-1.334
	(1.503)	(1.303)	(1.238)	(1.236)	(1.235)
L2.IFRS_timehat	0.926	1.644	1.544	1.533	1.533
	(1.385)	(1.165)	(1.134)	(1.133)	(1.132)
L3.IFRS_timehat	0.267	0.344	-1.084	-1.092	-1.088
	(1.220)	(1.108)	(1.006)	(1.005)	(1.004)
L4.IFRS_timehat	0.0613	-0.943	0.488	0.492	0.486
	(1.171)	(1.026)	(0.861)	(0.860)	(0.859)
L5.IFRS_timehat	-1.741	-1.194	-1.722**	-1.718**	-1.714**
	(1.104)	(0.881)	(0.853)	(0.852)	(0.851)
L6.IFRS_timehat	-1.801*	-1.729*	-1.582*	-1.584*	-1.595*
	(0.939)	(0.900)	(0.895)	(0.895)	(0.893)
L7.IFRS_timehat	2.758***	2.643***	2.816***	2.822***	2.830***
	(1.000)	(0.959)	(0.708)	(0.707)	(0.706)
L8.IFRS_timehat	-0.753	0.0603			
	(1.006)	(0.738)			
L9.IFRS_timehat	0.773				
	(0.788)				
IFRS_timehat	-0.00205	0.477	0.531	0.533	0.524
	(1.155)	(1.055)	(0.984)	(0.983)	(0.982)
L.SME	0.222	0.645	-0.0886	-0.0890	-0.0839
	(0.754)	(0.689)	(0.597)	(0.597)	(0.596)
L2.SME	-0.575	-1.267**	-0.615	-0.617	-0.615
	(0.692)	(0.594)	(0.515)	(0.515)	(0.515)
L3.SME	-0.249	0.267	0.257	0.254	0.256
	(0.602)	(0.509)	(0.524)	(0.524)	(0.524)
L4.SME	-1.041*	-1.056*	-1.081*	-1.080*	-1.156**
	(0.554)	(0.560)	(0.581)	(0.581)	(0.463)
L5.SME	-0.121	-0.211	-0.192	-0.111	
	(0.580)	(0.598)	(0.620)	(0.511)	
L6.SME	0.454	0.0816	0.128		
	(0.599)	(0.532)	(0.551)		
L7.SME	-0.992				
	(0.674)				
L8.SME	0.878				
	(0.761)				
SME	-0.293	-0.137	0.128	0.126	0.130
	(0.659)	(0.598)	(0.547)	(0.546)	(0.546)
Internet usage	-0.00244	0.00291	-0.00816	-0.00805	-0.00834
	(0.0156)	(0.0132)	(0.0116)	(0.0116)	(0.0115)
PVE	0.283	0.118	-0.0193	-0.0191	-0.0177
	(0.507)	(0.435)	(0.381)	(0.381)	(0.381)
L.GEE	2.155**	3.053***	2.817***	2.826***	2.826***
	(0.978)	(0.940)	(0.917)	(0.916)	(0.915)
L2.GEE	1.821*	1.007	0.295	0.298	0.305

	(0.986)	(0.939)	(0.944)	(0.944)	(0.943)
L3.GEE	-0.861	-1.133	-0.405	-0.418	-0.412
	(0.979)	(0.965)	(0.941)	(0.939)	(0.938)
L4.GEE	-0.454	0.645	0.629	0.625	0.620
	(1.035)	(0.980)	(0.934)	(0.934)	(0.933)
L5.GEE	2.336**	1.637*	1.504	1.510*	1.508*
	(1.037)	(0.956)	(0.915)	(0.914)	(0.913)
L6.GEE	0.553	0.248	-0.102	-0.101	-0.0955
	(1.013)	(0.933)	(0.854)	(0.853)	(0.853)
L7.GEE	-2.025**	-1.371*	-1.097	-1.104	-1.103
	(0.919)	(0.818)	(0.690)	(0.689)	(0.689)
GEE	2.166**	2.176***	2.972***	2.961***	2.962***
	(0.939)	(0.833)	(0.794)	(0.792)	(0.792)
L.RQE	-1.338	-1.301	-0.539	-0.550	-0.546
	(1.172)	(1.124)	(1.080)	(1.079)	(1.078)
L2.RQE	0.703	1.449	1.074	1.078	1.087
	(1.216)	(1.133)	(1.118)	(1.117)	(1.116)
L3.RQE	1.280	0.306	-0.0564	-0.0684	-0.0792
	(1.190)	(1.148)	(1.133)	(1.131)	(1.129)
L4.RQE	2.447**	0.903	0.295	0.308	0.314
	(1.236)	(1.199)	(1.145)	(1.143)	(1.142)
L5.RQE	-2.567**	-1.937*	-1.415	-1.424	-1.422
	(1.149)	(1.007)	(0.966)	(0.964)	(0.964)
RQE	2.355**	1.344	1.212	1.214	1.216
	(1.023)	(0.963)	(0.908)	(0.908)	(0.907)
L.RLE	2.008*	1.463	1.912	1.905	1.906
	(1.207)	(1.195)	(1.173)	(1.172)	(1.172)
L2.RLE	0.963	1.062	0.888	0.886	0.894
	(1.254)	(1.203)	(1.200)	(1.199)	(1.198)
L3.RLE	1.202	1.073	1.351	1.352	1.334
	(1.222)	(1.196)	(1.184)	(1.184)	(1.180)
L4.RLE	-1.226	-0.335	-1.008	-0.997	-1.002
	(1.303)	(1.258)	(1.184)	(1.182)	(1.182)
L5.RLE	2.627**	0.965	1.143	1.158	1.150
	(1.273)	(1.103)	(1.068)	(1.065)	(1.064)
RLE	2.302**	2.573**	1.906*	1.917*	1.913*
	(1.118)	(1.034)	(1.005)	(1.004)	(1.003)
Constant	47.20***	47.27***	46.77***	46.73***	46.76***
	(5.790)	(4.648)	(3.808)	(3.801)	(3.797)
Observations	873	1,022	1,170	1,170	1,170
R-squared	0.253	0.251	0.253	0.253	0.253
Number of years	16	16	16	16	16

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1