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MASTER'S THESIS

THE EFFECT OF CONTROL OF CORRUPTION ON FINANCIAL DEVELOPMENT

Evidence from high middle income and low middle income countries

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ABSTRACT

This thesis studies the effect of control of corruption on financial development using four aspects of financial development; depth, access, efficiency and stability. Previous studies have focused mainly on using corruption as an interaction term or using only one proxy for measuring financial development. Thus, this study adds new point of view to the current literature on corruption and financial development.

Panel data used in this study consists of 13 countries and 15-year period from 2000 to 2014. Generalized Method of Moments (GMM) is seen as a suitable method for statistical analysis since it accounts the most common problems with panel data, the problem of endogeneity of explanatory variables and the problem with country-specific fixed-effects.

The results show that control of corruption has significant and positive effect on financial depth and access. The effect stays persistent through robustness tests. Control variables compliment the effect on access while the effect on depth is even stronger when all the control variables are omitted. The results for efficiency are inconsistent, showing significance depending on the control variables used. Also the sign for the coefficient change with used control variables. Control of corruption seems to have significant impact on financial stability but the results are significant only when control variables are used.

More work needs to be done to find the effect of control of corruption on financial efficiency. Control variables used in this study were not appropriate ones for measuring turn-over ratio in stock markets. Also, the results of this study can be supported by using other proxies of access, depth and stability.

KEYWORDS: Financial Development, Control of Corruption,

1 INTRODUCTION

Financial development has an important role in the development of economies. Wide range of studies have recognized its positive effect on economic growth. However, the interpretation of financial development is not straightforward since it consists of various different determinants, none of which is supreme over every other. Thus, there does not exist a collective understanding on what determines financial development. Finding sufficient and universally agreed determinants is difficult since financial development does not show up in the same way in all economies. Countries with similar level of economic development can have differences between financial structures, one being bank-based and the other market-based. Also, the level of financial development may differ between countries with very similar economic conditions.

The determinants of financial development become important when interest is on the functioning of financial system. For example, the unsustainable amount of private credit caused by the last financial crisis on 2007-2009 showed that it is important to understand how different factors affect to financial system. Knowing determinants of financial development can help financial systems to develop into more stable and sustainable direction, while ignoring the development of these determinants may cause serious problems to financial system. In the end, financial development is so important factor in economic development that risking it can lead to worse economic conditions.

Widely known determinants of financial development are, according to Huang 2010, institutional, macroeconomic and geographic factors. Also wide range of other determinants exists. One of the determinants is control of corruption. Numerous studies show that the level of corruption has both direct and indirect effect to financial development. Corruption can for example increase bond spreads and prevent countries from undertaking productive projects (Ahlin and Pang (2008) Ciocchini, Durbin and Ng (2003)). The effect of corruption control is important especially in emerging countries. Their institutional quality is weaker so it does not protect country's financial markets that well from the negative effects of corruption.

The earlier studies have focused using corruption, or control of corruption as an interaction term with financial development to study economic growth, or studied the straight relationship of financial development and corruption with only certain proxy for financial development. This kind of approach ignores the fact that financial system consists of multiple dimensions which can be affected by corruption in different ways.

This study shows the effect of control of corruption on four dimensions of financial development; access, depth, efficiency and stability, and thus widens the base of studies focusing on the straight relationship of corruption and financial development. Its also adds approach where financial system development is seen as multidimensional and where corruption can have different effect on each dimension. This study includes four hypotheses, one for each dependent variable. The hypotheses are based on the results of previous studies concerning the relationship of control of corruption on financial development:

H1: Control of corruption has positive effect on financial access, measured with market capitalization excluding top 10 largest companies to market capitalization,
H2: Control of corruption has positive effect on financial depth, measured with stock market capitalization to GDP,
H3: Control of corruption has positive effect on financial efficiency, measured with Stock market turn-over ratio,
H4: Control of corruption has negative effect on financial stability, measured with stock market volatility.

Based of the previous studies, control of corruption is expected to have positive effect on financial access, depth and efficiency and negative effect on stability since more stable financial markets are seen as more developed. Limitation for the study is caused by the size of the panel data which is not as large as it could be for depth and efficiency. For the comparability of the results, the sample size should be same for all estimations. This causes elimination of data for longer periods for depth and efficiency for the sake of access and stability.

The data for this study consists of 13 upper and lower middle income countries and the time interval covers 15 years, from 2000 to 2014. Upper and lower middle income countries are combined into one group, middle income countries, to widen the amount of observations for valid research. To test the effect of control of corruption on financial development empirically, difference Generalized Method of Moments –method (GMM) is used. The estimation method accounts the most common problems related to panel data, country-specific fixed effects and endogeneity of explanatory variables.

The results show that control of corruption has very significant and positive effect on financial access and depth. For depth, the effect stays persistently through robustness tests and even strengthens when all the control variables are omitted. Thus, the effect of control of corruption on financial depth does not rely on the complimentary effect of control variables. The effect for access also stays persistently through robustness tests but is complemented by control variables. As a conclusion, it can be said that results support the first and the second hypothesis.

For financial efficiency finding more suitable control variables for turn-over ratio, or finding more suitable proxy for financial efficiency is required. Results are hard to interpret because the sign of the coefficient changes with estimations. The real effect of control of corruption on efficiency stays unclear. The results for stability support the fourth hypothesis partly. The coefficient of control of corruption is negative and significant in estimations, where one variable at a time is removed. Control variables seem to have complimentary effect on control of corruption since the effect of it becomes insignificant when all the control variables are omitted.

The study continues with theory of financial development and dimensions of financial system. Third chapter represents the previous literature related to financial development and control of corruption. Also previous literature on financial development and control variables is represented. Fourth chapter introduces the data, fifth chapter the method used and sixth chapter the results. Seventh chapter includes discussion and the final chapter concludes.

2 FINANCIAL DEVELOPMENT

The role of financial system is important for economic development. Various studies show that a positive effect exists between financial system development and economic growth. However, even if financial system development can be measured with various different proxies, the determination of financial development and how to develop financial markets is imperfectly understood.

Economic development is mainly used as a sign of financial development. Thus, financial development has been seen as something that forwards economic growth. McKinnon (1973) and Shaw (1973) proposed the financial repression and financial development framework which has been used as a basis of financial market analysis and policy advice especially in developing countries. The McKinnon-Shaw model forms policy implication on the basis of financial repression. The policy implication is that government's repressive policies, such as interest rate ceilings, high reserve requirements and credit control hold up financial development which in turn retards economic growth. Thus, the decision-making in financial system has an effect on economic growth through financial development. Various studies after McKinnon-Shaw model have also proven the relationship between financial development and economic growth. Some of these studies are represented in chapter 3.2. Since financial development has a substantial role in economic growth it is highly important to understand the origins of it.

Financial development is a complex entity which cannot be generalized for different economies. Nowadays, economists still lack complete understanding of what drives the emergence and development of financial markets and what are the reasons why different financial structures exist in countries with similar levels of economic development. Also, what causes the differences in the level of financial development in countries with similar income levels and geographic conditions has been under question. The determinants of financial development become important here. For the

last couple of decades, studies on potential determinants of financial development have increased.

The legal and regulatory system is essential for financial development. La Porta, Florencio, Shleifer and Vishny (1997) state that legal traditions influence financial development through laws and enforcement mechanisms and the protection of the rights of the outside investors. Protection of property rights, contract enforcement and good accounting practices are part of legal and regulatory system, and they can have profound impact especially on the supply side of financial development. (Huang 2010: 4-5). In addition, the study of Beck, Demirguc-Kunt and Levine (2001) highlights the importance of legal systems on financial development. It states that legal tradition is connected to financial development through two channels; political and legal adaptability channel. Political channel stresses that legal traditions differ in terms of the priority they give to private property rights. Private property rights are seen to form the basis of financial development.

Legal adaptability channel implies that legal traditions are different by their abilities to adapt changing circumstances in commercial and financial fields, and that the legal systems which adapts these changing conditions more effectively will support financial development more effectively. The results of the study show that legal traditions explain cross-country differences in financial development and that legal adaptability has more advantages explaining financial development than political channel. Also Rajan and Zingales (2003) point out the importance of political systems on financial development policies. They state that compared to open political systems, closed political systems are more likely to threat institutionalization and prevent financial system development that promotes competition.

The study of Beck et al. (2001) highlights the importance of legal tradition on financial development but also discusses about three alternative theories: politics and finance, culture and finance, and endowment. Politics and finance theory emphasizes the role of ruling groups and their power on choices which can affect financial development. Culture and finance theory highlights the importance of religious and cultural factors.

Also Stulz and Williamson (2003) argue that especially the views towards financial institutions are affected by religion.

Macroeconomic determinants are policies which promote financial development. Lower inflation, financial liberalization and higher investment for example have effect on financial development. Important studies about inflation on financial development are represented on section 3.3. McKinnon-Shaw model presented above concludes that financial repression reduces the quantity and quality of aggregate investment through government's repressive policies. Financial liberalization in turn can forward economic growth by increasing investment and its productivity. Chinn and Ito (2006) state that financial liberalization and especially financial openness is positively correlated with financial development. Law and Demetriades (2004) use various proxies for financial and trade openness to measure the effect of them to banking system and stock market development. They found simultaneously opening capital flows and trade encourages financial development. In addition, Svaleryd and Vlachos (2002) argue that trade openness influences financial development. Study of Falahaty and Hook (2011) states that improving quality of institutions, macroeconomic stability, inflation control and monetary policies, and privatizing banks can forward financial development in Middle East and North African countries. However, financial liberalization can also have some destabilizing effects. For example, opening up the stock market to foreign invertors can lead to more volatile stock returns and higher correlation with world market return (Bekaert, Campbell and Lumsdaine 2002).

According to Huang (2010: 6-7) the correlation between geography and financial development is less studied compared to that for policy and institutions. Importance of geography for economic development is however noticed. The studies on correlation of economic development with geography is divided into three groups. First group emphasizes the correlation between latitude and economic development and argues that more tropical climates suffer from adverse ecological conditions. This can effect to the agricultural production. The second group states that the economic development of countries that are landlocked, distant from large markets or have only limited access to the delivery channels such as coasts and rivers is more vulnerable. This is because the

mentioned factors may limit the external trade, and cause difficulties when inputs for the production of manufactured goods need to be imported from distant markets.

The last group focuses on resource endowment. Countries which have richer resources are more able to develop technologically and develop different export structures which help coping with external shocks. Huang also states that in general, geography is likely to have an effect on financial development through the demand side of financial development. However, the improved quality of institutions may also affect its supply side. For example, country's ability to produce its agricultural goods with its own natural resources could reduce the demand for external finance, compared to other countries at similar level of GDP per capita. Also Acemoglu, Johnson and Robinson (2001) state that geographic endowments effect to attitudes towards institutional development. For example places where high mortality rates were faced, settlement of a certain colony was not that likely. This retarded the development of institutions for that certain colony.

As stated in the beginning of this chapter, the determinants of financial development are argued since different studies highlight different theories. In this chapter the goal was to represent some widely known determinants, but also some additional theories to show that financial development is not based on just few determinants, and that the emphasizing of determinants can differ by studies. The more research is made about the subject the more support certain theories gain. Since financial development is a complex entity, full agreement can, however, be hard to achieve. This study represents five commonly used determinants of financial development in chapter three. These are control of corruption, which is the main variable of interest, economic growth, inflation, income level and intermediary development. Excluding control of corruption, these are common and widely used determinants of financial development and thus selected as control variables for this study.

2.1 Dimensions of financial system

Financial system has different dimensions. These dimension are important to take into account when finding determinants of financial development. The level of financial development can differ by countries due to differences between dimensions of countries' financial systems. Global Financial Development Report (2013) argues that each dimension captures a different and separate side of financial system. Some determinants can be more important for measuring development of certain dimension, for example financial depth, and some other determinants more important for measuring other dimension, for example financial access. Dividing financial system into dimensions thus helps to recognize which determinants are important for measuring financial development in which dimension. Four characteristics of financial system presented by Cihak et al. (2015) are used to construct a comprehensive picture of the financial system. These four characteristics of financial system are: depth, access, efficiency, and stability. As Cihak et al. (2015) state in their study these four characters illustrate the multi-dimensional nature of financial system.

2.1.1 Financial depth

Financial depth refers to the size of the financial sector, including banks, other financial institutions, and financial markets in a country, compared to a measure of economic output. Financial depth reveals large disparities in financial systems around the globe. According to Global Financial Development Report.. (2013) the largest financial system is more than 34 500 times the smallest one. Even after rescaling with the GDP's of the countries, the largest financial system is still 110 times the smallest one.

Financial depth can be a separate measure for the size of the institutions and the size of the market but it can also be a measure for separating financial markets and institutions from each other. In other words, financial depth can be used to measure how bank or market based financial systems are. Bank based systems are said to be deeper than

market based systems and the measure can be used for measuring differences between financial systems. Bank based financial systems for example rebounded faster from the last financial crisis since they showed improvements in depth after the crisis. Global Financial Development Report… (2013: 33-35).

Widely used proxy for financial depth is private credit relative to gross domestic product (GDP). Private credit excludes credit issued to governments, government agencies, and public enterprises. Financial depth is strongly linked to income level and economic development so that high income countries and developed economies tend to have deeper financial systems. However, measured with private credit to GDP bank-based financial systems have naturally deeper financial sector than market-based systems since private credit is issued by deposit money banks. (Global Financial Development Report… 2013.)

Levine and Zervos (1998) state that the greater the ability to trade ownership claims in the country the higher the economic development. This leads to the interest to measure the size of the stock and bond markets of the country. A common proxy to measure the relative size of a country's financial market is its stock market capitalization to GDP plus outstanding volume of its private debt securities to GDP. Measured with this market based proxy, larger, and high income countries tend to have deeper financial system (Global Financial Development Report… 2013: 23-25).

2.1.2 Financial access

Financial access tells about the level of access to financial services. Well functioning financial access means that financial system effectively identifies and funds the potential firms and offers easy access to financial services for individuals. So, when financial depth measures the size of the financial system, financial access measures how equally the possibilities to use the system are divided. Groups that are are involuntarily excluded from the use of financial services are for example individuals and firms which do not have enough income or present a lending risk too high. Also discrimination, lack

of information and regulatory barriers are examples reasons for exclusion. (Global Financial Development Report… 2013: 25-27).

In financial markets the access to stock and bond markets, in other words the degree of concentration tells about a country's degree of financial access. Higher degree of concentration means that newer and smaller issuers face more difficulties when trying to access to financial markets. Stiglitz and Weiss (1981) describe in their study how access to financial markets via credit rationing can be restricted and how credit rationing can cause worsening concentration. They state that increasing interest rates or increasing collateral requirements can lead to credit rationing since the loan portfolio of the bank would increase with the increasing amount of riskier investors who are chasing higher profits from interest. At times of high interest rates or increasing collateral requirements banks will decrease the number of loans made rather than limit the size of loans or charge higher interest rates from bigger loans.

This kind of credit rationing leads to decreasing amount of credit in the market and prevents it to channel to profitable investment targets. Stiglitz and Weiss (1981) also state that it might lead banks to select the most credit worthy customers they have and try to offer credit to them. This leads to even worse financial exclusion since only some selected ones have access to credit. However, because extending financial access with the expense of reducing screening and monitoring standards can cause severe negative outcomes for financial stability, interventions which remove market imperfections is more preferable way to develop financial access (Global Financial Development Report… 2013: 25-27).

2.1.3 Financial efficiency

Financial efficiency means that that a financial sector's intermediating functions are performed in the least costly way possible. The lower the intermediation costs are the less costly the financial sector functions are to households, firms, and governments. Higher intermediary costs for institutions can be seen for example in net interest

margins, and lending-deposit spread. (Global Financial Development Report… 2013: 27,28). In efficient financial system for example increasing amount of deposits in banks should lead to better liquidity and thus provide an opportunity to borrow more money and/or decrease the cost of borrowing.

Tobin (1984) represents efficiency through four different concepts. First concept concerns market efficiency. If market is efficient, only insiders should be able to make money, since all the information that is publically available is already in the prices of tradable assets. According to the second concept, a market is efficient if prices of assets reflect their fundamental values. Thus, the price of an asset is based only on rational expectations of the payments on asset. Third concept, "full-insurance" efficiency states that financial markets are efficient if economic agents are able to insure the deliveries of goods and services for themselves despite all the possible future contingencies, by handovering some of their resources in the present time or contracting to deliver them in specified future time. Fourth concept, the most economic one, called functional efficiency refers to the ability of financial industries to provide mechanisms and networks of payments. Financial system should be able to mobilize savings for in a way that benefits the country. This includes investments in physical and human capital, domestic and foreign, private and public and allocation to socially productive uses.

The proxies for efficiency in financial markets make strong assumptions about the behavior of investors and the functioning of financial markets. However, this is required to make this ambiguous dimension into a measurable form. According to Cihak, Demirguc-Kunt, Feyen, and Levine (2015) a basic proxy for efficiency in stock markets is the turnover ratio, the ratio of stock market's annual turnover to its capitalization. The turnover ratio refers to increased liquidity which allows more efficient channeling of funds. If financial markets can produce higher turnover relative to capitalization investors should be more eager to invest and the trading volumes should increase. With higher trading volumes information should move to prices quicker and price discovery should be more effortless. Efficiency in bond markets can be seen for example from the tightness of bid-ask spread. Wider spread prevents efficient price discovery and

discourages to trading since intermediary costs are higher (Global Financial Development Report… 2013: 27,28).

2.1.4 Financial stability

The last dimension of financial system is financial stability. It is a dimension which has been under vast discussion since the 2008 financial crisis. The loose borrowing policies without proper risk management and loan monitoring caused a world wide financial crisis which caused for example failures of various banks and insolvency of mortgage customers since the demands for payments of loans became unbearable. Also economic growth and overall trust to the banking system decreased. Global Financial Development Report (2013: 37, 38) for example show that volatility in financial markets has increased between years 2008 and 2010 versus years 2000-2007. It might not be surprising that for example institutional development, measured with domestic credit to private sector as a % of GDP, can forward volatility, and thus development of one dimension can lead to problems in one dimension. One good example is the rapid growth of China in the 2000s. When viewing the size of the financial institutions, the depth scores were high and China's financial system seemed developed. However, the credit growth in the country was too rapid, which caused dramatic decrease in stability. The overall picture of the level of Chinese financial system development was therefore not that promising.

If the financial intermediaries only focus on developing size (depth) and inclusion (access), and do not spend money on monitoring the outflow of loans (efficiency) the financial stability can be in danger. This can result into wider financial crisis and can disturb economic growth.

The most used proxy for financial stability is the z-score. Its has a direct link with the probability of default which makes it so widely used. It is defined as the sum of capital to assets and return on assets, divided by the standard deviation of return on assets. Thus, z-score compares capitalization and returns with the risk they bear. (Global

Financial Development Report… 2013: 28-30). Also excessive credit growth has been found to be associated with banking crises according to for example Kaminsky and Reinhart (1999) and IMF (2004). When income level does not keep up in pace with the growing amount of debt of firms and households, nonperforming loans and defaults eventually start to increase. The more banks have default and nonperforming loan customers the more likely the country will end up in banking crisis.

In financial markets, market volatility tells about the financial stability of a country (Cihak, Demirguc-Kunt, Feyen, and Levine 2015). Market volatility tells about the amount of uncertainty investors have about the size of changes in securities value traded in markets. Large volatility tells about high uncertainty about the real fundamental value of security which increases the risk investors bear. During times of financial and economic instability stock market volatility tends to increase visibly (Schwert 2011) which makes it a good measure of financial stability.

3 PREVIOUS LITERATURE

This chapter represents previous literature related to the subject of this study. Studies about the relationship between corruption and financial development are represented. Because financial market development is not a result of just one factor, various other factors which affect to it are also represented. These factors work as control variables in this study.

3.1 Control of corruption and financial development

Studies have shown that the level of corruption has an effect on financial development. Studies focus mostly on the effect of corruption and financial development on economic growth and thus use interaction of corruption and financial development. There exist also few studies which try to explain financial development with the level of corruption.

Most of these studies focus on studying the effect on emerging countries. Ahlin and Pang (2008) found that both, financial development and low corruption forward the undertaking of productive projects. However, they work as substitutes since corruption raises liquidity needs and thus makes financial improvements more potent. Financial underdevelopment in turn makes corruption more troublesome and thus reducing it becomes more beneficial. For example, using financial development and lack of corruption as two factors influencing growth, the growth gains of countries and industries associated with moving from the 25^{th} to the 75^{th} percentile in one factor are 0,63-1,68 percentage points higher if the other factor is at the 25^{th} percentile rather that the 75^{th}.

Ayaydin and Baltaci (2013) studied the effects of corruption level and banking sector development on stock market, and for this purpose they created an interaction term from these two independent variables. They found a strong negative relationship between interaction term and stock market development. Since banking sector development and

stock market development are complementaries the results show that the negative effect of corruption outweighs the positive effect of banking sector development and thus is more important factor when focusing on improving institutional quality, and through that developing stock markets.

Also Bahmani-Oskooee, Kholdy and Sohrabian (2013) show in their study that corruption can have indirect effect on financial development. According to the study, the investment flows of multinational companies seem to stimulate the financial markets of emerging countries more in countries that are more corrupted. However, Chinn and Ito (2006) find that controlling corruption in emerging markets fosters the development of equity markets. This is because lower levels of corruption increase the effect of financial opening in fostering equity market development. These results show that corruption can have different effects on different dimensions of financial markets.

The study of Ciocchini, Durbin and Ng (2003) shows the cost of corruption from the investors' point of view in emerging markets. They found that corruption increases bond spreads since countries that are seen more corrupted must pay a higher risk premium when issuing bonds. Cherif and Gazadar (2010) and Yartey (2010) find a negative relationship between corruption and stock market development. However, this relationship is insignificant.

3.2 Economic growth and financial development

Several studies have shown that many aspects of financial development affect economic growth in developing and developed countries. Dornbusch and Reynoso (1989) suggest that creating financial stability and aiming to modest inflation, forwards investment flow to country and thus, helps to create resources for economic growth. Odedokun (1998) shows that growth of financial aggregates affects positively on economic growth in developing countries. Further, low income developing countries seem to benefit from financial deepening, defined as the financial aggregates in relation to overall economic activities or GDP. Raghuram and Zingales (1998) show that financial development

forwards industrial growth, which leads to economic growth. It reduces the cost of external finance and thus, compared to countries which lack well-developed market, it brings comparative advantage in industries that are more dependent on external finance. Beck and Levine (2004) studied financial development as a whole measuring stock market development and financial institutions' development. They found that the development of stock markets and banks both have an impact on economic growth across different countries.

Even if the association between financial development and economic growth exists it is not straightforward. Levine (1997) argues that the link is not simple and requires understanding the evolution and functioning of financial systems in various levels, such as in firm and industry level. To understand the linkage one has to also understand nonfinancial development, such as changes in telecommunications and in legal system and their effects to financial system.

Even if various studies support the association of financial development to economic growth the direction of causality is argued. Study by Patrick (1966) identifies two possible patterns in this causal relationship. First pattern is demand following, which means demand for financial sector services which is a consequence of real economic growth. Second pattern is supply leading which means that financial institutions and their services are created for the needs of entrepreneurs in growth-inducing sectors. Thus, entrepreneurs create the demand in financial sector, not the economic growth. Also Kar et al. (2011) studied the direction of causality for fifteen MENA countries and found that the direction is sensitive to the measurement of financial development and differs between countries.

3.3 Inflation and financial market development

Many studies have shown that there is a link between high rates of inflation and financial development. Common finding of the studies is that permanent increase in inflation has a negative effect on the long-run rate of real growth or on long-run level of

real activity. Theoretical literature suggests that permanently increasing inflation disturbs the financial sector of a country and complicates the effective allocation of resources. Further, the high levels of inflation affect credit market frictions in financial markets as a whole lowering the performance of banking sector and equity markets.

The inflation drives down the real rate of return on money and assets in general. The reduction in real rates of return exacerbates credit market frictions which leads to credit rationing. Credit rationing in turn leads to decrease in given loans, less efficient resource allocation, and diminishing intermediary activity. (Huybens and Smith 1998, 1999). The models of Azariadis and Smith (1996) show that countries with high initial inflation rates do suffer from credit rationing and decreasing long-run output levels. In countries where the initial inflation rates are low the inflation in turn does not cause credit rationing. Also Rousseau and Yilmazkuday (2009) find that higher level of financial development combined with low-inflation forwards financial deepening. Burger and Warnock (2006) state that stable inflation rates can ensure more developed bond markets and make country to rely more on domestic bonds.

The study of Boyd, Levine and Smith (2000) shows how inflation affects to banking sector activity, and to the rates of return on stocks, using data from 100 countries over 45-year period. The bank lending activity and stock market development seem to rapidly diminish when inflation increases. Study also shows that when inflation rates exceed 15 percent limit there can be seen a discrete drop in financial sector activity. Inflation also effects to stock market development according to Naceur, Ghazouani, and Omran (2005). They studied stock market development in MENA region and found that inflation has a negative and significant impact to stock market capitalization.

Kim and Lin (2010) study the link between inflation and financial development, using measures of financial depth on short- and long-run. They collected data from 87 countries over the period 1960-2005 and found that inflation has negative long-run effects on financial development. However short-run effects are either significantly or insignificantly positive depending on the income-level of the country. The financial development of low income countries benefits from the short-run inflation when the

effect is insignificant in high income countries. This long-term result is consistent with the results of the above mentioned studies.

3.4 Income level and financial market development

Many studies have shown that real income level is an important predictor for stock market development. The study of Yartey (2008) shows that a percentage point increase in GDP per capita increases stock market development by 7,23 percentage point. Garcia and Liu (1999) found that when income level increases by one billion dollars, market capitalization shows significant increase of 0,007 percentage points. Also Cherif and Gazar (2010) found that income level is an important determinant of stock market development. In nine regressions out of ten the last year's income level is a significant variable at 5% level when T-test is used.

Income level is also an important determinant in bond market development. Ağca, De Nicolò, and Detragiache (2007) find that the more developed the country is, measured with GDP per capita, and the more developed its financial markets and intermediaries are, the more firms rely on debt.

3.5 Intermediary development and financial market development

Financial intermediary development has a positive and significant effect on financial market development. Demirguc-Kunt and Levine (1996) found that as countries reach middle income level, stock markets and nonbank financial intermediaries start to increase their share of the financial system, and banks start to represent a smaller share of the financial system. When financial intermediaries develop also stock markets continue developing which leads to a conclusion that stock markets and financial intermediaries can be seen as compliments as they seem to grow simultaneously.

Also, Garcia and Liu (1999) state that banking sector and stock market are complements. They found high and significant correlation between stock market capitalization and two proxies of financial intermediary development: domestic credit to private sector as a % of GDP (correlation 0,66), and liquid liabilities as a % of GDP (correlation 0,73). Cherif and Gazdar (2010) also find the complementary relationship in MENA region. They found that when domestic credit to private sector increases by one percentage point, stock market capitalization, measured by domestic credit to the private sector as a % of GDP, increases by 1,22 percentage points.

The complementary relationship exists also between bond markets and intermediary development. Figure 9 in the study of Eichengreen and Luengnaruemitchai (2004) shows that when domestic debt securities increase also domestic credit provided by banking sector increase. Ağca, De Nicolò, and Detragiache (2007) find that the more developed the financial intermediaries in are in a country the more firms rely on debt, which in turn increases the issued credit in a country. Banks act as dealers and market makers in bond market which highlights the important role of them when developing liquid and well-functioning bond market. Thus, it is logical that bond market development and intermediary development are complements rather than substitutes.

4 DATA

The sample pool consists of 13 middle income countries and 15-year time period from 2000 to 2014. Thus, the data is treated as panel data. The countries are Brazil, China, Colombia, India, Indonesia, Malaysia, Mexico, Peru, Philippines, South Africa, Sri Lanka, Thailand and Turkey. World Bank classifies all the countries in the world into four categories based on their income level: High income, high middle income, low middle income, and low income. All the target countries in this study represent lower and upper middle income countries and together these two income groups can be seen as one group for middle income countries.

The data of lower and upper middle income countries is combined since separately they do not hold enough data for a valid research on all four dimensions of financial development. Also, it can be said that in high income countries financial systems have already developed to such point where they are developing in a slower and more stable pace. When certain level of financial development is achieved, improvements in the system through time are not as visible anymore as in countries with lower levels of development. Thus, lower income countries can show more dramatic changes trough time and provide more significant and interesting results.

Using only one income group as a sample pool allows more reliable interpretation of results. Combining all income groups into one sample pool would lead to biased results since country specific features of high- and low income countries most probably would differ dramatically. So many unobservable factors would have to be taken into account that the results would be hard to interpret. Using middle income countries as a sample pool allows the analyzing to focus more on the actual variable of interest, the control of corruption, and does not leave so much unobservable factors to be taken into account.

The data for all the other variables except for control of corruption is from World Bank Global Financial Development Database from June 2016. The dataset provides information on the financial development indicators for all the countries in the world.

The data for control of corruption is from The World Wide Governance Indicators (WGI) from year 2015 which is provided by World Bank. WGI is a dataset which summarizes the views on the quality of governance in industrial and developing countries.

4.1 Variables

To study the link between four dimensions of financial market development and control of corruption four dependent variables are used. One for each dimension, to build separate estimations on each dimension. The independent variable of interest is control of corruption and three other independent variables are used as control variables. The proxies for financial market focus on stock markets since the data for bond markets is occasionally limited. Also, including bond markets to the study would make the regressions used more complex since more control variables should be used. Further, control of corruption might affect to stock and bond markets differently so there should be separate regressions for both to come out with valid analysis. Because already four different dimensions are analyzed, making separate regressions for bond and stock markets would increase the amount of regressions so much that the bond markets are left out of this study, and for further topic of research.

4.1.1 Dependent variables

In this study, stock market capitalization to GDP is a proxy for financial markets depth. It is the total value of all listed shares in a stock market as a percentage of GDP and thus works as a valid indicator for the size of financial markets. Higher values of the proxy indicate about larger, and thus deeper, stock markets. For measuring financial access, market capitalization excluding top 10 largest companies to market capitalization is used. It is a variable which shows how concentrated the financial markets are. The proxy is suggested by Global Financial Development report (Global Financial Development Report… 2013: 23). Higher values of the proxy indicate better access for

smaller companies to stock market since the largest companies do not then hold as significant part of the market capitalization. Small values would indicate about concentrated stock markets. A higher degree of concentration means that it is harder for companies to access to financial markets.

Stock market turn-over ratio is a proxy for financial efficiency in this study. It represents the total value of shares traded during one-year period divided by the average market capitalization for the period. Turn-over ratio refers to increased liquidity which allows more efficient channeling of funds, which should lead to increased trading volumes and, in the end, to better price discovery. Thus higher values of the proxy signal about better efficiency in the stock market.

A proxy for financial stability is stock price volatility. It is a measure of average of the 360-day volatility of the national stock market index. It signals about the overall expectations on companies and via that, expectations on stability. Financially developed countries have developed ways to control for instability and thus should have more stable financial markets. Values of the proxy decreasing over time should then signal of financial development. However, as noticed during the last financial crisis, even the most developed countries cannot protect their stock markets from high volatility.

The above mentioned proxies hold the most data in the dataset which makes them favorable choices in addition to the reasons stated above. The proxies are crude measures of financial development and for example, turnover ratio might include other information which is not straightly related to efficiency. However, when measuring financial development in a cross-country analysis, these proxies provide a good directional information.

4.1.2 Independent variable of interest

The independent variable of interest, provided by The World Wide Governance Indicators (WGI), is control of corruption, an estimate of how the public power is

exercised for private gain, including both petty and grand forms of corruption. It also captures the state of elites and private interests. The variable ranges from approximately -2,5 to 2,5, where negative value represents weak governance performance and positive represents strong governance. The variable is built using six representative sources and sixteen non-representative sources. Different sources provide information about corruption, such as corruption among different groups and frequency of corruption, as well as information about the control of corruption, such as accountability, anti-corruption policy, and transparency. (Control of Corruption 2015). Since, according to previous studies, control of corruption has positive effect on financial development, the values of proxies of financial development are expected to increase with the independent variable. However, as Bahmani-Oskooee et al. (2013) argue, financial markets can develop faster in more corrupted countries. Thus, negative effect of control of corruption on financial development might not be a surprising result.

4.1.3 Control variables

Economic growth and income level are included as control variables, since larger, and high income countries tend to have deeper financial systems. (Global Financial Development Report… 2013: 23-25). Size is a relevant control variable also for financial access and efficiency based on the research of Cihak, Demirguc-Kunt, Feyen, and Levine (2015) since countries like China and India score in the top quartile for financial market access. Countries with better financial efficiency are large developing, and developed countries such as Europe, China, India, and North America. The control variable for country size is GDP. GDP per capita as a proxy for income level development.

As previous studies show, including financial intermediary development as one of the determinants is important when measuring financial market development. In this study domestic credit to private sector as a % of GDP is used since it measures the development of the role of banks in providing long-term financing. It is also a better proxy for financial intermediary development compared to other widely used proxy,

broad money (M3) supply to GDP, which measures the size of the size of the banking sector in a country (Cherif and Gazdar 2010, Naceur, Ghazouani, and Omran 2005).

According to previous literature also inflation has significant effect on financial markets development. The measure for inflation is a country level year average of Consumer Price Index (CPI) which measures price change from the perspective of the purchaser. CPI measures the annual price change of goods and services which makes it reliable and relevant measure of inflation. The data is from World Bank Financial Development database. The base year of the index is 2010.

4.2 Descriptive statistics

This chapter first presents the descriptive statistics for the dependent and independent variables. Second, correlations between dependent and independent variables are shown to build expectations on estimates. Third, diagnostics for multicollinearity are shown to prove the validity of used independent variables. The descriptive statistics are shown for middle income countries as one group in Table 1.

Table 1. Descriptive statistics

Descriptive statistics					
	N	Mean	Std Dev	Minimum	Maximum
Access	189	52,75	14,33	18,18	92,84
Depth	195	59,79	52,30	7,27	256,50
Efficiency	195	57,07	58,70	2,47	313,18
Stability	193	23,10	8,79	7,77	64,34
Control of corruption	169	-0,26	0,32	-1,13	0,61
Inflation	195	87,35	21,51	19,28	140,36
Income	195	3786,00	2383,00	572,06	8865,00
Log GDP	195	26,54	1,29	23,43	29,93
Institutional development	195	59,68	43,49	13,45	160,13

Table 2 shows correlations between dependent and independent variables. According to Evans (1996) correlation is moderate if it varies between 0,40-0,59, strong if it varies between 0,60-0,79 and very strong between 0,80-1,0. According to Table 2 the control of corruption is expected to have positive effect on financial development from the

aspects of depth, access and stability. Correlation of control of corruption with dependent variables is highest for depth showing moderate positive correlation. In contrast, control of corruption is expected to have negative impact on efficiency. However, the correlation is moderate. Based on previous studies control of corruption should have positive effect on financial development which is why the third hypothesis expects positive correlation. Because the correlation is only moderate, the expectation for the coefficient follows the third hypothesis.

Based on previous studies inflation should have negative correlation with dependent variables since increasing inflation is shown to be harmful for financial development. However, for access and depth the correlation is positive, although low, which indicates that inflation might also be beneficiary for financial development. Interestingly income level has negative correlation with access. However, the correlation is not strong. For depth, efficiency and stability the coefficient is expected to be positive. Highest correlation, although moderate, with GDP exists on efficiency and the correlations with all dependent variables are positive. Thus, the coefficients for GPD are expected to be positive. As mentioned earlier the bigger the country is, the more developed the financial markets usually are. GDP is shown in logarithmic form for clarity. Institutional development shows strong correlation with access and depth so the coefficient is strongly expected to be positive. Correlations with stability and efficiency are low but the signs are as expected according to previous studies, positive for efficiency and negative for stability.

Table 2. Correlations – Independent and dependent variables

Pearson Correlation Coefficients - Dependent variable with independent variable

	Control of corruption	Inflation	Income	Log GDP	Institutional development
Access	0.12183	0.14653	-0.16923	0.27882	0.62306
	(0.1190)	(0.0442)	(0.0199)	(0.0001)	(<.0001)
	165	189	189	189	189
Depth	0.53903	0.23790	0.27254	0.04045	0.73425
	(<.0001)	(0.0008)	(0.0001)	(0.5745)	(<.0001)
	169	195	195	195	195
Efficiency	-0.06004	-0.07664	0.06410	0.52567	0.20558
	(0.4381)	(0.2869)	(0.3733)	(<.0001)	(0.0039)
	169	195	195	195	195
Stability	-0.14624	-0.38274	0.03573	0.18317	-0.22712
	(0.0586)	(<.0001)	(0.6218)	(0.0108)	(0.0015)
	168	193	193	193	193

Notes: Numbers in parentheses are *p* -values.
The last row for each correlation is the number of observations.

It is appropriate to test variables for possible multicollinearity. Multicollinearity arises if the correlation between two independent variables is near to unity. This makes the variances of the independent variables inflated. Multicollinearity may lead to lack of statistical significance of individual independent variable and thus estimation and interpretation of its coefficient becomes problematic.

Multicollinearity is tested by Eigensystem analysis of correlation matrix. The analysis provides eigenvalues and condition numbers for variables. Eigenvalues ($\lambda_1 \ldots \lambda_p$) are defined through correlation matrix. The corresponding condition number of correlation matrix is defined as the square root of the ratio of maximum eigenvalue of the matrix to each individual eigenvalue:

$K_j = \sqrt{(\frac{\lambda max}{\lambda \mathrm{j}})}$, j = 1,2,…,p,

where K is the condition number of correlation matrix. (Belsey, Kuh, and Welsch 1980).

According to Belsey et al, if eigenvalue is close to zero and the corresponding condition number of a variable is around 10, regression estimates might be affected by dependencies. Values larger than 100 indicate multicollinearity. For each variable, also the proportions of the variances of the estimates are accounted. Collinearity can be a problem when a variable associated with a high condition index contributes strongly to the variance of two or more variables. As can be seen from Table 3, none of the independent variables have large condition values (column Condition Index). Thus, they do not suffer from multicollinearity and can be used in the same regression.

Table 3. Collinearity Diagnostics - Eigensystem analysis of correlation matrix.

Collinearity Diagnostics (intercept adjusted)							
Access							
			Proportion of Variation				
Number	Eigenvalue	Condition Index	Control of Corruption	Inflation	Income	Log GDP	Institutional development
1	1,9241	1,0000	0,0531	0,0458	0,0725	0,0280	0,0754
2	1,3836	1,1793	0,0751	0,1776	0,0101	0,1795	0,0003
3	0,8625	1,4936	0,0005	0,0113	0,1918	0,0515	0,4074
4	0,6402	1,7336	0,0039	0,7389	0,0007	0,3274	0,0854
5	0,1895	3,1866	0,8675	0,0265	0,7250	0,4137	0,4315
Depth							
			Proportion of Variation				
Number	Eigenvalue	Condition Index	Control of Corruption	Inflation	Income	Log GDP	Institutional development
1	1,9338	1,0000	0,0518	0,0499	0,0716	0,0296	0,0747
2	1,3762	1,1854	0,0803	0,1676	0,0126	0,1813	0,0004
3	0,8566	1,5025	0,0007	0,0042	0,1998	0,0456	0,4132
4	0,6409	1,7370	0,0021	0,7405	0,0001	0,3490	0,0643
5	0,1925	3,1694	0,8652	0,0378	0,7159	0,3945	0,4474
Efficiency							
			Proportion of Variation				
Number	Eigenvalue	Condition Index	Control of Corruption	Inflation	Income	Log GDP	Institutional development
1	1,9338	1,0000	0,0518	0,0499	0,0716	0,0296	0,0747
2	1,3762	1,1854	0,0803	0,1676	0,0126	0,1813	0,0004
3	0,8566	1,5025	0,0007	0,0042	0,1998	0,0456	0,4132
4	0,6409	1,7370	0,0021	0,7405	0,0001	0,3490	0,0643
5	0,1925	3,1694	0,8652	0,0378	0,7159	0,3945	0,4474
Stability							
			Proportion of Variation				
Number	Eigenvalue	Condition Index	Control of Corruption	Inflation	Income	Log GDP	Institutional development
1	1,9250	1,0000	0,0529	0,0485	0,0728	0,0286	0,0752
2	1,3774	1,1822	0,0787	0,1708	0,0114	0,1838	0,0004
3	0,8587	1,4973	0,0006	0,0045	0,1986	0,0443	0,4163
4	0,6465	1,7255	0,0021	0,7369	0,0001	0,3484	0,0631
5	0,1925	3,1626	0,8657	0,0394	0,7172	0,3950	0,4450

5 METHODOLOGY

The link between financial market development and control of corruption is studied using panel data which covers data for upper middle income and lower middle income countries for the period of 2000-2014. The goal is to empirically show if control of corruption can explain the variation of financial development in upper middle income and lower middle income countries. Panel data enables to take into account the development of control of corruption over time in a country level and study if it has effect on a country's financial market development. Four dimensions of financial development (access, depth, efficiency, and stability) are used to account the effect of control of corruption. This allows to see if the control of corruption effects to dimensions individually and separate which dimensions of financial development are affected most by control of corruption.

5.1 Arellano – Bond difference GMM estimator

The simplest way to study the effect of independent variable on dependent variable is to use simple Ordinary Lear Squares (OLS) regression method where variable of interest and group of control variables are regressed on independent variable. However, for dynamic panels OLS is not appropriate method since several econometric problems may arise due to the inclusion of time. The first problem is endogeneity. Possible unobserved heterogeneity may arise from omitted variables in the error term, which consists of country-specific effects and observation-specific errors. The direction of causality with independent variable and regressors may be unclear and thus independent variables may be correlated with error term. Also, country-specific characteristics, also known as fixed effects, which are included in the error term, may be correlated with independent variables. The effect of long-term unobservable country-specific factors and endogeneity of independent variables have to be accounted. (Roodman 2009).

Using fixed-effects estimation technique, for example two-stage least squares (2SLS) method, to account these problems would be appropriate since it uses exogenous variables, called as instrumental variables to create new exogenous variables in place of endogenous variables. Instrumental variable is a variable not correlated with error term but correlated to the explanatory variable correlating with error term and thus, exogenous. Plugging the new variable, created by instrumental variable, into the regression, in place of the endogenous variable, should solve the endogeneity problem. However, dynamic endogeneity might occur. The values of independent variables at time t will probably be related to the values of dependent variable at time $s < t$. Thus, standard fixed-effects model might not be the best solution. (Roodman 2009).

Also, more needs to be accounted for considering appropriate model for dynamic panel data. Models used for estimating relationship of independent variable and independent variable through time tend to include lagged dependent variable to account the effect of the dependent variable itself to its future values. The problem with including lagged dependent variable is that it gives rise to autocorrelation. Autocorrelation tells about the tendency of observations made at different time points to be related to one another. The last problem with panel dataset is that it might cover short time dimension (T) and larger amount of observable targets (N). In large-T panels, shocks to the country-specific factors shown in the error term will decline with time when small-T panels suffer more from the shocks shown in the error term. (Roodman 2009).

To account the above-mentioned problems, the Arellano – Bond (1991) difference GMM estimation method first proposed by Holtz-Eakin, Newey and Rosen (1998) is used. It accounts the endogeneity problem by making endogenous independent variables predetermined. This happens by using lagged levels of the endogenous regressors as instruments in addition to exogenous instruments. This way the endogenous variables become predetermined and not correlated with the error term in the used equation. To account the problem of country-specific factors affecting explanatory variables difference GMM uses first-differences. The basic regression with lagged dependent variable

$$y_{it} = \alpha y_{it\text{-}1} + x'_{it}\beta + \Delta u_{it}$$

becomes

$$\Delta y_{it} = \alpha \Delta y_{it\text{-}1} + \Delta x'_{it}\beta + \Delta u_{it}$$

by the first-differencing. X' represents all the explanatory variables. Also the error term is differenced which makes the fixed effect removed since it does not vary with time. The error term can be expressed as

$$u_{it} = v_i + e_{it}$$

and after differencing

$$u_{it} - u_{i,t\text{-}1} = (v_i - v_i) + (e_{it} - e_{i,t\text{-}1}) = e_{it} - e_{i,t\text{-}1}$$

or Δe_{it} since the country-specific effect is zero. Since differencing removes the country's fixed effect, the above-mentioned problem with small-T large-N panels does not occur anymore. Finally, first-differencing the lagged dependent variable removes possible autocorrelation.

As stated, GMM method requires instrumental variables to be used. Instrumental variables are needed when the correlation between independent and dependent variable does not account the causal relationship of them. Instrumental variable helps to reveal the causal effect by causing changes in the independent variable while having no independent effect on the dependent variable. Appropriate instrumental variables should be correlated with the endogenous regressors and orthogonal to the errors. Orthogonality is present if the residuals of the model of interest are uncorrelated with the instrumental variables used. This means that there is no information available in residual that could be used to test the wanted hypothesis. The endogenous variables can be used as instruments with proper lags. Two or more lags of the variables are required

so they are not correlated with current error term. The first lag is correlated with error term through first-differencing

$$\Delta y_{i,t\text{-}1} = y_{i,t\text{-}1} - y_{i,t\text{-}2}.$$

since the differenced current error term includes first lag of country-specific effect

$$\Delta v_{it} = v_{it} - v_{i,t\text{-}1}.$$

The second lag is correlated with the first lag of the differenced error term but not with the current differenced error term. Thus, second lags of differenced endogenous variables can be used as instruments. (Roodman 2009).

In this study all the independent variables are considered endogenous since none of them cannot be seen as strictly exogenous. All the independent variables are suitable for instruments after taking second lags. Thus, in the GMM estimation for this study, second lags of the independent variables are used as instruments. In the estimation, two-step estimator is calculated. This means that the standard covariance matrix is robust to autocorrelation and heteroskedasticity that is panel-specific. The model used for GMM analysis is following:

$$logFD_{it} = \alpha_{it} + \beta_1 \Delta logFD_{i,t\text{-}1} + \beta_2 \Delta CORCONT_{it} + \beta_3 \Delta logINF_{it} + \beta_4 \Delta logINCOME_{it} + \beta_5 \Delta logGDP_{it} + \beta_5 \Delta logINTDEV_{it} + \varepsilon_{it}.$$

Where FD is one of the proxies for financial development (access, depth, efficiency or stability), CORCONT is the level of control of corruption, INF is inflation, INCOME is income level, GDP is gross domestic product and INTDEV institutional development. All the variables except control of corruption are transformed info logarithmic form for reducing variance. Control of corruption gets only values between range of -2,5 – 2,5, so due to small range and negative values, it is not reasonable to transform it into logarithmic form.

5.2 Sargan test for over-identification

Sargan test is used for testing if the instruments used in the model are jointly valid. Null hypothesis is that the instrumental variables are uncorrelated to residuals (exogenous). If the null hypothesis cannot be rejected it can be said that the model is identified. In other words, the instruments used are valid. The test result is computed from residuals from regression of instrumental variables. The model is said to be identified if the amount of used appropriate instruments and endogenous variables is the same. Over-identified model would have residuals correlated with instrumental variables and thus the amount of appropriate instruments would be greater than the amount of endogenous regressors.

If the model has too many instruments reducing the amount of lags used helps since instrument is used for every lag. If the model is over-identified and the minimum amount of two lags is used, the amount of instruments can also be reduced by reducing the amount of endogenous variables. This of course is not preferable if all the control variables are seen as important for the estimation. For the model to pass the Sargan test the null cannot be rejected and thus higher *p*-values are preferable. (Roodman 2009).

5.3 Test for autocorrelation

Autocorrelation occurs if observations made at different time points are related to one another. Test for autocorrelation is appropriate since the model used includes lagged dependent variable. This can cause the errors included in the lagged differenced dependent variable to be correlated with the errors included in the differenced dependent variable. Since current differenced error is mathematically related to first lag of differenced error due to shared term of error in first lag, first-order serial correlation is expected in differences.

To confirm that first-order serial correlation does not exist in levels, second-order correlation in differences has to be checked. Second-order correlation in differences would mean that correlation exists between $v_{i,t\text{-}1}$ in Δv_{it} and $v_{i,t\text{-}2}$ in $\Delta v_{i,t\text{-}2}$.

Assumption in the test for autocorrelation is that errors are not correlated across individuals. Positive autocorrelation would mean that increase in one time-series leads to an increase in the other time-series. Negative autocorrelation means that increase in one time-series causes decrease in the other time series. The test results for autocorrelation are reported as AR(1) for first-order autocorrelation and AR(2) for second-order autocorrelation. (Roodman 2009).

6 RESULTS

According to various studies corruption can have effect on financial development. Mainly studies argue that corruption has negative effect on financial development but also opposing views exist. Most of the earlier studies have focused using corruption or control of corruption as an interaction term with financial development to study economic growth. Studies about straight relationship of financial development and corruption use only certain proxy for financial development. This kind of approach ignores the fact that financial system consists of multiple dimensions which might be affected by corruption in different ways.

This study shows the effect of control of corruption on four dimensions of financial development and thus widens the base of studies focusing on the straight relationship of corruption and financial development. Its also adds approach where financial system development is seen as multidimensional and where corruption can have different effect on each dimension. This chapter represents the results of difference GMM estimation of control of corruption on financial development, where four dimensions of financial system (access, depth, efficiency and stability) are recognized and proxies of these are used as dependent variables for measuring the financial development in 13 middle income countries through years 2000-2014.

It was noticed during the tests that using all the control variables causes Sargan test to have *p*-value close to unity which may signal about problem of too many instruments. Significant Sargan test *p*-value signals about same problem. Limiting the lag depth or limiting the amount of variables instrumented are the most common solutions (Roodman 2009). Limiting the lag depth does not work as a solution since the minimum of two lags is already used so the amount of variables instrumented has to be reduced. Since GDP and GDP per capita are usually highly correlated variables, even if no multicollinearity is detected, another one is omitted for the sake of the estimation to succeed. In this study, income level is omitted. Tables 4 to 8 show the results for

difference GMM estimation for each dependent variable. They also show test results for autocorrelation and Sargan test.

6.1 Access

Table 4 shows that control of corruption has very significant and positive effect on market capitalization excluding top 10 companies to market capitalization (access). This supports the first hypothesis and the expectations based on correlations, stated earlier in this study. Also inflation has significant and positive effect on access showing that it can surprisingly forward financial development. The coefficients for GDP and institutional development are significant (institutional development only in 10% level) but negative, which is surprising since growth and the growth of domestic credit to private sector are expected to forward financial development. The model passes the Sargan test of appropriate amount of instruments and also the test for no autocorrelation in differences and levels.

Table 4. Difference GMM estimation results for access.

Difference GMM estimates	
Explanatory variables	Dependent variable
	Access
Lagged access	0,15534
	(0,0072)***
Control of corruption	0,379693
	(<.0001)***
Log Inflation	0,502203
	(<.0001)***
Log Institutional development	-1,8332
	(0,0567)*
Log GDP	-0,1213
	(0,0007)***
Sargan Test	103,49
	(0,9098)
AR(1)	-1,89
	(0,9703)
AR(2)	-1,26
	(0,8969)

Notes: Figures in parentheses are p-values.
Significance levels of p-values are shown as
*(10%) **(5%) and ***(1%).
H0 for AR(1) and AR(2): Autocorrelation is
No. of countries in each regression is 13.

6.2 Depth

Table 5 shows that control of corruption has highly significant effect on stock market capitalization to GDP (depth). The effect is positive which was expected. Also the coefficients of lagged depth, inflation and GDP are significant and positive as expected. Institutional development does not have significant effect on depth which is somewhat

surprising since correlation between these two variables is high and positive. The model is identified due to Sargan test and no autocorrelation is reported.

Table 5. Difference GMM estimation results for depth.

	Depth
Lagged depth	0,190813
	(0,002)***
Control of corruption	0,194179
	(0,0048)***
Log Inflation	-0,72727
	(0,0006)***
Log Institutional	-0,10418
development	(0,1923)
Log GDP	0,990767
	(<.0001)***
Sargan Test	114,26
	(0,7233)
AR(1)	-0,2
	(0,5776)
AR(2)	-2,2
	(0,986)

Notes: Figures in parentheses are p-values.
Significance levels of p-values are shown as *(10%) **(5%) and ***(1%).
H0 for AR(1) and AR(2): Autocorrelation is
No. of countries in each regression is 13.

6.3 Efficiency

Control of corruption has also very significant effect on stock market turn-over ratio (efficiency) as can be seen from the Table 6. The sign of the coefficient is negative which is expected according to correlations but unexpected according to third

hypothesis. Also lagged efficiency has explanatory power. It is surprising to notice that none of the control variables have significant effect on efficiency. Since selected control variables seem to be insufficient, different changes to set of control variables is made. Income, which was earlier omitted from the set because it was causing too many instruments in the estimation, is included now to the set of control variables. Then different combinations of control variables are made to test which set has the most explanatory power on stability. The results of these tests are not shown in this study to save space. All the combinations were bad in some way. One variable per estimation showed significance at 5% or lower level. The most successful results are given by the estimation where inflation is omitted and income, GDP and institutional development included in addition to control of corruption. The variables in this estimation are however significant at 10% level which is not that desirable result. Thus, finding more suitable control variables for turn-over ratio or changing the measure for efficiency is suggested for further studies.

Table 6. Difference GMM estimation results for efficiency

Difference GMM estimates	
Explanatory variables	Dependent variable
	Efficiency
Lagged efficiency	0,494841
	(<.0001)***
Control of corruption	-0,54057
	(0,0011)***
Log Inflation	-0,13456
	(0,6065)
Log Institutional	-0,27609
development	(0,2398)
Log GDP	-0,06189
	(0,6417)
Sargan Test	128,92
	(0,363)
AR(1)	-3,11
	(0,9991)
AR(2)	-0,41
	(0,6609)

Notes: Figures in parentheses are p-values.
Significance levels of p-values are shown as
*(10%) **(5%) and ***(1%).
H0 for AR(1) and AR(2): Autocorrelation is
No. of countries in each regression is 13.

6.4 Stability

Table 7 shows insignificant effect of variable of interest on stock price volatility (stability). Of other variables only lagged stability and institutional development show significance. Since selected control variables seem to be insufficient, above mentioned changes to set of control variables is again made. The best combination is to omit inflation and replace it with income. The results are shown in Table 8. Control of

corruption has very significant and negative effect on volatility which is expected according to the fourth hypothesis. All the control variables show significance but the signs of the coefficient for GDP and institutional development are not as expected according to correlations. Even if financial market stability is generally expected to increase as the values of financial development determinants improve, opposite can be possible. As the Global Financial Development Report (2013: 37) shows, volatility in financial markets has increased between years 2008 and 2010 versus years 2000-2007. Thus, it might not be that surprising that for example institutional development, measured with domestic credit to private sector as a % of GDP, can forward volatility. Unsustainable lending, in the end, was the main reason for the financial crisis in 2007.

Table 7. Difference GMM estimation results for stability – Income omitted and inflation included

Difference GMM estimates	
Explanatory variables	Dependent variable
	Stability
Lagged stability	0,66257
	(<.0001)***
Control of corruption	-0,06587
	(0,4082)
Log Inflation	0,016797
	(0,9144)
Log Institutional	0,426198
development	(0,0041)***
Log GDP	-0,12321
	(0,1584)
Sargan Test	134,6
	(0,2429)
AR(1)	-2,5
	(0,9939)
AR(2)	-1,32
	(0,907)

Notes: Figures in parentheses are *p*-values.
Significance levels of *p*-values are shown as
*(10%) **(5%) and ***(1%).
H0 for AR(1) and AR(2): Autocorrelation is
No. of countries in each regression is 13.

Table 8. Difference GMM estimation results for stability – Inflation omitted and income included.

Difference GMM estimates	
Explanatory variables	Dependent variable
	Stability
Lagged stability	0,895868 (<.0001)***
Control of corruption	-0,23359 (0,0048)***
Log Income	3,475524 (<.0001)***
Log Institutional development	1,306471 (<.0001)***
Log GDP	-1,18455 (<.0001)***
Sargan Test	80,31 (0,9992)
AR(1)	-2,23 (0,987)
AR(2)	-1,83 (0,9664)

Notes: Figures in parentheses are p-values.
Significance levels of p-values are shown as
*(10%) **(5%) and ***(1%).
H0 for AR(1) and AR(2): Autocorrelation is
No. of countries in each regression is 13.

Overall, it seems that the effect of control of corruption is significant for all aspects of financial development although it seems to improve only access, depth and stability. For more robust results, multiple other GMM estimations are made. The results are presented in the next section.

6.5 Robustness tests

In total of four GMM estimations are made for each dependent variable for robustness testing. Different estimations test if omitting some control variable and all of the control variables changes the significance of the variable of interest. This approach works as a robustness test. If control of corruption stays significant when one control variable at a time is omitted, it can be argued that control of corruption has an effect on financial development but it is complimented by control variables. If control of corruption stays significant when all the control variables are omitted, it can be argued that control of corruption individually has an effect on financial development.

6.5.1 Access

Table 9, column one shows that when inflation is omitted, the coefficient for control of corruption stays very significant and positive. Also, the effects of all the other variables stay significant, and GDP and institutional development become positive as expected. Also, when institutional development is omitted (column two) all the variables stay very significant and interestingly the coefficient GDP becomes negative again. Results in column three show that when GDP is omitted all the variables stay significant. The coefficient for institutional development becomes positive. Institutional development and GDP seem to suffer from Simpson's paradox, a statistical problem where effect appears in some data groups but disappears or reverses with combination of groups (Pearl 2014). The three first models pass the Sargan and autocorrelation tests.

In the model of last column, all the control variables are omitted. The amount of lags is changed from two to six to increase the amount of instruments since omitting all the control variables collapses the instrument amount. Model is identified and does not suffer from autocorrelation. Lagged access and control of corruption stay highly significant. The coefficients for control of corruption in all the regressions made show that control variables have complementary effect on it. The value of the coefficient for

control of corruption is clearly the highest when all the control variables are included. Thus, even if it seems that control of corruption individually has effect on financial access measured with market capitalization excluding top 10 companies to market capitalization, the control variables complement the effect.

Table 9. Difference GMM robustness estimation results for access.

Difference GMM estimates				
Explanatory variables	Dependent variable			
	Access			
	1	2	3	4
Lagged access	0,183522	0,218566	0,130828	0,42694
	(<.0001)***	(<.0001)***	(0,0016)***	(<.0001)***
Control of corruption	0,136177	0,168352	0,069784	0,083781
	(0,0003)***	(<.0001)***	(<.0001)***	(<.0001)***
Log Inflation		0,441575	0,19909	
		(<.0001)***	(<.0001)***	
Log Institutional development	0,087605		0,008917	
	(0,0012)***		(0,7825)	
Log GDP	0,058849	-0,13846		
	(<.0001)***	(0,0007)***		
Sargan Test	145,43	133,92	121,94	149,67
	(0,1022)	(0,2766)	(0,5607)	(0,103)
AR(1)	-1,92	-1,89	-1,67	-2,26
	(0,9728)	(0,9709)	(0,9524)	(0,9881)
AR(2)	0,33	0,2	0,16	1,14
	(0,3719)	(0,4191)	(0,4351)	(0,1263)

Notes: Figures in parentheses are *p*-values.
Significance levels of *p*-values are shown as *(10%) **(5%) and ***(1%).
H0 for AR(1) and AR(2): Autocorrelation is absent.
No. of countries in each regression is 13.
Model in 4th column uses 6 lags.

6.5.2 Depth

The results for depth (Table 10) are consistent for control of corruption when one control variable at a time is omitted. The sign of coefficient for control of corruption stays positive and significant. The effect of institutional development becomes significant and negative which is unexpected since the correlation between the variables is strong and positive. Inconsistency can only be seen with inflation when GDP is omitted. The effect of inflation becomes positive which is against expectations. In the third model, three lags are used since the model with two lags did not pass the Sargan test. The first model passes the Sargan test only in 1% level. Increasing the amount of lags from two to three does not improve the results, it makes the instrument amount too large. All the models pass the autocorrelation tests in second level which is more important, since it detects autocorrelation in levels.

For the model in fourth column, where all the control variables are omitted, seven lags are used to cover proper amount of instruments. The coefficient for control of corruption stays positive and very significant and the value of it is actually highest in this regression. The model passes the Sargan and autocorrelation tests. All in all, it can be said that control of corruption individually has positive and significant effect on financial depth measured with stock market capitalization to GDP.

Table 10. Difference GMM robustness estimation results for depth.

Difference GMM estimates				
Explanatory variables	Depedent variable			
	Depth			
	1	2	3	4
Lagged depth	0,447226	0,113429	0,635104	0,797195
	(<.0001)***	(0,034)**	(<.0001)***	(<.0001)***
Control of corruption	0,255483	0,226406	0,172538	0,23942
	(<.0001)***	(<.0001)***	(0,0317)**	(<.0001)***
Log Inflation		-1,49892	0,581024	
		(<.0001)***	(<.0001)***	
Log Institutional	-0,42075		-0,4531	
development	(<.0001)***		(<.0001)***	
Log GDP	0,482665	1,229454		
	(<.0001)***	(<.0001)***		
Sargan Test	152,18	106,33	147,48	153,75
	(0,0495)**	(0,8854)	(0,9779)	(0,2739)
AR(1)	-1,81	3,03	-2,19	-2,27
	(0,9652)	(0,00121)***	(0,9859)	(0,9884)
AR(2)	-2,2	-1,58	-2,58	-2,59
	(0,9861)	(0,9429)	(0,9951)	(0,9952)

Notes: Figures in parentheses are *p*-values.
Significance levels of *p*-values are shown as *(10%) **(5%) and ***(1%).
H0 for AR(1) and AR(2): Autocorrelation is absent.
No. of countries in each regression is 13.
Model in 3rd column uses 3 lags. Model in 4th column uses 7 lags.

6.5.3 Efficiency

Table 11 shows results of robustness tests for efficiency. Lagged dependent variable stays very significant through testing. The effect of control of corruption stays significant and negative in estimations where inflation or GDP is removed. However, the significance level drops from 1% to 5% level when GDP is removed. Coefficient for

inflation becomes significant when institutional development or GDP is omitted. Also coefficient for institutional development becomes significant but surprisingly, negative. GDP has significant, and again negative effect on efficiency when institutional development is omitted. All the models are identified and they pass the autocorrelation tests.

When only control of corruption is used as a regressor, the Sargan test is passed. Seven lags are used for this estimation. However, because the sign of the coefficient changes, the real effect of control of corruption on turnover ratio measuring efficiency stays unclear. As discussed in the previous section, it seems that the control variables used are not suitable for predicting changes in efficiency. The model omitting inflation and including income is giving the most significant results although still not favorable. This model is also used for robustness tests (estimations not showed in this study), but the results are as inconsistent as with the set of control variables used in Table 11. As stated in the previous result section for efficiency, finding more suitable control variables for turn-over ratio, or finding more suitable proxy for financial efficiency is left for further research.

Table 11. Difference GMM robustness estimation results for efficiency.

Difference GMM estimates				
Explanatory variables	Dependent variable			
	Efficiency			
	1	2	3	4
Lagged efficiency	0,517898	0,684057	0,603063	0,5092
	(<.0001)***	(<.0001)***	(<.0001)***	(<.0001)***
Control of corruption	-0,49509	-0,0465	-0,26548	0,241612
	(0,0006)***	(0,6654)	(0,031)**	(0,0206)**
Log Inflation		1,02649	0,529577	
		(0,0004)***	(0,0044)***	
Log Institutional	-0,12025		-0,62829	
development	(0,0405)**		(0,0049)***	
Log GDP	-0,26524	-0,55568		
	(0,2511)	(<.0001)***		
Sargan Test	129,17	113,63	143,5	161,15
	(0,381)	(0,758)	(0,1233)	(0,1557)
AR(1)	-3,33	-3,46	-2,97	-2,80
	(0,9996)	(0,9997)	(0,9985)	(0,9974)
AR(2)	-0,38	-0,18	-0,24	-0,20
	(0,6495)	(0,5733)	(0,5947)	(0,5783)

Notes: Figures in parentheses are *p* -values.
Significance levels of *p* -values are shown as *(10%) **(5%) and ***(1%).
H0 for AR(1) and AR(2): Autocorrelation is absent.
No. of countries in each regression is 13.
Model in 4th column uses 7 lags.

6.5.4 Stability

The results for stability are shown in table 12. The set of control variables differs from the one used in robustness tests for other dimensions (access, depth and efficiency). As stated in the previous result section for stability, appropriate set of control variables omits inflation and replaces it with income. The coefficient of control of corruption stays negative and significant through estimations, when one variable at a time is removed. Although the significance level is only 10% when income is omitted. It seems that control variables have complimentary effect on each other. Omitting income makes

GDP insignificant and omitting GDP makes income and institutional development insignificant. Thus income has complimentary effect on GDP and GDP on income and institutional development. Control variables also have complimentary effect on control of corruption as can be seen from the fourth column. The effect of control of corruption becomes insignificant. All models pass the Sargan test and autocorrelation does not exist in any of the models. Results partly support the fourth hypothesis. Control of corruption has negative and significant effect on stock market volatility but the effect is supported by control variables. Control of corruption individually does not have effect on financial stability.

Table 12. Difference GMM robustness estimation results for stability.

Difference GMM estimates				
Explanatory variables	Dependent variable			
	Stability			
	1	2	3	4
Lagged stability	0,745976	0,819846	0,628307	0,589597
	(<.0001)***	(<.0001)***	(<.0001)***	(<.0001)***
Control of corruption	-0,15574	-0,45142	-0,16891	-0,03743
	(0,0504)*	(<.0001)***	(0,0246)**	(0,4166)
Log Income		1,76288	-0,05273	
		(0,0002)***	(0,636)	
Log Institutional development	0,775197		0,072519	
	(<.0001)***		(0,4934)	
Log GDP	-0,05061	-0,47393		
	(0,1268)	(0,0007)***		
Sargan Test	132,4	117,02	156,43	158,91
	(0,3082)	(0,6821)	(0,9307)	(0,187)
AR(1)	-2,47	-2,42	-2,43	-2,73
	(0,9932)	(0,9923)	(0,9924)	(0,9968)
AR(2)	-1,39	-0,99	-1,25	-1,28
	(0,9179)	(0,8388)	(0,895)	(0,9001)

Notes: Figures in parentheses are *p* -values.
Significance levels of *p* -values are shown as *(10%) **(5%) and ***(1%).
H0 for AR(1) and AR(2): Autocorrelation is absent.
No. of countries in each regression is 13.
Model in 4th column uses 7 lags.

7 DISCUSSION

The empirical results support hypotheses one and two stating that control of corruption has positive effect on financial access and depth. The effect of control of corruption on access is complemented by control variables, but the effect on depth is even stronger when all the control variables are excluded. Estimations for efficiency suffer from statistical problem called Simpson's paradox. It argues that in empirical analysis, the statistical significance and sign of coefficient of variables changes with including and omitting other variables in the model. The results were so inconsistent that the effect of control of corruption on efficiency, measured with turn-over ratio, could not be interpreted. Regardless of changing the set of control variables, no impressing results were reported. Suggestion for future studies would be to use different proxies for financial efficiency or to choose control variables which are more suitable for predicting turn-over ratio. Using other proxies for measuring access, depth and stability would also be appropriate to strengthen the results of this study.

The standard errors from two-step GMM estimation are downward biased (Roodman 2009). Thus, to get more robust results, this has to be taken into account. Future studies about this subject can be improved by correcting the bias of standard errors. Roodman argues that difference GMM might perform poorly if past levels do not provide important information about future values, in other words, if they work as weak instruments. Thus, using another approach, system GMM might be appropriate as additional robustness test. It uses past changes to predict current levels. System GMM however uses more instruments than difference GMM so for using it, it would be appropriate to use larger number of countries to avoid over-identification. More countries and longer time-period could also provide more valid results.

8 CONCLUSION

Numerous studies show that the level of corruption has both direct and indirect effect to the financial development. This study widens the base of studies focusing on the straight relationship of corruption and financial development. Since studies focusing on straight relationship of corruption and financial development observe financial development as a whole with one proxy variable, this study adds approach where financial system development is seen as multidimensional and where corruption can have different effect on each dimension. This study shows the effect of control of corruption on four dimensions of financial development; access, depth, efficiency and stability.

The data for this study consists of 13 middle income countries and the time interval covers 15 years, from 2000 to 2014. The effect of control of corruption on financial development is empirically tested using, difference GMM estimation method. The estimation method accounts the most common problems related to panel data, country-specific fixed effects and endogeneity of explanatory variables.

The results support the first and the second hypothesis stating that control of corruption has very significant and positive effect on financial access and depth. For depth, the effect stays persistently through robustness tests and even strengthens when all the control variables are omitted. Thus, the effect of control of corruption on financial depth does not rely on the complimentary effect of control variables. The effect for access also stays persistently through robustness tests but is complemented by control variables. The significance of all the control variables is also persistent through estimations except for institutional development on access when GDP is omitted. The effect of institutional development on depth is surprisingly significant and negative in robustness tests which is unexpected since the correlation between the variables is strong and positive. As a conclusion, it can be said that control of corruption has positive and significant effect on financial depth, measured with stock market capitalization to GDP, and on access,

measured with market capitalization excluding top 10 companies to market capitalization.

For financial efficiency results are harder to interpret because the sign of the coefficient changes when all the control variables are omitted. The real effect of control of corruption on efficiency stays unclear. It also seems that the control variables used are not suitable for predicting changes in turn-over ratio. Different combinations of control variables presented in this study are used to find more suitable set, but none of the made estimations (not showed in this study) showed significant and consistent results. Finding more suitable control variables for turn-over ratio, or finding more suitable proxy for financial efficiency is left for further research.

The set of control variables is changed for estimations on stability since the ones used for other dimensions are not appropriate for predicting volatility in stock markets. Appropriate set of control variables omits inflation and includes income but is otherwise the same. The results support the fourth hypothesis partly. The coefficient of control of corruption stays negative and significant through estimations, when one variable at a time is removed, although the significance level is only 10% when income is omitted. Control variables seem to have complimentary effect on control of corruption since the effect of it becomes insignificant when all the control variables are omitted.

To find support for the results for access, depth and stability alternative proxies for them can be used. Also, the standard errors from two-step GMM estimation are downward biased so to get more robust results, this has to be taken into account. Further suggestion is to use system GMM as an estimation method. It can work as an additional robustness test if enough data is found for more that 13 countries used in this study. In addition, using longer time period is recommended if enough data exists since it adds reliability on the results.

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APPENDICES

Appendix 1 (1/2). Variables used to construct measure for control of corruption (World Bank 2016).

Control of Corruption

Control of corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. This table lists the individual variables from each data sources used to construct this measure in the Worldwide Governance Indicators

Code	Concept Measured
Representative Sources	
EIU	Corruption among public officials
GCS	Public Trust in Politicians
	Diversion of Public Funds
	Irregular Payments in Export and Import
	Irregular Payments in Public Utilities
	Irregular payments in tax collection
	Irregular Payments in Public Contracts
	Irregular Payments in Judicial Decisions
	State Capture
GWP	Is corruption in governmnent widespread?
IPD	Level of "petty" corruption between administration and citizens
	Level of corruption between administrations and local businesses
	Level of corruption between administrations and foreign companies
PRS	Corruption
WMO	*Corruption.* The risk that individuals/companies will face bribery or other corrupt practices to carry out business, from securing major contracts to being allowed to import/export a small product or obtain everyday paperwork. This threatens a company's ability to operate in a country, or opens it up to legal or regulatory penalties and reputational damage.
Non-representative Sources	
ADB	Transparency, accountability and corruption in public sector
AFR	How many elected leaders (parliamentarians) do you think are involved in corruption?
	How many judges and magistrates do you think are involved in corruption?
	How many government officials do you think are involved in corruption?
	How many border/tax officials do you think are involved in corruption?
ASD	Transparency, accountability and corruption in public sector
BPS	How common is it for firms to have to pay irregular additional payments to get things done?
	Percentage of total annual sales do firms pay in unofficial payments to public officials?
	How often do firms make extra payments in connection with taxes, customs, and judiciary?
	How problematic is corruption for the growth of your business?
BTI	Anti-Corruption policy
	Prosecution of office abuse
CCR	Anti-Corruption and Transparency
FRH	Corruption (FNT)
GCB	Frequency of household bribery - paid a bribe to one of the 8/9 services
	Frequency of corruption among public institutions: Political parties
	Frequency of corruption among public institutions: Parliament/Legislature
	Frequency of corruption among public institutions: Media
	Frequency of corruption among public institutions: Legal system/Judiciary
	Frequency of corruption among public institutions: Public officials
GII	Accountability
IFD	Accountability, transparency and corruption in rural areas
LBO	Frequency of corruption
PIA	Transparency, accountability and corruption in public sector
PRC	To what extent does corruption exist in a way that detracts from the business environment for foreign companies?
VAB	Frequency of corruption among government officials

Appendix 1 (2/2). Variables used to construct measure for control of corruption (World Bank 2016).

WCY	Bribing and corruption exist in the economy
WJP	Factor 2: Absence of Corruption

Code	**Data Source Name**
ADB	African Development Bank Country Policy and Institutional Assessments
AFR	Afrobarometer
ASD	Asian Development Bank Country Policy and Institutional Assessments
BPS	Business Enterprise Environment Survey
BTI	Bertelsmann Transformation Index
CCR	Freedom House Countries at the Crossroads
EBR	European Bank for Reconstruction and Development Transition Report
EIU	Economist Intelligence Unit Riskwire & Democracy Index
FRH	Freedom House
GCB	Transparency International Global Corruption Barometer Survey
GCS	World Economic Forum Global Competitiveness Report
GII	Global Integrity Index
GWP	Gallup World Poll
HER	Heritage Foundation Index of Economic Freedom
HUM	Cingranelli Richards Human Rights Database and Political Terror Scale
IFD	IFAD Rural Sector Performance Assessments
IJT	iJET Country Security Risk Ratings
IPD	Institutional Profiles Database
IRP	IREEP African Electoral Index
LBO	Latinobarometro
MSI	International Research and Exchanges Board Media Sustainability Index
OBI	International Budget Project Open Budget Index
PIA	World Bank Country Policy and Institutional Assessments
PRC	Political Economic Risk Consultancy Corruption in Asia Survey
PRS	Political Risk Services International Country Risk Guide
RSF	Reporters Without Borders Press Freedom Index
TPR	US State Department Trafficking in People report
VAB	Vanderbilt University Americas Barometer
WCY	Institute for Management and Development World Competitiveness Yearbook
WJP	World Justice Project Rule of Law Index
WMO	Global Insight Business Conditions and Risk Indicators

Appendix 2 (1/5). Descriptive statistics – Country level

Descriptive statistics - Per country					
	N	Mean	Std Dev	Minimum	Maximum
	Brazil				
Access	15	48,2586	2,5553	44,3948	53,8000
Depth	15	47,9408	14,6252	26,9829	77,0581
Efficiency	15	52,7222	15,2587	28,7274	75,6877
Stability	15	29,7139	7,5460	21,3019	48,4423
Control of corruption	13	-0,0320	0,0988	-0,1700	0,1457
Inflation	15	87,5663	22,7811	52,5424	126,9258
Income	15	5101,7200	583,2004	4385,9100	5926,8800
Log GDP	15	27,8061	0,6350	26,9177	28,5865
Institutional development	15	43,5401	14,3782	14,3782	67,0925
	N	Mean	Std Dev	Minimum	Maximum
	China				
Access	14	74,9760	7,1282	60,5912	85,6823
Depth	15	44,9627	17,7987	18,8240	80,6027
Efficiency	15	154,1942	66,6147	67,6930	290,9728
Stability	15	24,6852	7,2135	17,3143	40,9980
Control of corruption	13	-0,5134	0,1171	-0,6537	-0,2405
Inflation	15	93,0124	12,1203	79,0236	113,2250
Income	15	2300,7400	917,5077	1127,7300	3862,9200
Log GDP	15	28,8705	0,7609	27,8133	29,9336
Institutional development	15	120,2009	11,1788	102,8060	141,8740
	N	Mean	Std Dev	Minimum	Maximum
	Colombia				
Access	12	29,5641	10,3932	18,1782	51,5474
Depth	15	36,8621	20,5863	9,8877	64,4365
Efficiency	15	12,1953	7,7486	2,4707	29,3200
Stability	13	20,5836	6,0068	12,9179	33,5245
Control of corruption	13	-0,2640	0,1278	-0,4385	-0,0984
Inflation	15	87,2230	17,6064	58,2116	111,9878
Income	15	3713,6700	547,1580	3036,7700	4657,7500
Log GDP	15	25,9362	0,5405	25,2341	26,6368
Institutional development	15	36,0471	10,4563	20,9475	52,7273

Appendix 2 (2/5). Descriptive statistics – Country level

	N	Mean	Std Dev	Minimum	Maximum
	India				
Access	14	67,4010	6,5455	53,1237	76,8187
Depth	15	61,2264	24,4414	22,8935	109,8937
Efficiency	15	109,6931	70,0834	46,6669	313,1811
Stability	15	24,8350	7,7663	15,8078	43,7410
Control of corruption	13	-0,4522	0,0869	-0,5728	-0,2967
Inflation	15	84,8651	28,6718	54,1609	140,3594
Income	15	854,1825	221,7006	572,0590	1233,9500
Log GDP	15	27,6640	0,5250	26,8760	28,3242
Institutional development	15	42,2053	9,1062	27,8511	51,8707
	N	Mean	Std Dev	Minimum	Maximum
	Indonesia				
Access	15	50,1662	5,3085	42,5070	59,4098
Depth	15	30,6342	10,2320	14,0077	43,2702
Efficiency	15	36,8709	10,5626	23,1465	56,5357
Stability	15	23,7260	5,2550	17,1821	35,7509
Control of corruption	13	-0,7853	0,1653	-1,1339	-0,5627
Inflation	15	82,6764	25,7769	44,0200	124,3863
Income	15	1409,0600	258,4805	1072,6900	1853,8100
Log GDP	15	26,7005	0,6770	25,6649	27,5145
Institutional development	15	26,9964	5,2028	19,9085	36,5169
	N	Mean	Std Dev	Minimum	Maximum
	Malaysia				
Access	15	63,2067	1,6212	59,8000	66,9391
Depth	15	132,7191	10,3292	115,3071	148,5357
Efficiency	15	31,4949	8,2813	18,1396	53,7903
Stability	15	13,8804	5,6868	7,7721	27,0027
Control of corruption	13	0,2359	0,1518	-0,0312	0,4257
Inflation	15	93,8176	10,0110	80,4614	110,4833
Income	15	5925,1400	818,0761	4784,8700	7365,2400
Log GDP	15	25,8720	0,4917	25,1776	26,5224
Institutional development	15	113,8051	10,4712	96,7484	135,0000

Appendix 2 (3/5). Descriptive statistics – Country level

	N	Mean	Std Dev	Minimum	Maximum
	Mexico				
Access	15	36,3818	5,9484	23,0557	47,8577
Depth	15	28,7357	9,5751	15,0516	42,3583
Efficiency	15	28,1873	4,9627	21,4998	41,8915
Stability	15	21,8078	6,9131	13,8559	35,3646
Control of corruption	13	-0,2971	0,0924	-0,4760	-0,1521
Inflation	15	88,6450	16,7346	63,3150	116,2480
Income	15	8019,4500	344,8016	7529,0600	8521,8900
Log GDP	15	27,5495	0,2203	27,2305	27,8934
Institutional development	15	21,0276	5,8532	13,4464	30,9867
	N	Mean	Std Dev	Minimum	Maximum
	Peru				
Access	15	37,7516	5,1302	27,2121	45,3829
Depth	15	37,7244	14,3827	18,9768	60,6541
Efficiency	15	8,0845	4,5532	3,4844	20,3055
Stability	15	21,2567	8,8142	11,2108	42,8908
Control of corruption	13	-0,3046	0,1056	-0,4866	-0,1001
Inflation	15	93,6168	11,3953	79,1623	113,7194
Income	15	3129,8200	645,6369	2329,0000	4123,5800
Log GDP	15	25,2739	0,5037	24,6353	25,9703
Institutional development	15	24,5732	4,6924	17,9130	34,0287
	N	Mean	Std Dev	Minimum	Maximum
	Philippines				
Access	15	47,3471	9,9668	34,9174	62,3265
Depth	15	50,0400	21,6910	24,3105	82,8716
Efficiency	15	17,2273	4,4227	10,8203	27,3057
Stability	15	21,7498	4,3592	17,3644	31,4041
Control of corruption	13	-0,6271	0,1387	-0,8087	-0,4034
Inflation	15	87,9493	17,4144	63,6169	115,8022
Income	15	1299,0500	193,6690	1056,7900	1662,0700
Log GDP	15	25,8829	0,4984	25,2231	26,5812
Institutional development	15	32,6190	3,5564	28,6940	39,1509

Appendix 2 (4/5). Descriptive statistics – Country level

	N	Mean	Std Dev	Minimum	Maximum
	South Africa				
Access	14	66,7402	10,7701	50,7968	80,2466
Depth	15	199,1955	42,9420	129,6691	256,4981
Efficiency	15	27,8126	4,7690	18,8565	34,1278
Stability	15	19,4892	5,2679	13,3794	34,3760
Control of corruption	13	0,2451	0,2520	-0,1653	0,6121
Inflation	15	85,8089	22,0172	55,9338	124,4293
Income	15	5601,8100	471,0661	4854,3900	6090,3000
Log GDP	15	26,2293	0,4382	25,4237	26,7394
Institutional development	15	139,9823	14,0855	110,7180	160,1250
	N	Mean	Std Dev	Minimum	Maximum
	Sri Lanka				
Access	15	55,5199	6,0451	44,2770	63,1354
Depth	15	18,6125	7,5995	7,2718	30,6562
Efficiency	15	17,9180	8,0488	8,5408	34,2028
Stability	15	18,5996	5,9843	9,0866	32,2115
Control of corruption	13	-0,2575	0,0964	-0,3992	-0,0977
Inflation	15	78,4702	31,2668	36,4800	126,7203
Income	15	1449,0700	342,8863	1051,7600	2045,8600
Log GDP	15	24,2089	0,5599	23,4313	25,0137
Institutional development	15	28,5928	3,0388	23,2586	33,9736
	N	Mean	Std Dev	Minimum	Maximum
	Thailand				
Access	15	55,3291	3,3231	50,6728	62,6301
Depth	15	61,4723	20,6388	26,0885	95,3629
Efficiency	15	83,5465	19,2861	46,3066	125,8369
Stability	15	23,3553	5,5164	15,8784	35,4947
Control of corruption	13	-0,2705	0,1006	-0,4199	-0,1013
Inflation	15	92,9342	11,8021	77,3340	111,3507
Income	15	3068,9300	485,6908	2316,8200	3768,7900
Log GDP	15	26,1526	0,4413	25,5108	26,7147
Institutional development	15	110,6806	19,3526	88,9066	146,8190

Appendix 2 (5/5). Descriptive statistics – Country level

	N	Mean	Std Dev	Minimum	Maximum
	Turkey				
Access	15	51,8159	12,0481	43,9000	92,8366
Depth	15	27,1209	5,9093	16,6714	37,3464
Efficiency	15	161,9588	27,2874	106,4797	218,4883
Stability	15	36,2736	13,4818	22,3167	64,3352
Control of corruption	13	-0,0657	0,2427	-0,7101	0,1672
Inflation	15	78,9384	34,4021	19,2795	135,6614
Income	15	7348,3600	1046,7800	5679,9400	8864,7400
Log GDP	15	26,9267	0,4988	25,9703	27,4203
Institutional development	15	35,6249	20,5689	14,5213	74,6374