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The Effect of Corruption on Stock Markets and Economies

**Introduction**

It is indisputable that corruption is entangled with the growth and economics of countries, but the specifics of these interactions are unclear. In this paper we aim to shed light on the dynamics of these interactions by examining the stock market data of various countries. In short, we look to answer the question “What is the effect of corruption on stock markets?”. We then discuss the results and to what degree stock market results generalize to economy.

Study of the interactions between corruption and economic factors could help us understand more about how countries develop. Economic growth is one of the core factors affecting the life cycle of a country; an understanding of how economies develop at a systems level could be invaluable in advancing civilzation. It is plausible that stock markets act as a proxy for economies, that is, movements of a stock market roughly emulate the movements of the larger economy that contains it. It follows that by analyzing the effects of corruption on stock markets, we may gain greater understanding of how corruption affects economies altogether.

Various studies have been conducted analyzing the relationship between corruption and both economies and stock markets. Conclusions point to two probable narratives: “greasing” and “sanding”. Greasing denotes the theory that corruption “greases the wheels” of an economy or stock market, thus increasing its growth/efficiency. Sanding denotes the opposite: the theory that corruption impedes the growth/efficiency of economies or stock markets. Studies have also been conducted that support stock markets as rough models of economies, although the generalization of these studies is unclear.

The main contribution of this study is the use of stock market data to model economies. An abundance of stock market data is available, allowing for very granular studies to be conducted. On the other hand, there is no objective way to measure economic growth or size; aggregated statistics like GDP are usually the best estimate for economic size or growth. In other words, the data available for stock markets is far more granular and detailed than that currently available for economies. We aim to use this granular stock market data to conduct a more focused study on the effects of corruption. We can expect to uncover more subtle findings than if we were using an aggregated economic statistic like GDP.

**Literature Review**

As stated above, the dominant narratives for the effect of corruption on economic systems are "greasing” and “sanding”. Once again, greasing denotes the theory that corruption increases the growth/efficiency of economic systems. Sanding denotes the opposite: the theory that corruption impedes the growth/efficiency of economic systems. Various studies support each theory independently, in different contexts. The abundance of possible inputs and controls suggests that it is possible that both theories are valid, depending simply on the context. These results are found both in studies focusing on stock markets and in studies focusing on economies.

Studies that support the “greasing” theory generally construct the narrative that corruption boosts economies by removing certain impedances in business. Hypothetically, unnecessary regulations that suppress business are difficult to remove or change; allowing for corrupt deals that allow bypassing of said regulations might be an effective way conduct more business, thereby boosting an economy (Tavares 2010). Another mechanism by which corruption can boost an economy, as stated by Krishnamurti (2021), is by reducing business uncertainty. By bypassing one or more business steps with a single corrupt transaction, uncertainty in business is decreased. This theory tends to hold weight when applied to less-developed countries or systems with high difficulty of doing business.

Studies that support the “sanding” theory construct the narrative that corruption penalizes otherwise efficient economic systems. Any potential benefits of speeding up business are outweighed by the removal of value from the system by the corrupt transaction. This theory tends to apply to more developed countries with high transparency and high ease of doing business.

Studies also exist that support both greasing and sanding depending on the context. Although it is most common for a study to focus on a particular context and consequently support only one of either greasing or sanding, studies that aim to generalize their context conclude that greasing/sanding is context dependent (see Tavares 2010).

It is important to note that the majority of studies take a hard line either in favor of greasing or sanding, not both. The idea that greasing/sanding is context dependent is a relatively underexamined theory. This contradiction between greasing and sanding results raises several questions about how corruption really affects economic systems.

The degree to which stock markets accurately model economies is not widely researched, but studies do exist that find that stock markets are typically a good predictor of economic growth. As stated by Choong (2010), stock markets appear to be a significant channel or leading institutional factor though which capital flows affect economic growth. It is reasonable then to assume that stock markets at least roughly model economic growth (to the degree that capital flows are the main contributor to economic growth).

**Hypothesis and Model**

We seek to examine the discrepancy between greasing and sanding results in literature. Using granular stock market data on size and volatility of markets, we aim to uncover characteristic effects of corruption on economic systems depending on context. Ultimately, we aim to propose a conclusion that marries past narratives in literature with each other. We hypothesize that in examining the relationship between corruption and market size/volatility, we will see evidence of greasing, sanding, or some combination of the two.

We use linear regression models to predict stock market value and stock market volatility using WGI Control of Corruption, WGI Ease of Doing Business, WGI Voice and Accountability, Log(GDP/capita), Precipitation, and GINI index. We use a correlation table to ensure that we avoid multicollinearity. Models:

Details of the included variables are as follows:

* **DEPENDENT** VARIABLES
  + Stocks Traded
    - Total value of stocks traded over the course of a year, as a % of GDP. Figures are single counted (only one side of the transaction is considered). Gathered from the World Federation of Exchanges database.
    - We are using 2011 data.
    - Serves as a rough measure of the size of a stock market. We can extrapolate this figure as a rough model of the size of an economy.
    - Source: <https://data.worldbank.org/indicator/CM.MKT.TRAD.GD.ZS>
  + Stock Volatility
    - 360-day standard deviation of the return on the national stock market index. Gathered by the Federal Reserve Economic Data from the World Bank.
    - Serves as measure of stability of the stock market. We can extrapolate this figure as a rough model of the stability of an economy.
    - Source: <https://fredaccount.stlouisfed.org/public/datalist/1601>
* **INDEPENDENT VARIABLES AND CONTROLS**
* Control of Corruption
  + Compiled from multiple variables and sources by the World Bank. Details about this aggregation can be found in a detailed format at <http://info.worldbank.org/governance/wgi/Home/downLoadFile?fileName=cc.pdf>
  + We are using 2011 data.
  + This is the main indicator of corruption that we use in the model. Secondarily we have Ease of Doing Business and Voice and Accountability, but this is the primary indicator of corruption.
  + Source: <http://info.worldbank.org/governance/wgi/>
* Log(GDP/capita)
  + Log of Gross Domestic Product (over 1 year) divided by midyear population. Measured in US dollars.
  + Used as a control for preexisting differences in economic size and strength.
  + Source: <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD>
* Precipitation
  + Year-long average of depth of precipitation (in mm) in the country. Precipitation is defined as any kind of water that falls from clouds as a liquid or solid. The data is collected by the Food and Agriculture Organization of the United Nations (FAO) using annual questionnaires. The FAO tries to impose standard definitions and reporting methods, but complete consistency across countries and over time is not possible.
  + We are using 2012 data.
  + We use precipitation as a control for preexisting differences in economic strength. Precipitation might account for categorical differences in the size of agricultural economies. In some countries, agriculture accounts for a large portion of the economy. In all cases, we would expect the agriculture industry’s prosperity to trickle down into the rest of the economy, since agriculture is such a core industry for society.
  + Source: <https://data.worldbank.org/indicator/AG.LND.PRCP.MM>
* Ease of Doing Business
  + RANKING of economies from 1 to 190, where 1 is the hardest to do business with and 190 is the easiest. The ranking is formed according to the **Doing Business** World Bank project, providing objective measures of business regulations and their enforcement across 190 economies. More info about this project can be found here: <https://doingbusiness.org>
  + Using 2019 data (only year where data is available)
  + Another WGI corruption measure. We expect to see size of the stock market correlate heavily with this since more ease of business allows for more trades.
  + We note that this dataset was originally inverted (1=easiest, 190=hardest) but we inverted the dataset so as to keep all variables in the same direction.
  + Source: <https://data.worldbank.org/indicator/IC.BUS.EASE.XQ>
* GINI index
  + GINI index measures the extent to which the distribution of income within an economy deviates from a perfectly equal distribution. Data is collected by the **Poverty and Inequality Platform** of the World Bank. The data is collected using household survey data and the Luxembourg Income Study database.
  + We are prioritizing 2011 data. If 2011 data is missing, we use 2012. If 2012 is missing, we use 2013. If 2013 is missing, we use 2014.
  + We use this as a control, since we suspect that countries with different amounts of wealth inequality behave categorically differently in regards to stock market behavior and corruption interactions. In theory, countries with high wealth inequality would tend to see more corrupt influences in the economy.
  + Source: <https://data.worldbank.org/indicator/SI.POV.GINI>
* Voice and Accountability
  + Score for the perceptions of the extent to which a country’s citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
  + We are using 2011 data.
  + Another WGI corruption measure. We use this as a control since we expect countries with different governmental systems to behave categorically differently in regards to corruption and economic systems.
  + Source: <http://info.worldbank.org/governance/wgi/>

Correlation table is as follows:

Table

Description automatically generated

**Results**

Our linear regression results for Value of Stock Market are as follows:

Table

Description automatically generated

We see that Ease of Doing Business is very significant, as expected. Plotting Ease of Doing Business against Size of the Stock Market:

Chart, scatter chart

Description automatically generated

We see a clearly positive correlation between these variables. For every Ease of Doing Business rank that a country goes up, the amount of stocks traded in their markets increases by 1% of the country’s GDP.

We notice, however, that Control of Corruption is not significant in the regression. We had expected to see some kind of relationship between Control of Corruption and Value of the Stock Market. Plotting this data:

Chart, scatter chart

Description automatically generated

We see no clear correlation between the variables. However, we notice that the upper right section of the plot is populated mostly with developed countries, and that the bottom left section is populated mostly with underdeveloped countries. Here is the same plot with a distinction between the two sections:

Chart, scatter chart

Description automatically generated

We extrapolate that development level is likely a critical factor in the relationship between corruption and economic systems. This is consistent with literature that asserts that this relationship is context dependent. Looking at the bottom left section (underdeveloped countries), we can see a clear downwards-sloping trend. That is, as Control of Corruption increases, the Value of Stock Market decreases. This is consistent with the “greasing” narrative found in literature. On the other hand, looking at the top right section (developed countries), it is difficult to identify a trend, mostly because the sample size is small and there are outliers.

Inclusion of a development level dataset might allow us to control for development and focus in on more specific metrics for the relationship between corruption and economic systems for developed and underdeveloped countries. It seems from the plot that there is a categorical difference in the corruption-economy relationship between developed and underdeveloped countries.

Our linear regression results for Volatility of Stock Market are as follows:

Table

Description automatically generated

We see that Control of Corruption is significant at a 10% level, and Precipitation is significant at a 5% level. Plotting Control of Corruption versus Volatility of Stock Market:

A picture containing text, indoor

Description automatically generated

With a coefficient of -3.815, an improvement of 1.0 on the Control of Corruption scale decreases Volatility of Stock Market by roughly 20%. This is consistent with the “sanding” narrative; that is, as corruption lessens, we tend to see more stable markets. Overall, the correlation does not appear to convincingly describe the relationship since the regression is significant only at a 10% level and there are significant outliers. We once again observe the developed (top right section) and underdeveloped countries (bottom left section) phenomenon. The same plot is included, with a subjective divider:

Chart, scatter chart

Description automatically generated

It is more difficult to draw subjective conclusions from each section since no obvious trends exist. However, it is plausible that development is once again acting as a categorical divider between different types of interactions between corruption and economic systems. Once again, use of a development variable would be useful in determining the behavior of the corruption-economy relationships within each of these different sections. Assuming this categorical difference in behavior exists, this supports the narrative found in literature that the corruption-economy relationship is dependent on certain contexts, namely development.

Plotting Precipitation versus Volatility of Stock Market:

A picture containing text, indoor, white

Description automatically generated

We see a clear negative relationship. With a coefficient of -0.00242, an increase in rainfall of 400 mm/year corresponds to a 5% decrease in Volatility of Stock Market. This is a somewhat unexpected result that we did not expect to find so clearly. Although this finding does not appear to have anything to do with corruption, it is an interesting finding that could contribute to economic literature.

Regarding the relationships between Control of Corruption and Size/Volatility of Stock Market, we had suggested that development likely plays an instrumental role. Without further study, however, it is unclear what is causing what; we cannot conclude causality without further study. For instance, it is possible that both Control of Corruption and Size/Volatility of Stock Market are dependent variables responding to a development independent variable. In this case we would find correlations between Control of Corruption and Size/Volatility of Stock Market when in fact both are just responding to the development variable. For this reason, access to a development dataset would be very helpful. With this dataset we can further investigate this relationship and narrow down causality.

A significant issue must be addressed: the uncertainty of generalization from stock markets to economies. Although it is plausible that stock markets roughly track economies, the degree to which this occurs is unclear and difficult to uncover. Literature indicates that there is definitely a link but coming to a numerical conclusion on the strength of this link is difficult. Further study is needed in this area before we can use the stock market to come to causality conclusions between corruption and economies.

In these results we have found support for both “greasing” and “sanding” narratives found in literature. We have also found evidence for the narrative that “greasing” and “sanding” both exist concurrently, depending on the context. Further study is needed with a focus on the development variable to identify the details of how and where these narratives are true. Overall, these results are consistent with findings in past literature.

**Conclusions**

We have found evidence for both “greasing” (corruption promotes positive economic effects) and “sanding” (corruption promotes negative economic effects). Development appears to play a key role in determining the direction of this relationship. The overall dynamics of the relationship are still unclear, seeing as we did not include a development variable in our dataset. However, the corroberation of the categorical development division in both the Value of Stock Market and Volatility of Stock Market datasets is convincing in highlighting development as a key variable in this relationship.

We have also found that Precipitation has a strong relationship with Volatility of Stock Market. This result was somewhat unexpected but seems unlikely to be related to the corruption-economy relationship described above.

Future steps in this study would be to find and include a development dataset. Evidence from this investigative study suggests that development plays a key role in describing the relationship between corruption and economy. Highlighting the dynamics of development, corruption, and economy could shed light on countries at a systems level. Investigation of the relationship between Precipitation and Volatility of Stock Market could also yield interesting results for economic literature. Finally, analysis of stock market as a model for the larger economy would also be useful seeing as it is unclear how robust this connection is.