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## An Analysis of Financial Corruption Index (FCI) in Iran Through Deprivation Theory

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### Abstract

For many years, the economics of corruption has been widely used from political perspective. Scholars identified many variables and determinants of corruption; yet, one could hardly find a comprehensive index of financial corruption that provides a more precise picture of its impacts on the political and economic system. Financial corruption is a hidden variable that cannot be properly observed and measured. Corruption studies face with the conceptual and measurement issues. Most researchers, applied either limited items or some aspects of corruption to represent the entire of concept. Some indicators such as Corruption Perceptions Index (CPI), Corruption Control Index (CCI), etc. are based on expert's and business executive's understanding of corruption, instead of actual objective measurement of the phenomenon. Additionally, none of these indicators especially CPI, are adequate for the empirical research of the impact's corruption on economic variables. To address these shortcomings, it is necessary to create a proper indicator designed to measure corruption. In this paper, we established a new comprehensive Financial Corruption Index (FCI) that has been framed based on "Deprivation Theory", which measures the shortfall of the nation in each of economic dimensions including government expenditures, investment, income and economic freedom. Applying these four dimensions, in conjunction with a composite index approach to corruption, makes it feasible to create a novel framework for understanding of financial corruption. The results show during 2007 and 2017, Iran saw its FCI rating increased from 0.475 to 0.535 from 2007 to 2017, which means an improvement in Iran's rank from 87 in 2007 to 82 in 2017 among 126 countries. The CPI scores for Iran confirms that our results in FCI are valid and accurate.

**Keywords:** Financial Corruption Index (FCI), Composite Index, Multivariate Analysis, Deprivation Theory.

**JEL Classification:** D72, D73, C38, C63, F37.

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## 1. Introduction

Literature review reveals that corruption is multifaceted and highly complex phenomenon involving political, economical and sociocultural aspects that affect a society in numerous ways. Studies identified many variables and determinants of corruption. Shabbir and Anwar (2007), Krajewska and Makowski (2017), and Zahedgharavi (2017) have conducted studies on the causes of corruption, while Moradi (2022), Hosseinidoust (2020), and Momeni (2017) have investigated the correlation between existing indicators of corruption and the fundamental variables of the economy. However, one could hardly find a comprehensive index of political or financial corruption that provides a more precise picture of its impacts on the political and economic system. In this study, we will try to identify the determinants of financial corruption and its measurement. The goal is to construct a comprehensive financial corruption index (FCI).

In the first part, we are trying to understand the concept of corruption, forms and types of corruption, causes, impacts and its consequences on the economy.

## 2. What is Corruption?

In general, there is no sole or established definition in the academic debate for corruption. In fact, even the source and direction of corruption is largely anchored to the individual author's disciplinary background (Linhartová & Halásková, 2022). The term of corruption is defined as “dishonest or illegal behavior by those in positions of power”<sup>1</sup> including government officials and business managers. Nye (1967) describes corruption as “an attitude that violates rules or deviates from the ethical public duties due to private regard influence” (Nye, 1967). Corruption was also defined as “the abuse of entrusted power for private gain” by Transparency International<sup>2</sup>. Clearly, corruption can involve anyone and entity and happen everywhere. It can easily adapt itself with any change in rules and legislations.

The catalog of corruption in terms of types and category is vast and varied in different ways. The most common forms of corruption are mainly classified under supply and demand corruption, grand and petty corruption, conventional and unconventional corruption, and public and private corruption.

### 2-1. Supply and demand corruption

Supply-side of corruption describes the act of offering an illegal payment or undue advantage. This refers to those who make corrupt payment, whereas in demand-side of corruption there are people who demand and accept such a payment or advantage (Beets, 2005).

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<sup>1</sup>. <https://www.merriam-webster.com/dictionary/corruption>

<sup>2</sup>. <https://www.transparency.org/en/what-is-corruption>

## 2-2. Conventional and unconventional corruption

In conventional corruption government officials illegally abuse public office for private gain disregarding public interest. In this type the elected officials will engage in quid pro quo transaction. Unconventional corruption occurs in the same way except the officials will not be involved in a quid pro quo (this for that) transaction and the purpose is to serve a relatively small group, rather than the people.

## 2-3. Grand and petty corruption

Grand corruption takes place at the high levels of power i.e. government to benefit a few at the expense of public such as large-scale government projects including infrastructure and construction projects. Petty corruption, also known as bureaucratic corruption, entails engaging of public administration officials and non-elected officials. Examples under this category are bribes paid to enforcement officials, customs staff, health service providers, and grease payments.

## 2-4. Public and private corruption

If the illicit act involves a public official as one party to the corrupt act, then it would be considered as a public corruption, and if engages with any individual from private sector, then it is called private corruption.

## 2-5. Systematic corruption

A classic definition of systematic corruption indicates that political actors control the economic system to create economic privilege to secure their control of the political system (John, 2006; Saint-Martin, 2015).

In the majority of published articles in leading journal economics, corruption is often defined as the misuse of public office for personal gain (Hodgson & Jiang, 2007). This reflects conceptual corruption itself. Corruption is also evident and widespread in private organizations. In this study, we will try to provide a more inclusive definition that applies to both the public and private sectors.

## 3. Determinants of Corruption

Depending on type of corruption and the environment, the causes or factors that promote corruption would be different. Literature reveals that the degree of corruption is associated with multiple factors (Park, 2003), ranging from political (Nye, 1967; Knack, & Omar 2000; Lederman et al. 2005; Mustapha, 2014), economic-bureaucratic, legal (Sviderskyi & Lubentsov 2020), and social (Deyshappriya, 2015; Krajewska & Makowski, 2017). Some studies even examined the moral dimensions of corruption (Ochulor, 2011).

Since the goal of this study is to build a comprehensive FCI and to find out as to what extent a country is financially (economically) corrupt, we will focus on the abundant literature that has been reviewed the economic factors of corruption. In Table 1-2: we summarized the existing published studies that address the determinants of corruption.

Shabbir and Anwar (2007) found out that most economic determinants including economic freedom, globalization, level of education, average level of income are negatively associated with corruption in developing countries. Seldadyo and De Haan (2006) found that government wage is the key factor of corruption. Serra (2006) conducted a sensitivity analysis and find out political stability and country's level of development have negative relationship towards corruption.

Paolo Mauro (1997) believes corruption exists because of availability of massive profits for rent-seekers due to government restrictions and interventions. He lists causes of corruption as below:

- *Trade restrictions*: Are the major sources of government rents.
- *Government subsidies*: If those direct/indirect government payments under industrial policies are paid to some firms that are not intended to be subsidized, then we would see a higher level of corruption index.
  - *Price controls*: These create inefficiencies, nepotism, bureaucratic corruption, and form the black market ensuing rent-seeking behavior.
  - *Multiple exchange rate*: This means government implicitly impose indirect tariffs and taxes on goods and services, which manipulate the relative prices and provides opportunities for rent-seeking behavior.
  - *Low wages in the civil service*: The empirical evidence indicates a negative relationship between corruption and wages.
  - *Natural resources*: These include oil and gas, minerals, waters, fisheries, wildlife and forestry are associated with high levels of corruption.

According to a Cariolle (2018), as public expenditure grows, corruption levels rise, but taxation is associated with a lower prevalence of corruption. In addition, this study reveals that income per capita has a significant negative effect on bribery prevalence.

In another study by Khati & Han (2023), they found that a higher Voice and Accountability (VoA) and Regulatory Quality had a positive correlation with corruption. Regarding economic variables, it was discovered that those connected to a nation's FDI inflows and natural resource endowments had a positive and negative correlation to corruption, respectively. With respect to socio-cultural factors, this article found a remarkable outcome that a variable related to religious fractionalisation displayed a positive correlation with corruption.

Some of the economic consequences of corruption are as follow:

- One of the fiscal distortions of corruption is lowering investment level. This hinders economic growth to a significant extent, which ultimately increases poverty and aggravate income inequality.
- Alters the size and composition of government expenditure, weakens the financial system, and strengthens the underground economy.
- Erodes the tax base and causes a significance loss in tax revenues.
- Reduces the effectiveness of aid flows through the public diversion of funds.
- By reducing tax collection or raising the level of public expenditure, corruption may lead to adverse budgetary consequences.

- A corrupt system may lead to lower quality of infrastructure and public services.

Table 1 summarizes the findings of studies that delved into the determinants of corruption.

**Tab. 1: Determinants of Corruption**

Study	Political Determinants	Economic Determinants	Social Determinants
Shabbir and Anwar (2007)	Press freedom (NA), Democracy (NA)	Economic freedom (-), Globalization (-), Distribution of income (+), Average level of income (-).	Share of population affiliated with particular religion (NA), level of education (-)
Seldadyo and De Haan (2006)	Regulatory capacity (-)	Government wage (+)	Population density (-), ethnic tension (+), Portion of population with no religion (+), Portion of female in labor force (-)
Serra (2006)	Political stability (-)	Country's level of development (-)	prevalent protestant countries (-), age of democratic institutions to exert corruption (-)
Paolo Mauro (1997)		Trade restrictions (+), Government subsidies (+), Price controls (+), Multiple exchange rate (+), Low wages in the civil service (+), Natural resource endowments (+).	
Tanzi and Davoodi (1997)		Public investment (+), Government Revenues (-), Expenditures on operations and maintenance (-)	
Jajkowicz & Drobiszová, (2015)		Government expenditures on defense (+), but on health and education (-)	
Joël Cariolle (2018)		Income per capita (-). Larger public expenditures (+), higher tax revenues (-)	
Khati and Han (2023)	Voice and Accountability (VoA) and the Regulatory Quality (+)	FDI inflows (+), and natural resource endowments (-)	Religious fractionalization (+)

Note: (+) and (-), and (NA: No Association) refers to direction of variable towards corruption.

Before we start to establish the framework of FCI, a common understanding of the following terms are required<sup>3</sup>:

*Indicator*: A summary measure related to a key issue or phenomenon and derived from a series of observed facts or reported perceptions, attitudes or expectations.

*Sentiment Indicators*: They are indicators that rely on the opinions, attitudes or expectations of respondents.

*Composite Indicators*: When individual indicators are collected into a single index based on an underlying model. In this model a multi-dimensional concept is being measured.

Both sentiment and composite indicators comes with/without reference series.

*Reference Series*: a series that an indicator aims to approximate or predict. It is worth mentioning that indicators with reference series may reveal a leading<sup>4</sup>, coincident<sup>5</sup> or lagging<sup>6</sup> relationship with the reference series. The distance from a reference series is a common way to determine whether the choice of component indicators and weighting scheme or aggregation method for a composite indicator are appropriate.

*Composite Indicators with Reference Series*: These indicators used to approximate or predict another indicator. In fact, most composite indicators that have a reference series are economic indicators such as growth rate of GDP and Industrial Production Indices (IPIs).

*Composite Indicators without Reference Series*: These indicators measure a phenomenon directly and do not track the movements of another indicator. Examples are UNDP HDI or the OECD Better Life Index.

A composite indicator may contain multiple dimensions, where each dimension is characterized by different components of the phenomenon being measured. Here, there are two steps to compile indicators. In the first step, all relevant component indicators are aggregated or weighted together into one indicator for each dimension. Next step will be the aggregation of all dimensions' indicators into a composite indicator. For instance, there are three dimensions in UNPD's Human Development Index (HDI): health, knowledge and standard of living. Component indicators under knowledge dimension are arithmetically averaged. The dimensions themselves are then geometrically averaged to yield the final index.

<sup>3</sup>. Please note the methodology used in this chapter is based on "Nardo M, Saisana M, Saltelli A, Tarantola S, Hoffmann A, Giovannini E. Handbook on Constructing Composite Indicators: Methodology and User Guide. Paris (France): OECD publishing; 2008. JRC47008"

<sup>4</sup>. *Leading indicator* it estimate or predict the movement of a given reference series. Most composite leading indicators are economic indicators.

<sup>5</sup>. *Coincident indicator*: It is a composite indicator whose movements occur simultaneously as those of its reference series.

<sup>6</sup>. *lagging indicator*: This composite indicator's movements follow those of its reference series.

#### 4. Methodology

There are a number of steps that should be taken to build a composite index of Financial Corruption (FCI).

**Step 1: Theoretical framework:** The theoretical framework serves as the foundation for choosing and merging variables into a useful composite indicator based on fitness-for-purpose principle. This entails definition of FCI, determining sub-groups, and selection criteria for the underlying indicators.

**Step 2: Variables selection:** The indicators that we choose will be backed by a logical analysis, able to be evaluated, cover multiple countries, and be pertinent to the phenomenon being monitored, and their relationship to each other.

**Step 3: Imputation of missing data:** This is vital to deliver a complete dataset.

**Step 4: Multivariate analysis:** The intention is to evaluate the entire composition of the dataset, its appropriateness, and lead future methodological choices.

**Step 5: Normalisation:** This needs to be done in order to make the variables comparable.

**Step 6: Weighting and aggregation:** This should be implemented in accordance with the underlying theoretical framework.

**Step 7: Uncertainty and sensitivity analysis:** The robustness of the composite indicator should be examined, including factors such as the mechanism for including or excluding an indicator, the normalization scheme, the imputation of missing data, the choice of weights, and the aggregation method.

##### 4-1. Theoretical framework

Financial corruption index (FCI) is a composite index of leading indicators that gives an overall indication of corrupt level in an economy. It includes key economic data and shows the impacts of corruption in economic and business environment. This index represents a widely differing components of the economy such as economic development, economic openness, investment, government expenditures, etc. The intention is to summarize a range of different corruption indicators into one number in order to simplify interpretation<sup>7</sup>.

FCI has been framed based on the shortfall of the nation in each of economic dimensions. The deprivation perspective has a certain merit, in that it focuses on the distance the country must travel to achieve a desired goal or target. According to HDI

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<sup>7</sup>- A word of caution applies here. FCI highlights the economic aspect of corruption, therefore those variables measured for the index represent the economic determinants of corruption. In order to have a comprehensive index of corruption, we need to consider political and societal aspects of corruption such as higher levels of political monopolization, low levels of democracy, weak civil participation and low political transparency, higher levels of bureaucracy and inefficient administrative structures.

Methodology and Measurement (Sen and Anand, 1994), the shortfall or deprivation indicator is defined as below:

$$I_{ij} = \frac{\max\{X_{ik}\} - X_{ij}}{\max\{X_{ik}\} - \min\{X_{ik}\}}$$

Where,

i refers to variable, j indicates the country, k is desirable goal/target, and max and min are the maximum and minimum values of variables.

An average deprivation index  $I_j$  for country  $j$  for all variables is defined as a simple unweighted average of the  $I_{ij}$ :

$$I_j = \frac{1}{n} \sum_{i=1}^n I_{ij}$$

This means the shortfall in the financial corruption index is defined to be the average deprivation. So, of  $FCI_j$  is the financial corruption index for country  $j$ , then:

$$FCI_j = 1 - I_j$$

There are two perspectives in measuring composite indexes: shortfall and attainment perspectives. The attainment perspective is designed to evaluate the performance of a country is doing, whereas the perspective of shortfalls is more important in regard to the difficulty in the task that remains to be completed. Here, we prefer to express FCI in terms of shortfall levels of  $X_{ij}$ , therefore:

$$\begin{aligned} FCI_j &= 1 - \frac{1}{n} \sum_{i=1}^n I_{ij} \\ &= \frac{1}{n} \sum_{i=1}^n (1 - I_{ij}) \\ &= \frac{1}{n} \sum_{i=1}^n \left( 1 - \frac{\max\{X_{ik}\} - X_{ij}}{\max\{X_{ik}\} - \min\{X_{ik}\}} \right) \\ &= \frac{1}{n} \sum_{i=1}^n \left( 1 - \frac{X_{ij} - \min\{X_{ik}\}}{\max\{X_{ik}\} - \min\{X_{ik}\}} \right) \\ &= \frac{1}{n} \sum_{i=1}^n FCI_{ij} \end{aligned}$$

Where,

$$FCI_{ij} = \frac{X_{ij} - \min\{X_{ik}\}}{\max\{X_{ik}\} - \min\{X_{ik}\}}$$



#### 4-2. Variables Selection

The selection of FCI variables is largely based on the “Quality Framework for Composite Indicators” (Nardo et al 2008), which requires the selected variables should meet the criteria of accessibility, comparability, coherence, and accuracy.

Accessibility refers to effective data and metadata that are easily available to data users. Comparability indicates that all data and statistics can be compared between geographical areas, non-geographical domains or over time. Coherence is the ability to combine the datasets in a reliable manner for different purposes. Accuracy and reliability means that the data sources, statistical techniques, etc., are adequate enough to accurately portray the reality.

With these criteria, the economic determinants of corruption can be classified into 4 major sub-groups with 9 relevant indicators. These include government expenditures (4 indicators), investment (3 indicators); income and economic freedom each represented by one indicator (See Table2).

**Tab. 2: The Economic Determinants of Corruption**

<b>Economic Dimensions</b>	<b>Indicators</b>	<b>Source</b>	<b>Time period</b>
Government expenditures	Diversion of public funds	World Bank	2007-2017
	Wastefulness of government spending	World Bank	2007-2016
	Strength of auditing and reporting standards	World Bank	2007-2017
	Irregular payments and bribes	World Bank	2010-2017
Investment	Strength of investor protection	World Bank	2007-2017
	Soundness of Banks	World Bank	2007-2019
	Effectiveness of anti-monopoly policy	World Bank	2007-2017
Income	Adjusted net national income per capita	World Bank	1970-2021
Economic freedom	Index of Economic Freedom	Heritage Foundation	1995-2023

### 4-3. Imputation of missing data

Even if the study is well designed and controlled, missing data is present in almost every study or research project. Data that are missing often hinder a robust composite indicator. The data could be missed for a random or non-random reasons. The patterns of missing data<sup>8</sup> could appear as missing completely at random (MCAR), missing at random (MAR), and not missing at random (NMAR). There are a number of methods for dealing with missing data<sup>9</sup>: (i) listwise (case) deletion, (ii) pairwise deletion, (iii) mean substitution, (iv) regression imputation, (v) maximum likelihood, (vi) expectation-maximization (EM), and (vii) multiple imputation.

To handle missing data in our study, we applied EM algorithm method. The EM algorithm is an iterative approach that is cyclical between two modes. The first mode is a method of estimating the missing variables or latencies, referred to as the estimation-step or the E-step. The second mode is to optimize parameters of a model to explain the best possible data, referred to as maximization step or M-step. This method of imputation can be done by almost all statistical software such as SAS, R, python, XLSTAT, etc.

Another method that has been used is regression imputation based on ETS (Error, Trend, Seasonal) technique<sup>10</sup>. In exponential smoothing, recent data is given greater emphasis, while older data is given less attention. We applied this method specifically for “strength of investor protection” indicator due to missing data in 2017.

### 4-4. Multivariate analysis

Here, the intention of multivariate analysis is to investigate whether the dimension of the phenomena is statistically balanced in the indicator composite. There are different analytical approaches, but we use principal components analysis (PCA) method to analyse the correlation between variables, and to determine if changes in the variables in certain countries are different from changes in the other countries.

From the table3, we can see all variables are positively correlated. It also reveals that the strength of investor protection (F8) has low correlation with the other variables meaning that the indicator may have different impact on corruption.

**Tab. 3: Correlation matrix (Pearson)**

Variables	F1	F2	F3	F4	F5	F6	F7	F8	F9
F1	1	0.799	0.741	0.534	0.689	0.631	0.706	0.268	0.575
F2	0.799	1	0.808	0.575	0.830	0.637	0.771	0.305	0.825

<sup>8</sup>. <https://www-users.york.ac.uk/~mb55/intro/typemiss4.htm>

<sup>9</sup>. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3668100/>

<sup>10</sup>. <https://otexts.com/fpp2/estimation-and-model-selection.html>

F3	0.741	0.808	1	0.597	0.705	0.667	0.867	0.423	0.650
F4	0.534	0.575	0.597	1	0.529	0.550	0.606	0.338	0.460
F5	0.689	0.830	0.705	0.529	1	0.616	0.739	0.322	0.671
F6	0.631	0.637	0.667	0.550	0.616	1	0.746	0.339	0.536
F7	0.706	0.771	0.867	0.606	0.739	0.746	1	0.477	0.624
F8	0.268	0.305	0.423	0.338	0.322	0.339	0.477	1	0.279
F9	0.575	0.825	0.650	0.460	0.671	0.536	0.624	0.279	1

Values are different from 0 with a significance level  $\alpha=0.05$

F1: Adjusted net national income per capita (current US\$)

F2: Diversion of public funds

F3: Effectiveness of anti-monopoly policy

F4: Index of Economic Freedom

F5: Irregular payments and bribes

F6: Soundness of banks

F7: Strength of auditing and reporting standards

F8: Strength of investor protection

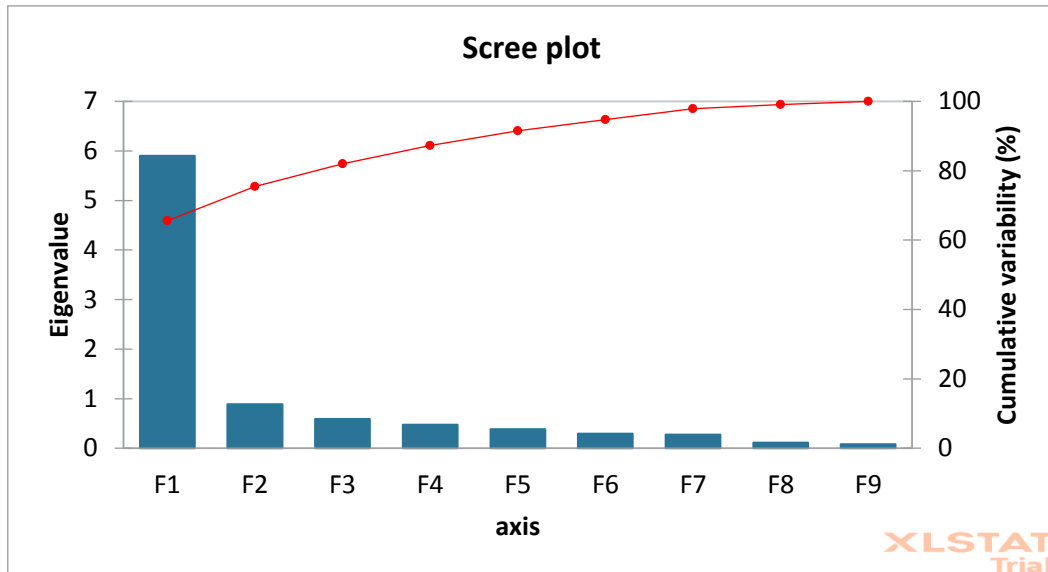
F9: Wastefulness of government spending

The next table and the corresponding chart represents the eigenvalues, which reflects the total variance that is explained by each principal component. The eigenvalues and the corresponding factors are arranged by descending order of initial variability, which they represent. In table 4, we can see that the first eigenvalue equals 5.90 and represents 65% of the total variability. This means that if we represent the data on only one axis, we will still be able to see 65% of the total variability of the data.

Ideally, the first two or three eigenvalues will correspond to high percentages of variance, which ensures that the map of the two or three factors is a reliable projection of the initial multidimensional table. In this example, the first two factors represent 67.72% of the initial variability of the data, which is a good result. But we have to be vigilant when interpreting the maps, as some of the information may be hidden by the next factor.

**Tab. 4: Eigenvalues**

	F1	F2	F3	F4	F5	F6	F7	F8	F9
Eigenvalue	5.90	0.89	0.59	0.47	0.38	0.30	0.28	0.11	0.08
Variability (%)	65.57	9.86	6.56	5.28	4.24	3.28	3.08	1.26	0.88
Cumulative %	65.57	75.43	81.99	87.27	91.50	94.78	97.86	99.12	100.00



#### 4-5. Normalisation

The datasets often have different measurement units; therefore, normalization of the data is required before the data aggregation. As you can see in the table below, one of investment indicators i.e. “strength of investor protection” has different measurement unit. So, this need to be rescaled from 0-10 to 1-7.

Economic Dimensions	Indicators
Government expenditures	Diversion of public funds, 1-7 (best)
	Wastefulness of government spending, 1-7 (best)
	Strength of auditing and reporting standards, 1-7 (best)
	Irregular payments and bribes, 1-7 (best)
Investment	Strength of investor protection, 0-10 (best)
	Soundness of banks, 1-7 (best)
	Effectiveness of anti-monopoly policy, 1-7 (best)
Income	Adjusted net national income per capita (current US\$)
Economic freedom	Index of Economic Freedom

A variety of normalisation methods exist including, ranking, standardization (or z-scores), min-max, distance to a reference country, categorical scales, indicators above or below the mean, etc. Here we rely on min-max technique:

$$I_{qc}^t = \frac{x_{qc}^t - \min_c(x_q^{t_0})}{\max_c(x_q^{t_0}) - \min_c(x_q^{t_0})}$$

Where  $x_{qc}^t$  is the value of indicator q for country c at time t.

Note that the first 6 indicators are relied on above formula. However, the natural logarithm of the actual, minimum and maximum values will be used for the last two indicators i.e. adjusted net national income per capita and Index of Economic Freedom.

#### 4-6. Weighting and aggregation

There are a number of weighting techniques such as as factor analysis, data envelopment analysis and unobserved components models (UCM), or from participatory methods like budget allocation processes (BAP), analytic hierarchy processes (AHP) and conjoint analysis (CA). However, most composite indicators are based on equal weighing (Ew), which means that all variables have equal weights. In this study, we apply equal weighing, to reflect all variables are “worth” the same in the FCI composite index.

Aggregation methods are classified into two linear and geometric aggregations. A linear method for aggregating data is useful if all indicators are measured in the same unit of measurement. Geometric aggregations are more suitable if a modeller wants some level of non-compensation between individual indicator or dimension.

#### 4-7. FCI Computation

As discussed earlier, for the government expenditures,  $GE_j$ , and investment dimensions,  $INV_j$ , we apply the following equation:

$$GE_j \text{ or } INV_j = \frac{X_j - \min\{X_i\}}{\max\{X_i\} - \min\{X_i\}}$$

For the income dimension,  $INC_j$ :

$$INC_j = \frac{\ln(ANNI_j) - \ln(100)}{\ln(\max\{ANNI_i\}) - \ln(100)}$$

Where  $ANNI_j$  represents the actual adjusted net national income per capita of a country.

Similar to income index, we use the natural logarithm of the actual to compute the economic freedom dimension:

$$EF_j = \frac{\ln(IEF_j) - \ln(20)}{\ln(\max\{IEF_i\}) - \ln(20)}$$

$IEF_j$ , refers to index of economic freedom.

Finally, the FCI is the geometric mean of the previous four normalized indices:

$$FCI = \sqrt[4]{GE_j \times INV_j \times INC_j \times EF_j}$$

Minimum and maximum values are determined to normalize the indicators between 0 and 1.

The summary of the FCI results can be seen in **Appendix1**. Note that the higher the FCI score, the lesser the degree of corruption in the country.

## 5. Conclusion

As we discussed, the Financial Corruption Index (FCI) is a single index measure to capture key dimensions of financial corruption. It measures the average achievements (being less corrupt) in a country in four basics of economic dimensions including government expenditures, investment, income and economic freedom. These four dimensions are constructed of nine quantitative and qualitative economic indicators. Unlike other corruption indices such as CPI which are based on perception and objectivity, this composite indicator (FCI) puts the financial facets of corruption under the spotlight and accurately measures the level of corruption.

Table 5 shows Iran saw its FCI rating increased from 0.475 to 0.535 from 2007 to 2017, which means an improvement in Iran's rank from 87 in 2007 to 82 in 2017 among 126 countries. To compare with Corruption Perceptions Index (CPI), this index evaluates 180 nations and territories across the globe based on their assumed extent of public sector corruption, with a score range of 0 (extremely corrupt) to 100 (very clean). By looking at CPI scores for Iran, we can confirm that our results in FCI for Iran are valid and accurate.

**Tab. 5: Financial Corruption Index (FCI) and Corruption Perceptions Index (CPI)**

Year	FCI (Iran)		CPI (Iran)	
	Score	Rank	Score	Rank
2007	0.475	87	25	131
2008	0.504	84	23	141
2009	0.492	93	18	168
2010	0.493	92	22	154
2011	0.504	89	27	120
2012	0.505	87	28	133
2013	0.509	87	25	144
2014	0.490	95	27	136
2015	0.473	99	27	130
2016	0.514	93	29	131
2017	0.535	82	30	130

Table 6 also shows the most and least corrupt country between 2007 and 2017.

**Tab. 6: The least and most corrupted countries, 2007-2017**

Year	Corruption Level	Country	Score
2007	Least	Singapore	0.921
	Most	Burundi	0.091
2008	Least	Singapore	0.928
	Most	Burundi	0.122
2009	Least	Singapore	0.946
	Most	Burundi	0.189
2010	Least	Singapore	0.956
	Most	Zimbabwe	0.216
2011	Least	Singapore	0.955
	Most	Burundi	0.230
2012	Least	Singapore	0.953
	Most	Burundi	0.239
2013	Least	Singapore	0.954
	Most	Burundi	0.257
2014	Least	Singapore	0.956
	Most	Burundi	0.285
2015	Least	Singapore	0.956
	Most	Venezuela, RB	0.311
2016	Least	Singapore	0.967
	Most	Burundi	0.290
2017	Least	Singapore	0.965
	Most	Venezuela, RB	0.264

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### Conflict of Interest

The authors declare no conflict of interest.

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## Appendix 1: Financial Corruption Index, 2007-2017

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Albania	0.467	0.497	0.509	0.601	0.607	0.609	0.585	0.556	0.565	0.606	0.623
Algeria	0.518	0.539	0.518	0.518	0.545	0.500	0.441	0.466	0.477	0.495	0.487
Argentina	0.503	0.506	0.499	0.500	0.499	0.490	0.477	0.451	0.446	0.468	0.547
Armenia	0.521	0.530	0.535	0.546	0.543	0.558	0.591	0.614	0.595	0.600	0.633
Australia	0.856	0.870	0.876	0.869	0.860	0.846	0.842	0.822	0.828	0.843	0.842
Austria	0.786	0.795	0.806	0.792	0.781	0.764	0.743	0.760	0.755	0.798	0.805
Azerbaijan	0.475	0.499	0.529	0.582	0.566	0.551	0.570	0.593	0.583	0.573	0.637
Bahrain	0.710	0.740	0.771	0.784	0.789	0.811	0.792	0.760	0.750	0.788	0.756
Bangladesh	0.392	0.395	0.423	0.448	0.467	0.466	0.460	0.466	0.465	0.468	0.500
Belgium	0.819	0.832	0.841	0.802	0.782	0.784	0.775	0.779	0.783	0.799	0.790
Benin	0.442	0.483	0.468	0.460	0.454	0.456	0.451	0.434	0.432	0.458	0.447
Bolivia	0.422	0.444	0.429	0.416	0.450	0.462	0.459	0.467	0.472	0.496	0.485
Bosnia and Herzegovina	0.509	0.520	0.509	0.516	0.524	0.520	0.540	0.551	0.527	0.504	0.527
Botswana	0.638	0.633	0.656	0.696	0.694	0.692	0.689	0.690	0.676	0.666	0.647
Brazil	0.566	0.567	0.600	0.587	0.579	0.597	0.599	0.593	0.559	0.548	0.530
Bulgaria	0.555	0.573	0.587	0.581	0.583	0.583	0.596	0.599	0.595	0.614	0.612
Burkina Faso	0.455	0.463	0.460	0.454	0.440	0.441	0.444	0.417	0.408	0.456	0.458
Burundi	0.091	0.122	0.189	0.234	0.230	0.239	0.257	0.285	0.317	0.290	0.317
Cabo Verde	0.556	0.570	0.593	0.591	0.596	0.585	0.580	0.568	0.564	0.570	0.552
Cambodia	0.414	0.436	0.446	0.461	0.477	0.489	0.509	0.493	0.467	0.491	0.499
Cameroon	0.432	0.436	0.443	0.444	0.454	0.454	0.458	0.449	0.458	0.476	0.456
Canada	0.858	0.872	0.887	0.890	0.891	0.888	0.884	0.870	0.873	0.881	0.874
Chad	0.326	0.337	0.338	0.353	0.367	0.354	0.352	0.331	0.334	0.351	0.316
Chile	0.759	0.762	0.748	0.754	0.772	0.792	0.791	0.779	0.776	0.775	0.746
China	0.496	0.528	0.570	0.585	0.597	0.596	0.593	0.603	0.612	0.610	0.638
Colombia	0.589	0.597	0.612	0.613	0.629	0.626	0.623	0.628	0.622	0.620	0.595
Costa Rica	0.559	0.594	0.619	0.628	0.631	0.614	0.608	0.607	0.610	0.607	0.604
Cote d'Ivoire	0.313	0.392	0.396	0.410	0.415	0.397	0.448	0.503	0.521	0.568	0.556
Croatia	0.556	0.579	0.601	0.592	0.581	0.571	0.567	0.573	0.563	0.605	0.579
Cyprus	0.774	0.780	0.812	0.787	0.778	0.739	0.732	0.697	0.666	0.689	0.687
Denmark	0.894	0.905	0.911	0.880	0.856	0.852	0.827	0.809	0.818	0.861	0.855
Dominican Republic	0.467	0.487	0.497	0.500	0.514	0.507	0.522	0.538	0.558	0.564	0.506
Ecuador	0.429	0.450	0.460	0.459	0.457	0.489	0.499	0.539	0.557	0.566	0.496
Egypt, Arab Rep.	0.500	0.520	0.533	0.554	0.561	0.527	0.499	0.481	0.491	0.545	0.535
El Salvador	0.599	0.594	0.583	0.588	0.583	0.561	0.508	0.507	0.534	0.568	0.467
Estonia	0.751	0.759	0.760	0.737	0.733	0.736	0.748	0.760	0.769	0.797	0.777
Ethiopia	0.314	0.365	0.385	0.373	0.393	0.421	0.405	0.409	0.413	0.456	0.439
Finland	0.864	0.874	0.880	0.868	0.861	0.852	0.864	0.870	0.867	0.886	0.883
France	0.781	0.792	0.789	0.772	0.767	0.760	0.739	0.730	0.732	0.775	0.767

Gambia, The	0.433	0.472	0.491	0.496	0.481	0.473	0.471	0.452	0.450	0.485	0.462
Georgia	0.549	0.577	0.615	0.607	0.601	0.621	0.639	0.643	0.644	0.655	0.642
Germany	0.816	0.829	0.825	0.798	0.784	0.765	0.781	0.789	0.791	0.829	0.861
Ghana	0.496	0.509	0.504	0.523	0.537	0.541	0.553	0.554	0.548	0.545	0.525
Greece	0.615	0.628	0.622	0.609	0.577	0.542	0.510	0.518	0.549	0.566	0.542
Guatemala	0.482	0.523	0.528	0.526	0.512	0.500	0.521	0.520	0.521	0.530	0.516
Guyana	0.482	0.486	0.535	0.544	0.549	0.559	0.556	0.554	0.557	0.551	0.536
Haiti	0.364	0.382	0.378	0.358	0.384	0.367	0.375	0.395	0.409	0.374	0.346
Honduras	0.443	0.491	0.505	0.486	0.476	0.487	0.487	0.452	0.489	0.523	0.496
Hungary	0.647	0.643	0.625	0.607	0.600	0.606	0.605	0.604	0.605	0.608	0.598
Iceland	0.828	0.822	0.835	0.777	0.703	0.727	0.757	0.757	0.764	0.813	0.830
India	0.526	0.531	0.546	0.557	0.555	0.539	0.540	0.533	0.535	0.580	0.600
Indonesia	0.515	0.541	0.553	0.579	0.586	0.565	0.573	0.585	0.592	0.606	0.629
Iran, Islamic Rep.	0.475	0.504	0.492	0.493	0.504	0.505	0.509	0.490	0.473	0.514	0.535
Ireland	0.879	0.874	0.886	0.819	0.712	0.657	0.706	0.748	0.778	0.814	0.813
Israel	0.795	0.810	0.796	0.802	0.809	0.793	0.781	0.760	0.753	0.767	0.817
Italy	0.650	0.648	0.649	0.639	0.639	0.638	0.624	0.610	0.600	0.626	0.627
Jamaica	0.592	0.593	0.595	0.607	0.611	0.609	0.605	0.600	0.603	0.613	0.632
Japan	0.773	0.779	0.782	0.791	0.797	0.793	0.785	0.807	0.836	0.853	0.830
Jordan	0.615	0.627	0.649	0.653	0.638	0.620	0.632	0.633	0.602	0.645	0.624
Kazakhstan	0.581	0.592	0.586	0.578	0.574	0.583	0.646	0.654	0.632	0.641	0.626
Kenya	0.443	0.473	0.493	0.481	0.465	0.485	0.495	0.511	0.517	0.521	0.507
Korea, Rep.	0.695	0.740	0.739	0.705	0.682	0.668	0.670	0.677	0.677	0.714	0.732
Kuwait	0.753	0.755	0.727	0.707	0.708	0.704	0.684	0.684	0.648	0.673	0.683
Kyrgyz Republic	0.404	0.428	0.445	0.444	0.446	0.442	0.443	0.455	0.456	0.463	0.489
Latvia	0.662	0.675	0.665	0.626	0.601	0.623	0.643	0.658	0.670	0.692	0.636
Lebanon	0.540	0.534	0.520	0.532	0.546	0.551	0.551	0.517	0.482	0.527	0.524
Lesotho	0.456	0.441	0.437	0.463	0.457	0.445	0.446	0.472	0.471	0.460	0.442
Lithuania	0.659	0.678	0.665	0.635	0.630	0.633	0.653	0.653	0.657	0.686	0.679
Luxembourg	0.829	0.825	0.844	0.850	0.833	0.824	0.823	0.828	0.829	0.866	0.861
Madagascar	0.417	0.452	0.452	0.433	0.415	0.400	0.406	0.412	0.402	0.404	0.379
Malawi	0.420	0.440	0.466	0.480	0.490	0.434	0.408	0.411	0.403	0.372	0.398
Malaysia	0.724	0.734	0.725	0.716	0.726	0.746	0.737	0.744	0.770	0.772	0.763
Mali	0.413	0.433	0.416	0.406	0.409	0.407	0.416	0.406	0.414	0.450	0.430
Mauritania	0.432	0.457	0.444	0.458	0.452	0.428	0.445	0.407	0.393	0.392	0.379
Mauritius	0.673	0.693	0.720	0.729	0.735	0.730	0.738	0.734	0.734	0.722	0.722
Mexico	0.600	0.635	0.625	0.635	0.617	0.610	0.632	0.627	0.604	0.610	0.578
Moldova	0.446	0.474	0.486	0.513	0.516	0.511	0.515	0.506	0.492	0.490	0.481
Mongolia	0.456	0.479	0.473	0.463	0.458	0.492	0.508	0.515	0.532	0.536	0.481
Montenegro	0.584	0.609	0.639	0.659	0.651	0.645	0.640	0.630	0.617	0.629	0.626
Morocco	0.526	0.556	0.543	0.531	0.527	0.536	0.586	0.592	0.596	0.596	0.589

Mozambique	0.409	0.425	0.442	0.436	0.456	0.449	0.438	0.433	0.422	0.393	0.352
Namibia	0.601	0.599	0.634	0.657	0.670	0.649	0.620	0.617	0.613	0.630	0.630
Nepal	0.397	0.413	0.417	0.431	0.434	0.432	0.442	0.438	0.449	0.464	0.475
Netherlands	0.841	0.851	0.859	0.829	0.809	0.813	0.825	0.806	0.797	0.815	0.835
New Zealand	0.893	0.887	0.897	0.918	0.916	0.911	0.927	0.930	0.937	0.944	0.943
Nicaragua	0.465	0.479	0.485	0.486	0.481	0.479	0.506	0.522	0.498	0.490	0.482
Nigeria	0.491	0.499	0.505	0.502	0.474	0.484	0.498	0.481	0.473	0.492	0.465
Norway	0.872	0.876	0.884	0.876	0.873	0.861	0.872	0.877	0.879	0.905	0.894
Oman	0.673	0.703	0.730	0.754	0.757	0.758	0.760	0.762	0.736	0.715	0.699
Pakistan	0.496	0.504	0.508	0.496	0.502	0.502	0.504	0.490	0.496	0.509	0.522
Panama	0.595	0.620	0.635	0.635	0.641	0.647	0.662	0.675	0.657	0.670	0.654
Paraguay	0.437	0.470	0.471	0.493	0.512	0.526	0.543	0.527	0.507	0.495	0.521
Peru	0.582	0.610	0.636	0.653	0.650	0.660	0.650	0.635	0.622	0.624	0.606
Philippines	0.454	0.474	0.493	0.492	0.485	0.503	0.540	0.565	0.574	0.577	0.546
Poland	0.622	0.636	0.639	0.669	0.683	0.679	0.681	0.674	0.678	0.700	0.691
Portugal	0.741	0.746	0.747	0.716	0.684	0.643	0.649	0.655	0.676	0.675	0.647
Qatar	0.754	0.772	0.778	0.826	0.825	0.808	0.849	0.870	0.846	0.865	0.835
Romania	0.583	0.606	0.627	0.623	0.611	0.592	0.574	0.570	0.602	0.613	0.617
Russian Federation	0.511	0.527	0.539	0.530	0.536	0.527	0.523	0.537	0.537	0.550	0.572
Saudi Arabia	0.664	0.685	0.732	0.754	0.788	0.796	0.788	0.779	0.763	0.773	0.760
Senegal	0.454	0.471	0.467	0.470	0.472	0.458	0.461	0.478	0.486	0.525	0.506
Serbia	0.525	0.544	0.550	0.540	0.528	0.518	0.526	0.531	0.534	0.557	0.579
Singapore	0.921	0.928	0.946	0.956	0.955	0.953	0.954	0.956	0.956	0.967	0.965
Slovak Republic	0.651	0.666	0.669	0.657	0.628	0.616	0.619	0.589	0.599	0.624	0.631
Slovenia	0.686	0.702	0.718	0.725	0.698	0.655	0.634	0.604	0.577	0.619	0.660
South Africa	0.729	0.724	0.740	0.731	0.707	0.698	0.698	0.688	0.676	0.677	0.624
Spain	0.750	0.752	0.769	0.742	0.705	0.689	0.670	0.646	0.636	0.684	0.670
Sri Lanka	0.528	0.572	0.582	0.582	0.596	0.603	0.620	0.611	0.603	0.624	0.578
Sweden	0.805	0.861	0.871	0.872	0.870	0.876	0.867	0.864	0.846	0.873	0.861
Switzerland	0.789	0.804	0.811	0.802	0.798	0.798	0.802	0.799	0.800	0.889	0.862
Tajikistan	0.340	0.365	0.374	0.437	0.470	0.499	0.504	0.500	0.519	0.517	0.552
Tanzania	0.443	0.472	0.466	0.464	0.460	0.460	0.472	0.461	0.458	0.465	0.488
Thailand	0.623	0.624	0.625	0.651	0.654	0.637	0.629	0.616	0.607	0.619	0.650
Trinidad and Tobago	0.637	0.650	0.642	0.663	0.667	0.647	0.636	0.636	0.622	0.609	0.614
Tunisia	0.614	0.629	0.632	0.638	0.669	0.626	0.587	0.579	0.565	0.554	0.562
Turkey	0.603	0.634	0.613	0.626	0.641	0.645	0.680	0.692	0.676	0.688	0.698
Uganda	0.377	0.393	0.434	0.436	0.430	0.427	0.430	0.423	0.440	0.445	0.436
Ukraine	0.458	0.466	0.461	0.433	0.413	0.422	0.445	0.430	0.411	0.417	0.428
United Arab Emirates	0.739	0.751	0.760	0.779	0.772	0.775	0.805	0.814	0.841	0.883	0.875
United Kingdom	0.893	0.878	0.849	0.801	0.791	0.815	0.826	0.818	0.827	0.856	0.857
United States	0.857	0.839	0.851	0.811	0.791	0.792	0.793	0.802	0.813	0.823	0.883

Uruguay	0.603	0.632	0.655	0.671	0.681	0.689	0.683	0.676	0.683	0.699	0.675
Venezuela, RB	0.417	0.415	0.403	0.389	0.370	0.380	0.365	0.348	0.311	0.327	0.264
Vietnam	0.369	0.389	0.431	0.453	0.463	0.451	0.454	0.454	0.464	0.512	0.503
Zambia	0.438	0.478	0.500	0.521	0.532	0.530	0.546	0.555	0.538	0.534	0.484
Zimbabwe	0.202	0.235	0.246	0.216	0.251	0.345	0.371	0.407	0.396	0.412	0.403







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## شاخص فساد مالی در ایران، رویکرد نظریه محرومیت

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### چکیده

سال‌هاست که فساد اقتصادی به‌طور گسترده از دیدگاه اقتصاد سیاسی مورد مطالعه قرار گرفته و پژوهشگران بسیاری متغیرها و عوامل تعیین‌کننده فساد را شناسایی نموده‌اند؛ با این حال، به سختی می‌توان شاخص جامعی از فساد مالی را مشاهده نمود که تصویر کاملاً دقیقی از تأثیرات فساد بر نظام‌های سیاسی و اقتصادی ارائه نماید؛ چراکه فساد مالی متغیری پنهان و مکتوم است که بسادگی نمی‌توان آن را مشاهده و اندازه‌گیری کرد. مطالعات فساد عموماً با مشکلات مفهومی و اندازه‌گیری مواجه است و اکثر محققان از موارد محدود و یا برخی از جنبه‌های فساد را برای معرفی فساد بهره برده‌اند. بر این اساس برخی از شاخص‌های معرفی شده هم‌چون شاخص ادراک فساد (CPI) و شاخص کنترل فساد (CCI) به جای سنجش واقعی فساد، ادراک و احساس کارشناسان و مدیران تجاری از فساد را اندازه‌گیری نموده‌اند. علاوه بر این، هیچ‌یک از این شاخص‌ها به‌ویژه CPI برای تحقیقات تجربی تأثیر فساد بر متغیرهای اقتصادی کافی به‌نظر نمی‌رسد و برای رفع این کاستی‌ها، لازم است شاخص مناسبی برای سنجش فساد ارائه گردد. در این پژوهش، با تکیه بر «نظریه محرومیت»، یک شاخص جامع جدید فساد مالی (FCI) معرفی می‌شود که کمبود یک کشور را در هر یک از ابعاد اقتصادی از جمله مخارج دولت، سرمایه‌گذاری، درآمد و آزادی اقتصادی اندازه‌گیری می‌کند. به‌کارگیری این چهار بُعد، همراه با رویکرد شاخص ترکیبی به فساد، ایجاد یک چارچوب جدید برای درک فساد مالی را امکان‌پذیر می‌کند. نتایج محاسبه این شاخص طی دوره زمانی ۲۰۰۷ تا ۲۰۱۷ م. و برای ۱۲۶ کشور منتخب نشان داد نمره ایران در شاخص فساد از ۰٫۴۷۵ در سال ۲۰۰۷ به ۰٫۵۳۵ در سال ۲۰۱۷ م. افزایش یافته است که به معنای بهبود رتبه ایران از ۸۷ به ۸۲ در فاصله این سال‌ها بوده است. مقایسه نمرات و رتبه ایران در شاخص ادراک فساد (CPI) با شاخص فساد مالی محاسبه شده این پژوهش (FCI)، حاکی از هم‌پوشانی این دو شاخص است.

**کلیدواژگان:** شاخص فساد مالی، شاخص مرکب، تحلیل چندمتغیره، تئوری محرومیت.

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