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Economic Research-Ekonomska Istraživanja

ISSN: 1331-677X (Print) 1848-9664 (Online) Journal homepage: http://www.tandfonline.com/loi/rero20

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To cite this article: Danilo Lučić, Mladen Radišić & Dušan Dobromirov (2016) Causality between corruption and the level of GDP, Economic Research-Ekonomska Istraživanja, 29:1, 360-379, DOI: 10.1080/1331677X.2016.1169701

To link to this article: http://dx.doi.org/10.1080/1331677X.2016.1169701

Published online: 13 May 2016.

ECONOMIC RESEARCH-EKONOMSKA ISTRAŽIVANJA, 2016
VOL. 29, NO. 1, 360–379
http://dx.doi.org/10.1080/1331677X.2016.1169701

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Causality between corruption and the level of GDP

Danilo Lučić, Mladen Radišić and Dušan Dobromirov

Industrial Engineering and Management Department, Faculty of Technical Sciences, University of Novi Sad, Novi Sad, Republic of Serbia

ABSTRACT

Interaction between corruption and economic development is one of the most widely studied topics in the recent history of scientific research. Because of the strong influence of both these factors on the standard of living, we have tried to answer the following question: In what time frame is the interaction between these two factors most prominent? Taking into account the data of the level of corruption (as measured by the Corruption Perception Index (CPI) and economic development (as measured by the movement of GDP per year), in the time period from 1995 to 2011, we divided the research results into three time zones: zone 1 – which covers the time period of the first five years (short-term impacts), zone 2 – which covers the time period of the next five years (medium-term impacts), and finally zone 3 – which covers the time period of the last five years (long-term impacts). Based on the research results, we have come to conclusion that the strongest causality between these two factors are in zone 2, the so-called medium-term framework. The empirical findings of this article suggest that further research in this direction is necessary, if we take into account the fact that corruption is present in almost all countries of the world.

ARTICLE HISTORY
Received 30 April 2013
Accepted 3 March 2014

KEYWORDS
Corruption; GDP; correlation

JEL CLASSIFICATIONS
D73; E60; O50

1. Introduction

The definition of corruption ranges from the broad terms of 'misuse of public power' and 'moral decay' to strict legal definitions of corruption as an act of bribery involving a public servant and a transfer of tangible resources. It has been studied as a problem of political, economic, cultural and moral underdevelopment. We present descriptions of the most common definitions of corruption in the modern literature.

Corruption is 'The abuse of public office for private gain' (Transparency International), or 'Monopoly plus discretion minus accountability' (United Nations), or 'a symptom of deep-seated economic, political and institutional weaknesses' (World Bank), or 'An act of guilt, moral pervasion, dishonest proceedings, debasement or alteration and depravity' (Webster's Unabridged Dictionary). Corruption is behaviour that deviates from the formal

CONTACT Danilo Lučić lucic.danilo@gmail.com

rules for conduct governing the actions of someone in a position of public authority because of private-regarding motives such as wealth, power, or status (Khan, 1996). Corruption is a transaction between private and public sector actors through which collective goods are illegitimately converted into private-regarding payoffs (Heidenheimer, Johnston, & LeVine, 1989). Corruption is an act in which the power of public office is used for personal gain in a manner that contravenes the rules of the game (Jain, 2001), or corruption is the sale by government officials of government property for personal gain (Shleifer & Vishny, 1993). Corruption that can be generally defined as the use of public power for individual interest is a complex and multifaceted concept (Aidt, 2003). Even though there is no universal definition of corruption, the general opinion is that it negatively affects society.

Corruption is an ancient problem. It is as old as government itself. The acts of corruption are not recent issues; the account of corruption is as old as human existence (Lipset & Lenz, 2000). It has always existed, but to different extents and with a variety of consequences (Bardhan, 1997). Furthermore, it has been noted that corruption does not disappear as countries develop and modernise, but rather, takes on new forms (Girling, 1997). Corruption occurs as people use wealth to buy power, and where economic opportunities are few, corruption occurs when political power is used to pursue wealth. It is considered to be a cankerworm, which has eaten profoundly into the fabric of the nation; it arises from so called little forms of corruption to bureaucratic or systematic corruptions. Macrae (1982) refers to corruption as an arrangement that involves an exchange between two parties (the demander and the supplier) which: (1) has an influence on the allocation of resources either immediately or in the future; and (2) involves the use or abuse of public or collective responsibility for private ends.

Corruption can take many forms. Public office can be misused by bribery, embezzlement, extortion, fraud, nepotism, patronage, theft of state assets and inside trading. This phenomenon has been seen either as a structural problem of politics or economics, or as a cultural and individual moral problem (Andving et al., 2000). Corruption is an extremely complex social behaviour. Many methods could be employed in analysing corruption.

There is a multidimensional picture to illustrate the economic causes of corruption (Adaman, Çarkoglu & Senatalar, 2001). Corruption can be a major obstacle in the process of economic development and in modernising a country. It undermines development by weakening the institutions on which economic growth depends (Klitgaard, 1988). Murphy et al. (1993) suggests that corruption can be viewed as an additional tax on business transactions.

Corruption has been honoured with significant time and attention among economists and global financial institutions such as the World Bank and the IMF in the last few decades, because of its dominant effect on economic development. Because it has a feature that combines the various social sciences in a joint research centre, there have been many notable studies on corruption. Furthermore, economists and other researchers remain open-minded about the impact of corruption on economic development, although there is an increasing amount of literature on the relationship between corruption and economic development.

In the future, such studies should focus on a microanalysis of corruption too, as well as a determinant of corruption. Corruption is a very important world issue because over $1 trillion is paid in bribes every year, about $148 billion is lost to corrupt activities in Africa every year and eliminating this 'social virus' will create a healthy environment for continued globalisation. Information about the determinants of corruption is critical to understand the complete picture. This field will be challenging to study because at the micro-level every

country may have its own blend of corruption that does not show itself on a macro-level study.

Most empirical papers on corruption and economic development study mutual interaction of corruption and the level of GDP and vice versa, but only a few of them research the time period when the causality between them is the strongest. The motivation of this study was the lack of evidence on this issue. The starting assumption of this research, which we tried to prove, is the following hypothesis: *It is possible to determine the time period where the strongest causality is between the movement levels of corruption and GDP*. In order to test this hypothesis, we started from already known and proven facts that are presented in many papers exploring these issues: (1) There is mutual causality between corruption and the level of GDP; and (2) The mutual causality between corruption and GDP level is negative, which means a higher level of corruption results in a lower level of GDP and vice versa.

It is in the interests of people who have influence on the economic development planning to have access to information about this causality, and for it to be as accurate as possible because this data will significantly influence the future decisions of the economic politicians and, therefore, the continued economic development of each country. It is very important to maintain the low level of corruption for the persistence of high economic growth in most of the countries, but a low level of corruption is not the only reason for an explanation of high economic growth. However, the negative impact of corruption on growth is mediated through political economy factors in individual countries, the channel through which it is transmitted (investment, human capital, public finance, etc.), the extent of centralisation/coordination of rent-seeking activities, etc.

The following section presents the earlier published theoretical foundation of this causality. Section 3 describes the data. Section 4 describes empirical models. Section 5 discusses the results and section 6 refers to conclusions.

2. Literature review

Today, more and more authors are involved in researching the economic phenomenon of corruption and its impact on many macroeconomic indicators. There is an active debate concerning the relation between corruption levels and economic development. Some earlier studies suggest that corruption may help the most efficient firms bypass bureaucratic obstacles and rigid laws leading to a positive effect on economic development, while more recent works do not find a significant negative dependence between corruption and development.

Does the strong and robust correlation between GDP and corruption tell us that development reduces corruption, or does it tell us that corruption is an obstacle to development? Both directions of causation are plausible. On the one hand corruption feeds on rent, which produce inefficient economic policies, also corruption often works as a tax on factor accumulation and on investment and that hinders economic development. On the other hand, high levels of national income may bring greater willingness to combat corruption. Corruption-development traps may lock some countries into a 'bad' equilibrium with high corruption–low growth while others may converge to a 'good' equilibrium with low corruption–high growth (Blackburn, Bose, & Haque, 2005).

Some authors (Lambsdorff, 2007) claim that corruption is a vice causing low growth, so the causality is mainly from corruption to GDP. Others (Paldam, 2001; Treisman, 2000) claim that corruption is a poverty driven disease that vanishes when countries develop, so

that causality is mainly from the level of GDP to corruption. Brown and Shackman (2007) find evidence that shows that causality is present in both directions. In the fundamental part of theoretical arguments, it is assumed that there is a relationship between the level of economic development and the level of corruption (Husted, 1999). Aidt, Dutta, and Sena (2008) found that corruption has an adverse impact on economic growth in countries with high quality institutions only. At the same time economic growth reduces corruption. On the other hand, corruption has no impact on growth in countries with low quality institutions.

Blackburn, Bose and Haque (2005) indicated that the relationship between corruption and economic development is both negative and mutual. Igwike and Hussain (2012) accrued only limited evidence in support of the two-way relationship. Causation runs from economic development to lower corruption and from corruption to lower economic development (measured by GDP per capita). There is a plausible argument that lower economic growth could lead to higher corruption or higher corruption could lead to lower growth rate. No agreement has been reached about the main direction of causality between these two variables.

Of course there are some works which show that between these values there is no correlation. Méon and Sekkat (2005), Mendez and Sepulveda (2006) incorporated measures of political freedom as a key determinant of the relationship between corruption and long-run economic growth. Using cross-country data and regressions during the period 1960 to 2000, they found no relationship between corruption and growth in 'not-free' countries. Heckelman and Powell (2008) found that corruption is growth enhancing when economic freedom is most limited but the beneficial impact of corruption decreases as economic freedom increases. Aidt et al. (2008) find that in countries with low quality institutions, corruption has no impact on growth.

Svensson (2005) concluded that 'to the extent we can measure corruption in cross-country settings, it does not affect growth'. Littvay and Donica (Littvay & Donica, 2006) study the period 1986 to 2003 and found no relationship between corruption and economic growth of non-Asian countries, but found a positive relationship for Asian countries. Paiders (2008) analyses the average values and changes in GDP per capita for 1998–2005 and the Corruption Perception Index (CPI) for 1998–2007. He found that when looking at the data from the countries of the world and European countries, no interrelation can be observed between changes in CPI and GDP per capita, these values fluctuate independently of each other.

The attitude that dominates in published scientific literature is that corruption affects the level of GDP and that these are mutual influences

Secondly, a consensus of the majority of published works is the fact that the correlation between corruption and GDP is negative. The World Bank and IMF presume that corruption has significantly negative effects on economic growth. Corruption undermines development by distorting the rule of law and weakening the institutional foundation on which economic growth depends.[1] Similarly, the IMF states, 'Many of the causes of corruption are economic in nature, and so are its consequences – poor governance clearly is detrimental to economic activity and welfare'.[2]

Serious research in this area began with the work of Mauro (1995), which is cited as the first attempt at empirically studying the impact of corruption on economic growth. Mauro found corruption affects economic growth by reducing private investment and possibly by altering the composition of government expenditure, specifically by lowering the share

of spending on education. Mauro's results were later confirmed by Mo (2001), Méon and Sekkat (2005) and Podobnik (2008), who consistently report that corruption is detrimental for economic growth. Wei (2000) found that countries with high levels of corruption tend to record poor economic performance. Gupta and Terme (1998) find that corruption leads to inequality and poverty through its negative influence on economic growth. Shleifer and Vishny (1993) investigated the situation in Russia, the Philippines and Africa. The authors concluded that corruption has adverse effects on economic growth.

Knack and Keefer (1995) also considered that corruption has a negative effect on economic growth. Rahman, Kisunko and Kapoor (1999) concluded that corruption is significantly and negative related with economic growth. Aidt et al. (2008) report that corruption has a regime-specific impact on growth in that it has the most harmful effect in countries with good quality institutions, but little impact in countries with weak institutions. Aidt (2009) confirm a strong negative relationship between growth and corruption. Tanzi and Davoodi (1997) identify four channels through which corruption may have an adverse effect on economic growth: higher public investment, lower government revenues, lower expenditures on business operations and maintenance and lower quality of public infrastructure. Mo (2001) found that a 1% increase in the corruption level reduce the growth rate by about 0.72% and the most important channel is political instability, accounting for about 53% of the total effect.

Abed and Davoodi (2002) show that higher growth is associated with lower corruption. Aizenman and Glick (2003) showed that a one index point reduction in corruption impacts on the rise of GDP by 0.5 percentage points. Guetat (2006) find significant negative effects of corruption on economic growth of bad institutions. Lambsdorff (2003) also shows how corruption may have an adverse impact on foreign direct investment and net capital inflows, both of which are important determinants of economic growth.

Proponents of this thought point to the following transmission channels to support their argument: (1) a decline in domestic and foreign investment; (2) an increase in cost of production; (3) misallocation of natural resources; (4) an increase in inequality and poverty; and (5) uncertainty in decision-making, among others.

Of course there are studies that confirm the hypothesis of a positive correlation between these factors, as is the case with work that discusses the countries in the Asia-Pacific zone. Some experts claim that corruption is the essential 'speed money' that will increase the efficiency of the economic system, implying that corruption has a positive effect on economic development.

If we look at the relationship between the level of economic development measured by GDP and perceived corruption level across countries, the negative relationship is quite strong: poor countries tend to be corrupt. On the other hand, if we examine the relationship between perceived corruption level and economic growth rate across countries, we can see that growth rates diverge more for countries with high-level corruption. In other words, while many highly corrupt countries have low economic growth rates, there are countries that have achieved rapid economic growth under rampant governmental corruption. This at least suggests that some countries may achieve high economic performance despite high corruption. Bardhan (1997) indicates one way through which 'greasing the wheel' effect may materialise.

Huang (2012) in his research of 10 Asian countries (China, Indonesia, Japan, South Korea, Malaysia, the Philippines, Singapore, Taiwan, Thailand and Vietnam) from 1995 to 2010 shows that the impact of corruption on economic growth is significantly positive, indicating that corruption causes an increase in economic growth. Rock and Bonnett (2004) show that corruption in the large East Asian newly industrialised economies (i.e., China, Indonesia, Korea, Thailand and Japan) significantly promotes economic growth. They find a significantly positive impact of corruption on GDP growth in large East Asian countries. One explanation might be that a strong centralised government can limit the negative effects of bribery compared to a decentralised corrupt bureaucracy.

More than 30 years ago, Leff (1964) first argued that corruption might promote economic growth as it relaxes inefficient and rigid regulations imposed by government. Colombatto (2003) finds, that in some developing countries, corruption has a positive impact on economic growth. Li and Wu (2010) argue that in countries with a higher level of trust, corruption tends to be relatively less harmful to economic growth. Barreto (2001) also finds a significantly positive direct relationship between GDP and corruption.

Wedeman (2002), Bayley (1966) and Acemoglu and Verdier (1998) suggest that corruption introduces efficiency in the economy and positively affects economic growth. Lui (1985) and Beck and Maher (1986) claim that bribes can assist in minimising bureaucratic costs and enhance efficient public administration in economies. Recently, Swaleheen (2011) tested the corruption–growth relationship and results showed that corruption is not growth reducing at all levels and it significantly increases growth even at a higher level of corruption.

The proponents of 'efficient corruption' claim that bribery may allow firms to get things done in an economy plagued by bad, rigid laws (Leff, 1964). In their model agents use 'speed money' to get around bad laws and institutions.

There are claims on both sides regarding the usefulness or harmfulness of corruption. Studies which claim that corruption is harmful to economic growth, tend to focus attention on the bad implications of corruption for efficiency. Yet, other studies advocate that corruption greases the wheels of business and commerce and thus, facilitates economic growth and investment.

The prevailing view is that corruption is harmful to economic growth. Therefore, it is a common finding in academic literature that corruption hampers and hinders economic growth and development.

The brief review above enables us to make two observations. *First, there is causality between corruption and GDP level. Secondly, empirical evidences on the corruption–GDP relationship tends to indicate that there is negative causality between them.*

Until now, there is a very modest number of published papers related to time interaction between the movement levels of corruption and GDP. Akai, Horiuchi and Sakata (2005) show that the effect of corruption on economic growth is negative and statistically significant in the middle- and long-term, but insignificant in the short-term, so the policymakers and economists care more about the middle- and long-term consequences of corruption than about the short-term effects. Paldam and Gundlach (2008) suggest that long-run (they observed the period from 1994 to 2006) causality is from GDP to corruption, as a country gets richer corruption vanishes; they find long-run interaction, but only in one direction.

Shao, Ivanov, Podobnik and Stanley (2007) observe a negative correlation between levels of corruption and long-term growth rate. They observe two periods: 1990–2005 and 1980–2005 and find that less corrupt countries exhibit significant economic growth while

more corrupt countries display a negative growth rate. Pulok (2010) found that there is a long-run relationship among corruption and GDP, over the period 1984–2008. The long-run estimates indicate that corruption has direct negative impact on per capita GDP. The process of successful economic development reduces corruption considerably in the long-run, but little in the short-run, policies that boost growth, if successfully implemented, are likely to reduce corruption in the long-run (Paldam, 1999a).

Gundlach and Paldam (2000) use instrumental variables to identify the long-run direction of causality and they conclude that all long-run causality is from income to corruption, which also means that corruption vanishes as countries get richer. Lui (1996) found similar results. He considered that corruption has a negative effect on the long-term growth rate. Lui writes, 'corruption has two effects 1) a positive level (short-term) effect on allocative efficiency and 2) a negative effect on the economies long-term growth rate'. However, Piplica and Čovo (2011) find that the impact of corruption on economic growth takes place without a significant time delay.

Most of economists argue that corruption may work as the good solution to market distortions imposed by government procedures and policies in the short-run, but in the medium- and long-run corruption reduces market efficiency because in that period the negative effects are stronger. Another important fact is that the results of previous research speak about these deadlines generally and in this article we determine these time frames more precisely.

3. The data

The first question is how do we measure corruption because it is hidden by its nature? Almost all known models for the measurement of corruption are based on perceptions of some categories of the population. Actual corruption levels are difficult to measure (Andersson & Heywood, 2009). The CPI was used as the best measuring method of corruption in all countries in the sample. The CPI is measured by the answers obtained from reputable expert business leaders, based on the corresponding average for each country. The CPI is highly correlated with other corruption measures. Therefore, we used data published by Transparency International since 1995. Transparency International, which is a non-governmental organisation based in Berlin, annually publishes the CPI of countries. This index is a 'poll of polls', indicating impressions of businessmen, local population of relevant countries and risk analysts who have been surveyed. The index is a continuous scale from 0 to 10. A score of 10 represents a completely clean country, and 0 represents an absolutely corrupt state.

In spite of many desirable features of the CPI, it has several limitations. One limitation is that the CPI deals only with limited structure of people and professions. CPI does not measure corruption by businesses that pay bribes to make a big profit at the cost of consumers. Another often cited problem is that the CPI does not measure corruption per se; the index measures the perception of corruption. Despite these shortcomings, CPI is still the most well-known and widely used measure of corruption.

For information on the movement of GDP level we used data published by the World Bank since 1995. The GDP at purchaser prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current

US dollars. Dollars figures for GDP are converted from domestic currencies using single year official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used.

GDP is not the optimal measure, since it does not include all aspects that affect the economy, e.g. environmental aspects. However, it is one of the most commonly used measurements and considered by many to be the best economic measurement. For this purpose GDP is the optimal measurement.

Work includes a relatively long time period from 1995 to 2011 and a modest number of countries that have been sampled. We talk about a sample of 40 countries. Baseline data are limited by the fact that Transparency International begin to publish the corruption index by countries since 1995.

Our data, describing corruption and level of GDP, consists of countries which represent all continents and different levels of development. The details of the data and the sources used in this research are presented in the Appendix Table A1.

4. The model

We combined narrative method for theoretical/analytical studies with the logical method for empirical investigations. Narrative method has enabled us to research the nature of the relationship between corruption and GDP level. Logical method is used to explain time connections between these two indicators. The aim of this analysis is to determine a time delay and causality of the strongest interaction of corruption and GDP levels.

For us the most essential fact in this analysis is whether corruption, as measured by the CPI, and economic development, as measured by the GDP levels, in the current year compared to the previous year showed an increase or decrease. Each increase of corruption in the current year in relation to the previous year is marked by -1. Each decrease of corruption in the current year in relation to the previous year is marked by 1. Each increase of GDP level in the current year in relation to the previous year is marked by 1. Each decrease of GDP level in the current year in relation to the previous year is marked by -1.

Starting from the previously adopted and proven hypothesis of negative correlation between corruption and GDP trends, each combination (1,1) – corruption fall, GDP growth and (-1,-1) – corruption grows, GDP fall we mark as true (T). Each combination (1,-1) – corruption fall, GDP fall and (-1,1) – corruption growth, GDP growth we marked as false (⊥).

We will present this as following :

C(t) indicates change in corruption in the year t,
G(t) indicates change in GDP in the year t,
C(t+n) indicates change in corruption n years after year t,
G(t+n) indicates change in GDP n years after year t,

Where n=(1,2…,15)

We recognise following possible outcomes:

C(t+n) x G(t) = 1 - true (T)
C(t+n) x G(t)=- 1 - false (⊥)

G(t+n) x C(t) = 1 - true (T)
G(t+n) x C(t)=- 1 - false (⊥)

With 15 different time ranges (n) and 120 combinations (T,n) for each country in the observed sample, we cover the whole period of 1995 to 2011.

5. Empirical results

Research results are presented in the following tables and figures (see indicators of growth/decline levels of the CPI and GDP per years and countries in Appendix Table A2). Respecting the fact that the starting time series are stationary, there was no need for Dickey-Fuller test. First, the two tables show the effect of the level of corruption on the level of GDP (Table 1) and GDP impacts on the level of corruption (Table 2), for each time period separately.

Tables 1 and 2 and Figures 1 and 2 give us an overview of the number of (T) combination for each time period separately, including all countries in the sample. If you carefully observe

Table 1. The impact of corruption on the level of GDP. Individual display.

C(t) X G(t+n)	Number of (T) combination	%
C(t) x G(t+15)	20	3%
C(t) x G(t+14)	34	4%
C(t) x G(t+13)	60	8%
C(t) x G(t+12)	72	9%
C(t) x G(t+11)	56	7%
C(t) x G(t+10)	63	8%
C(t) x G(t+9)	61	8%
C(t) x G(t+8)	51	7%
C(t) x G(t+7)	58	8%
C(t) x G(t+6)	56	7%
C(t) x G(t+5)	47	6%
C(t) x G(t+4)	52	7%
C(t) x G(t+3)	50	6%
C(t) x G(t+2)	47	6%
C(t) x G(t+1)	43	6%

Source: Authors' calculation.

Table 2. GDP impacts on the level of the level of GDP. Individual display. corruption. Individual display.

G(t) X C(t+n)	Number of (T) combination	%
G(t) x C(t+15)	20	3%
G(t) x C(t+14)	34	5%
G(t) x C(t+13)	49	7%
G(t) x C(t+12)	58	8%
G(t) x C(t+11)	51	7%
G(t) x C(t+10)	68	9%
G(t) x C(t+9)	58	8%
G(t) x C(t+8)	60	8%
G(t) x C(t+7)	47	6%
G(t) x C(t+6)	56	8%
G(t) x C(t+5)	52	7%
G(t) x C(t+4)	46	6%
G(t) x C(t+3)	40	5%
G(t) x C(t+2)	53	7%
G(t) x C(t+1)	54	7%

Source: Authors' calculation.

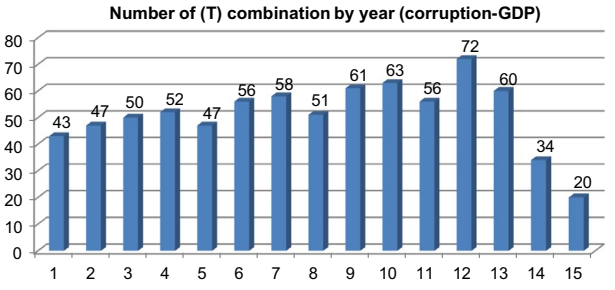

Figure 1. The impact of corruption on the level of GDP. Graphical individual display. Source: Table 1.

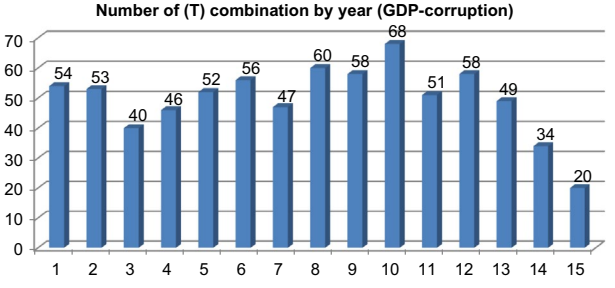

Figure 2. GDP impacts on the level of corruption. Graphical individual display. Source: Table 2.

data in these tables you can see that the highest number of (T) combination is concentrated in the period from six to 10 years, which show in the following tables and figures.

The results in Tables 3 and 4 and Figures 3 and 4 show that the mutual influences of corruption and GDP are most pronounced in the so called medium-term period, it is period between six and 10 years. It basically means that when you change one of these two indicators, it takes between six and 10 years for this change to reflect the strongest effect on the change of the other indicator. Influences one indicator to another are present through entire period, but they are still the strongest in medium-term which we can see from following numbers: 38% (which represents the medium-term period) versus 31% (which represents the short- and long-term periods) in the first table and 39% (which represents the medium-term period) versus 33% and 28% (which represents the short- and long-term periods) in the second table.

In the following we explore and explain the nature of the relationship that exists between the time periods (n) and the number (T) combination. For this purpose we have used the following indicators: the arithmetic mean, standard deviation, coefficient of variance and

Table 3. The impact of corruption on the level of GDP. Summary display.

Ct X Gt(n-n)	Number of (T) combination	%
C(t) x Gt(1–5)	238	31%
C(t) x Gt(6–10)	289	38%
C(t) x Gt(11–15)	242	31%

Source: Authors' calculation.

Table 4. GDP impacts on the level of corruption. Summary display.

Gt X Ct(n-n)	Number of (T) combination	%
G(t) x Ct(1–5)	244	33%
G(t) x Ct(6–10)	289	39%
G(t) x Ct(11–15)	212	28%

Source: Authors' calculation.

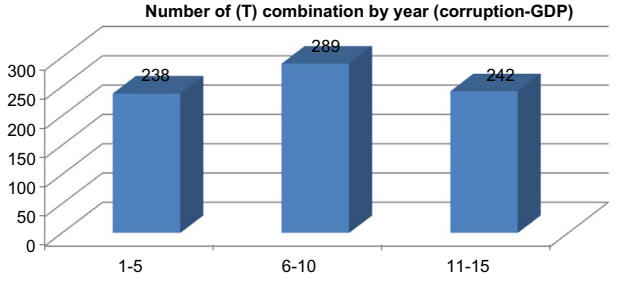

Figure 3. The impact of corruption on the level of GDP. Graphical summary display. Source: Table 3.

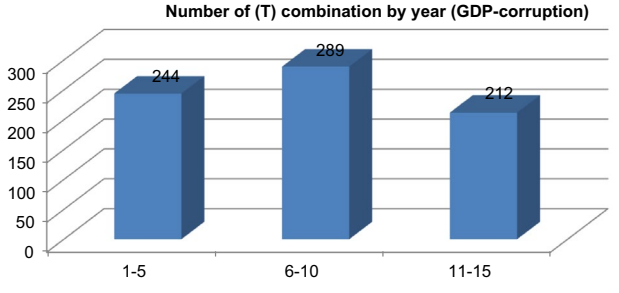

Figure 4. GDP impacts on the level of corruption. Graphical summary display. Source: Table 4.

Pearson's correlation coefficient. For the calculation of these indicators we have used the data from Tables 1 and 2.

Data from column 2 (Table 5) show the arithmetic mean of the number of (T) combination, taking into account all periods (n = 1,2...,15). Columns 3 and 4 represent standard deviation and coefficient of variation for number of (T) combination by periods, that is, for short-, medium- and long-term periods. The last column represents Pearson's coefficient of correlation for the number of (T) combination for the each time period (five years, 10 years and 15 years). In this case we look at the time period in which change in GDP is deferred after change in corruption.

An explanation of the columns in Table 6 is the same as for the previous Table 5, except that in this case we start from data on the number of (T) combination from Table 2. That means that we look at the time period in which change in corruption is deferred after change in GDP.

Figure 5 shows the nature of the relationship that exists between the time period (n = 1,2 … 15) and the number of (T) combination. Using research results from Table 5, the graph shows that increasing in time (n), increases the dispersion of the number of (T) combination

Table 5. Statistics (corruption-GDP).

Ct X Gt(n-n)	$\bar{x}$	σ	*Cv*	*r*
C(t) x Gt(1–5)	51	3.12	6%	0.6
C(t) x Gt(6–10)	51	4.28	8%	0.9
C(t) x Gt(11–15)	51	18.70	37%	-0.1

Source: Authors' calculation from Table 1.

Table 6. Statistics (GDP-corruption).

Gt X Ct(n-n)	$\bar{x}$	σ	*Cv*	*r*
G(t) x Ct(1–5)	50	5.51	11%	-0.3
G(t) x Ct(6–10)	50	7.00	14%	0.6
G(t) x Ct(11–15)	50	13.68	27%	-0.3

Source: Authors' calculation from Table 2.

around the mean value (columns 3 and 4 from Table 5). (T) varies more around the average line as (n) grows. Column 5 (Table 5) shows that in the medium term (six to 10 years) Pearson correlation coefficient is the largest and positive (0,9 versus 0,6 and -0,1). Pearson coefficient shows that in that period (T) is a positive, and strongly connected with the growth of (n). As (n) is growing, in that period, (T) is also growing. With further growth in (n), the number of (T) combination begins to fall (Table 5 show negative and weak Pearson coefficient of correlation, -0,1 for long-term time period). With further growth in (n), (T) is falling. *This fact is also a confirmation of our earlier assertion that the causality between corruption and GDP is the strongest in the medium period (six to 10 years).*

An explanation of Figure 6 is the same as for Figure 5 except that, in this case, we look at the time period in which change in corruption is deferred after change in GDP, and we use calculated indicators from Table 6. Standard deviation and coefficient of correlation are the largest in the long-term period (13.68 and 27% versus 7.00 and 5.51 and 14% and 11%). In that period the dispersion of (T) around arithmetic mean is the largest. The Pearson coefficient of correlation is again the largest and positive in medium-term period (0.6 versus -0.3 in the short- and long-term periods). That means, (n) is growing - number of (T) combination is growing, too. After that period, the Pearson coefficient is negative -0.3 which means (n) is growing (T) is falling. *Causality between GDP and corruption is the strongest in the medium-term period (six to 10 years), again.*

In this way we confirmed our initial hypothesis that it is possible to show the time period when the causality between the movement levels of corruption and GDP is the strongest. We

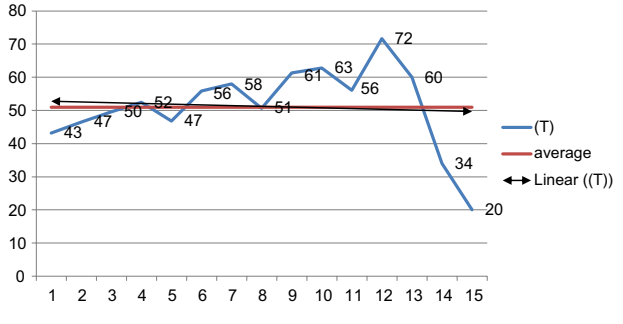

Figure 5. Graphical display of T/n in relation to the arithmetic mean and the trend line (corruption-GDP). Source: Table 1.

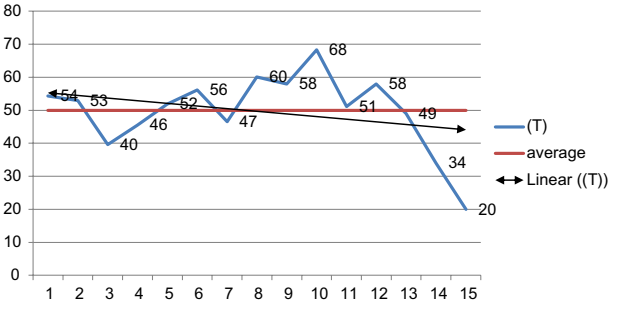

Figure 6. Graphical display of T/n in relation to the arithmetic mean and the trend line (GDP-corruption). Source: Table 2.

have shown that this interaction, in both causes, is the most expressed in the time period between six and 10 years.

6. Conclusion

This article presents an overview of time delay, in which are the most prominent mutual influences of corruption and GDP as indicators of economic development of each country.

Starting from the results of previous studies, about mutual influences of corruption and GDP, as well as their negative correlation, we come to an important conclusion on the temporal dimension of their influences. We showed that a change in GDP is deferred six to 10 years after change in corruption levels and vice versa. This information can be used as an important signpost to people who participate in the creation of economic policy.

Little research has yet been conducted in comparing the causal effects of corruption for different time spans, so the possible varying effects of corruption over time have not yet been analysed. Despite these findings, our study has limitations which should be noted. If we take into consideration the relatively modest number of published papers on this topic, we believe that further investigation is extremely important and necessary, especially if they take into account a larger sample and a longer period of time and with the use of new methods of data analysis, we may be able to get more accurate results about this time frame.

The findings of this article can be of importance for evidence-based policymaking by national governments, international organisations, and international donors of aid. We believe, however, that the results of our research could also serve as a useful guideline for future analyses of time connections between corruption and GDP.

Notes

1. The World Bank, http://www1.worldbank.org/publicsector/anticorrupt/index.cfm.
2. The IMF, http://www.imf.org/external/np/exr/facts/gov.htm.

Acknowledgement

The authors acknowledge the financial support of the Ministry of Education, Science and Technological Development of the Republic of Serbia, within the Project No 47,005.

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Appendix

Table A1: Description of Data Sources

Country/Year	1995		1996		1997		1998		1999		2000		2001		2002	
	CPI	GDP (US$)	CPI	GDP (US$)	CPI	GDP (US$)	CPI	GDP (US$)	CPI	GDP (US$)	CPI	GDP (US$)	CPI	GDP (US$)	CPI	GDP (US$)
New Zealand	9,6	62.795.370.434	9,4	68.870.600.813	9,2	64.924.816.050	9,4	55.199.814.553	9,4	57.698.043.178	9,4	51.599.749.516	9,4	53.872.980.328	9,5	65.463.945.931
Denmark	9,3	161.983.614.165	9,3	164.435.821.822	9,9	170.435.460.671	10,0	173.653.145.893	10,0	173.944.697.686	9,8	160.092.517.846	9,5	160.476.161.869	9,5	173.880.831.444
Singapore	9,3	80.769.992.427	8,8	94.688.546.180	8,7	104.561.712.486	9,1	95.803.611.618	9,1	85.963.561.402	9,1	95.922.653.586	9,2	91.140.432.628	9,3	90.592.818.234
Finland	9,1	130.806.100.218	9,1	126.308.339.604	9,5	122.987.057.611	9,6	129.763.017.366	9,8	130.202.851.223	10,0	121.795.808.734	9,9	124.642.936.593	9,7	135.183.512.140
Canada	8,9	590.517.341.883	9,0	613.761.642.831	9,1	637.536.472.627	9,2	616.766.430.738	9,2	661.264.733.696	9,2	724.910.860.683	8,9	715.423.553.719	9,0	734.661.951.188
Sweden	8,9	253.679.903.738	9,1	276.456.158.664	9,4	253.177.906.718	9,5	254.733.204.065	9,4	258.813.540.860	9,4	247.260.155.669	9,0	227.359.468.691	9,3	250.960.758.337
Australia	8,8	370.888.833.383	8,6	403.619.119.879	8,9	437.631.867.272	8,7	401.214.135.522	8,7	390.315.859.051	8,3	416.887.221.196	8,5	380.443.812.388	8,6	397.147.341.984
Switzerland	8,8	315.939.881.871	8,8	304.751.566.125	8,6	264.584.062.462	8,9	272.632.435.332	8,9	269.211.960.880	8,6	249.918.732.455	8,4	264.989.746.187	8,5	278.620.784.936
The Netherlands	8,7	418.969.256.108	8,7	417.990.392.157	9,0	386.533.770.047	9,0	400.648.000.378	9,0	411.456.424.462	8,9	385.074.626.866	8,8	400.654.138.702	9,0	437.807.265.199
Norway	8,6	148.919.844.677	8,9	160.158.299.482	8,9	153.223.061.046	9,0	151.139.149.912	8,9	159.045.286.696	9,1	168.286.531.891	8,6	170.922.861.074	8,5	191.927.007.230
Ireland	8,6	67.036.471.511	8,5	72.904.024.686	8,3	81.150.642.625	8,2	88.116.381.513	7,7	96.421.133.557	7,2	97.524.453.299	7,5	105.702.090.292	6,9	123.598.910.899
United Kingdom	8,6	1.167.118.510.336	8,4	1.219.541.341.654	8,2	1.358.894.891.945	8,7	1.456.051.799.636	8,6	1.502.784.338.104	8,7	1.477.200.786.806	8,3	1.470.598.919.634	8,7	1.611.762.589.928
Germany	8,1	2.522.860.653.382	8,3	2.436.963.867.949	8,2	2.157.229.866.907	7,9	2.178.170.501.278	8,0	2.131.046.239.079	7,6	1.886.401.226.700	7,4	1.880.894.854.586	7,3	2.006.597.615.283
Chile	7,9	71.349.200.326	6,8	76.769.008.174	6,1	80.808.986.152	6,8	79.373.597.980	6,9	72.995.286.764	7,4	75.210.311.780	7,5	68.568.293.067	7,5	67.355.403.373
USA	7,8	7.338.400.000.000	7,7	7.751.100.000.000	7,6	8.256.500.000.000	7,5	8.741.000.000.000	7,5	9.301.000.000.000	7,8	9.898.800.000.000	7,6	10.233.900.000.000	7,7	10.590.200.000.000
Austria	7,1	238.561.783.813	7,6	234.676.456.979	7,6	207.826.090.771	7,5	213.329.595.371	7,6	212.301.777.115	7,7	192.070.749.954	7,8	191.670.678.300	7,8	207.537.336.721
Hong Kong	7,1	144.229.968.760	7,0	158.965.769.144	7,3	178.312.032.926	7,8	166.908.762.265	7,7	163.283.016.436	7,7	169.121.013.113	7,9	166.593.107.870	8,2	163.760.952.483
France	7,0	1.570.061.768.958	7,0	1.572.776.351.507	6,7	1.421.492.020.678	6,7	1.458.872.804.092	6,6	1.456.431.067.547	6,7	1.326.334.899.576	6,7	1.338.302.816.792	6,3	1.452.030.303.030
Belgium	6,9	284.519.704.433	6,8	275.796.742.671	5,3	249.766.576.455	5,4	255.598.022.005	5,3	254.505.515.875	6,1	226.672.747.374	6,6	232.485.906.040	7,1	252.795.051.056
Japan	6,7	5.333.926.511.059	7,1	4.706.187.126.000	6,6	4.324.278.106.866	5,8	3.914.574.887.342	6,0	4.432.569.282.923	6,4	4.731.198.760.271	7,1	4.159.859.918.094	7,1	3.980.919.536.160
South Africa	5,6	151.113.088.035	5,7	143.732.002.577	5,0	148.814.150.953	5,2	134.256.556.522	5,0	133.183.580.945	5,0	132.877.640.091	4,8	118.478.978.978	4,8	111.100.827.741
Portugal	5,6	116.546.208.556	6,5	121.154.795.945	7,0	116.661.406.518	6,5	122.868.971.505	6,7	126.423.862.715	6,4	117.299.220.914	6,3	120.332.080.537	6,3	132.288.714.286
Malaysia	5,3	98.832.452.512	5,3	100.851.784.848	5,0	100.168.847.815	5,3	72.175.310.308	5,1	79.149.423.191	4,8	93.789.706.842	5,0	92.783.947.368	4,9	100.845.526.316
Argentina	5,2	268.001.878.144	3,4	272.149.757.952	2,8	292.659.888.192	3,0	296.948.362.240	3,0	283.523.022.848	3,5	284.203.745.280	3,5	268.696.715.264	2,8	102.040.334.259
Spain	4,4	596.750.733.900	4,3	622.428.740.313	5,9	572.637.500.000	6,1	600.838.633.455	6,6	617.879.821.010	7,0	580.345.494.748	7,0	608.866.375.839	7,1	686.295.978.035
South Korea	4,3	517.118.129.838	5,0	557.643.607.434	4,3	516.282.842.110	4,2	345.432.412.376	3,8	445.399.303.511	4,0	533.384.027.729	4,2	504.565.763.004	4,5	575.928.909.980
Hungary	4,1	45.561.413.231	4,9	45.900.691.784	5,2	46.533.207.226	5,0	47.951.604.854	5,2	48.255.011.860	5,2	46.386.598.534	5,3	52.730.966.883	4,9	66.389.486.264
Turkey	4,1	169.495.941.048	3,5	181.475.555.283	3,2	189.834.648.111	3,4	269.287.100.115	3,6	249.751.470.869	3,8	266.567.531.990	3,6	196.005.288.838	3,2	232.534.960.775
Greece	4,0	130.332.280.543	5,0	138.089.597.015	5,4	134.653.112.718	4,9	135.274.145.129	4,9	133.187.471.440	4,9	134.418.164.455	4,2	129.841.697.351	4,2	146.050.256.330
Colombia	3,4	92.937.277.796	2,7	97.160.111.573	2,2	106.659.507.964	2,2	98.443.743.191	2,9	86.186.156.584	3,2	100.393.791.871	3,8	98.745.443.240	3,6	98.029.102.139
Mexico	3,2	286.696.251.724	3,3	332.908.981.436	2,7	401.480.129.436	3,3	421.214.800.220	3,4	481.202.434.427	3,3	581.426.421.971	3,7	622.092.637.151	3,6	649.075.576.302
Italy	3,0	1.131.770.110.959	3,4	1.266.354.134.494	5,0	1.198.654.411.765	4,6	1.224.579.873.011	4,7	1.208.180.354.708	4,6	1.104.009.452.962	5,5	1.123.702.691.037	5,2	1.225.176.969.595
Thailand	2,8	168.018.557.308	3,3	181.947.631.900	3,1	150.891.449.495	3,0	111.869.654.864	3,2	122.629.741.698	3,2	122.725.247.706	3,2	115.536.455.150	3,2	126.876.916.690
India	2,8	366.599.645.609	2,6	399.706.888.515	2,8	423.160.419.440	2,9	428.741.030.147	2,9	454.344.395.616	2,8	474.691.627.708	2,7	492.376.579.616	2,7	522.799.457.731
Philippines	2,8	74.119.869.800	2,7	82.845.194.395	3,1	82.344.374.414	3,3	72.207.022.472	3,6	82.995.145.601	2,8	81.026.264.881	2,9	76.261.998.633	2,6	81.357.657.790
Brazil	2,7	769.951.180.336	3,0	839.693.246.760	3,6	971.199.967.488	4,0	843.826.501.464	4,1	586.863.191.445	3,9	644.701.831.101	4,0	553.582.178.386	4,0	504.221.238.974
Venezuela	2,7	74.888.743.194	2,5	68.259.588.963	2,8	85.837.385.779	2,3	91.338.542.542	2,6	97.974.136.437	2,7	117.147.614.566	2,8	122.909.734.601	2,5	92.888.586.976
Pakistan	2,3	60.636.071.694	1,0	63.320.170.084	2,5	62.433.340.468	2,7	62.191.955.814	2,2	62.973.855.719		73.952.374.970	2,3	72.309.738.921	2,6	72.306.820.396
China	2,2	738.007.199.956	2,4	856.084.729.312	2,9	953.650.693.079	3,5	1.019.458.586.326	3,4	1.080.277.930.360	3,1	1.198.474.934.199	3,5	1.324.806.914.368	3,5	1.453.827.954.714
Indonesia	1,9	202.193.033.844	2,7	227.369.671.349	2,7	215.748.854.647	2,0	95.445.548.017	1,7	140.091.582.927	1,7	165.021.012.962	1,9	160.446.947.638	1,9	195.660.611.034

Source: http://data.worldbank.org/indicator/NY.GDP.MKTP.CD and http://www.transparency.org/research/cpi/overview

Country/Year	2003		2004		2005		2006		2007		2008		2009		2010		2011	
	CPI	GDP (US$)	CPI	GDP (US$)	CPI	GDP (US$)	CPI	GDP (US$)	CPI	GDP (US$)	CPI	GDP (US$)	CPI	GDP (US$)	CPI	GDP (US$)	CPI	GDP (US$)
New Zealand	9,5	86.707.675.644	9,6	102.210.391.042	9,6	113.079.910.806	9,6	109.821.647.338	9,4	134.015.999.775	9,3	120.676.900.521	9,4	117.376.306.375	9,3	142.476.978.417	9,5	
Denmark	9,5	212.621.866.883	9,5	244.727.970.021	9,5	267.676.556.224	9,5	274.376.699.878	9,4	311.417.801.999	9,3	343.891.383.868	9,3	311.113.494.638	9,3	312.214.946.919	9,4	333.677.291.152
Singapore	9,4	93.362.870.573	9,3	109.336.453.914	9,4	123.536.892.366	9,4	139.152.049.812	9,3	160.434.001.845	9,2	166.792.256.695	9,2	175.934.870.516	9,3	213.164.516.603	9,2	239.699.598.482
Finland	9,7	164.256.207.675	9,7	186.954.566.832	9,6	195.777.993.334	9,6	207.949.409.201	9,4	246.137.337.186	9,0	271.974.219.955	8,9	239.660.592.657	9,2	236.476.000.000	9,4	266.070.833.333
Canada	8,7	865.970.042.462	8,5	992.226.099.552	8,4	1.133.769.995.478	8,5	1.270.610.846.645	8,7	1.424.066.759.448	8,7	1.500.679.437.547	8,7	1.337.577.639.762	8,9	1.577.040.095.218	8,7	1.736.893.936.191
Sweden	9,3	314.712.404.163	9,2	362.099.649.913	9,2	370.979.699.747	9,2	399.975.991.570	9,3	462.912.893.670	9,3	486.159.607.800	9,2	465.790.994.638	9,2	461.932.113.344	9,3	538.131.134.807
Australia	8,8	459.410.399.864	8,8	615.930.792.473	8,8	696.471.959.104	8,7	749.806.330.957	8,6	857.066.606.706	8,7	1.061.500.398.304	8,7	924.197.419.943	8,7	1.131.693.072.708	8,8	1.371.760.885.598
Switzerland	8,8	335.039.777.388	9,1	363.990.618.832	9,1	372.476.755.390	9,1	391.233.703.808	9,0	434.116.631.637	9,0	503.215.464.680	9,0	492.261.743.787	8,7	529.384.880.630	8,8	655.660.112.360
The Netherlands	8,9	538.317.641.084	8,7	609.888.955.686	8,6	638.470.635.375	8,7	677.891.931.433	9,0	782.566.743.008	8,9	870.811.147.335	8,9	783.429.955.254	8,8	774.228.947.368	8,9	856.256.544.444
Norway	8,8	224.880.794.335	8,9	261.035.106.200	8,9	304.060.869.849	8,8	340.041.912.704	8,7	393.479.163.066	7,9	451.886.460.860	8,6	374.767.527.038	8,6	417.793.549.007	9,0	485.800.390.857
Ireland	7,5	159.121.375.019	7,5	186.346.566.724	7,4	200.270.980.764	7,4	223.870.720.435	7,5	259.954.893.776	7,7	265.654.162.742	8,0	220.098.458.857	8,0	205.353.607.859	7,5	217.275.000.000
United Kingdom	8,7	1.960.311.936.765	8,6	2.201.417.115.827	8,6	2.280.592.201.961	8,6	2.444.579.171.167	8,4	2.812.874.670.862	7,7	2.635.955.188.378	7,7	2.171.386.158.462	7,6	2.251.886.491.938	7,8	2.431.598.709.677
Germany	7,7	2.423.814.888.402	8,2	2.795.341.472.300	8,2	2.765.263.750.966	8,0	3.092.749.698.160	7,8	3.333.907.412.152	7,9	3.693.998.324.999	8,0	3.286.655.955.560	7,9	3.258.947.368.421	8,0	3.570.555.555.556
Chile	7,4	73.999.936.839	7,4	96.953.704.478	7,3	120.055.492.800	7,3	154.999.553.123	7,0	173.079.595.862	6,9	179.926.701.840	6,7	172.990.990.098	7,2	216.306.075.370	7,2	248.566.343.709
USA	7,5	11.068.500.000.000	7,5	11.797.800.000.000	7,6	12.564.300.000.000	7,3	13.314.500.000.000	7,2	13.961.000.000.000	7,3	14.219.300.000.000	7,5	13.965.600.000.000	7,1	14.447.100.000.000	7,1	15.094.000.000.000
Austria	8,0	253.845.776.524	8,4	291.430.382.497	8,7	304.983.601.950	8,6	324.864.420.044	8,1	375.041.784.002	8,1	414.173.646.318	7,9	391.775.164.862	7,9	376.576.301.579	7,8	418.483.076.383
Hong Kong	8,0	159.572.061.519	8,0	165.886.363.636	8,3	177.771.729.913	8,3	189.951.596.265	8,3	207.087.359.793	8,1	215.365.075.594	8,2	206.283.363.342	8,4	224.457.899.259	8,4	243.865.853.093
France	6,9	1.792.214.324.219	7,1	2.065.078.663.937	7,5	2.136.555.468.200	7,4	2.283.765.477.490	7,3	2.536.399.703.396	6,9	2.831.794.045.463	6,9	2.649.696.000.767	6,8	2.549.007.353.158	7,0	2.773.932.155.000
Belgium	7,6	311.688.487.395	7,5	361.699.201.960	7,4	377.360.395.452	7,3	399.965.937.160	7,1	459.617.464.992	7,3	507.393.706.573	7,1	472.419.899.598	7,1	466.594.706.842	7,5	511.933.333.333
Japan	7,0	4.300.939.184.964	6,9	4.665.800.055.851	7,3	4.571.376.737.175	7,6	4.366.761.451.007	7,5	4.356.329.396.669	7,3	4.849.209.099.924	7,7	5.035.141.567.669	7,8	5.488.416.486.786	8,0	5.867.154.491.910
South Africa	4,4	169.219.300.335	4,6	219.905.936.699	4,5	247.064.310.096	4,6	261.007.059.379	5,1	286.171.830.700	4,9	273.870.082.686	4,7	283.012.416.451	4,5	363.533.195.108	4,1	408.236.753.338
Portugal	6,6	161.831.941.309	6,3	186.397.304.300	6,5	191.647.859.926	6,6	201.760.596.436	6,5	231.741.575.805	6,1	251.955.263.891	5,8	234.085.804.955	6,0	227.196.843.105	6,1	237.592.080.333
Malaysia	5,2	110.000.368.421	5,0	134.749.473.684	5,1	137.960.939.791	5,0	155.831.403.249	5,1	186.777.391.971	5,1	222.744.224.710	4,5	192.914.631.100	4,4	237.796.914.597	4,3	278.671.114.917
Argentina	2,5	129.597.193.004	2,5	163.139.451.873	2,8	183.183.408.841	2,9	214.066.231.200	2,9	260.760.703.248	2,9	326.676.673.163	2,9	307.091.774.685	2,9	368.710.991.391	3,0	445.868.571.982
Spain	6,9	880.838.792.102	7,1	1.044.913.470.304	7,0	1.130.798.886.730	6,8	1.208.362.183.344	6,7	1.441.426.934.970	6,5	1.593.366.873.988	6,1	1.455.658.243.338	6,1	1.383.344.736.842	6,2	1.490.809.792.222
South Korea	4,3	643.762.388.701	4,5	721.975.555.824	5,0	844.863.004.335	5,1	951.773.478.965	5,1	1.049.255.951.107	5,6	931.402.204.982	5,5	834.060.441.841	5,4	1.014.880.141.871	5,4	1.116.247.397.319
Hungary	4,8	83.938.370.061	4,8	101.925.774.932	5,0	110.324.711.573	5,2	112.533.193.716	5,3	135.100.000.867	5,1	154.333.541.852	5,1	126.631.634.135	4,7	128.634.135.135	4,6	140.029.344.474
Turkey	3,1	303.005.300.918	3,2	392.166.274.999	3,5	482.979.839.038	3,8	530.900.984.535	4,1	647.165.131.629	4,6	730.337.495.189	4,4	614.553.921.823	4,4	731.144.395.555	4,2	773.091.360.340
Greece	4,3	193.893.218.244	4,3	227.893.430.086	4,3	240.075.890.332	4,4	263.053.978.708	4,6	304.886.439.400	4,7	341.187.719.027	3,8	331.765.168.414	3,5	299.102.434.666	3,4	298.733.586.253
Colombia	3,7	94.916.590.095	3,8	117.188.200.355	4,0	145.634.593.204	3,9	163.740.400.845	3,8	207.821.494.227	3,8	244.539.677.722	3,7	235.164.279.711	3,5	288.764.794.434	3,4	331.854.672.814
Mexico	3,6	700.324.664.927	3,6	768.777.472.100	3,5	848.647.464.928	3,3	893.878.430.347	3,5	1.033.902.332.495	3,6	1.094.490.538.422	3,3	882.364.743.911	3,1	1.058.910.800.042	3,0	1.153.316.620.667
Italy	5,3	1.514.500.536.301	4,8	1.726.201.500.772	5,0	1.766.275.014.007	4,9	1.972.982.702.430	5,2	2.127.160.496.503	4,8	2.307.311.495.086	4,3	2.111.148.000.712	3,9	2.043.638.726.121	3,9	2.194.750.336.353
Thailand	3,3	142.640.079.033	3,6	161.338.790.595	3,1	176.391.815.960	3,6	207.088.800.190	3,3	245.977.009.058	3,5	272.577.816.171	3,4	263.595.029.604	3,5	318.907.979.752	3,4	345.649.290.707
India	2,8	617.572.578.403	2,8	721.595.253.520	2,9	834.216.944.755	3,3	949.116.785.851	3,5	1.038.700.320.055	3,4	1.224.096.604.710	3,4	1.361.557.169.827	3,3	1.684.333.716.830	3,1	1.847.991.885.838
Philippines	2,5	83.900.206.702	2,6	91.371.336.959	2,5	103.065.973.408	2,5	122.240.749.246	2,5	149.359.920.006	2,3	170.606.533.340	2,4	168.333.640.385	2,4	199.589.447.404	2,6	224.753.569.097
Brazil	3,9	552.469.286.369	3,9	663.760.000.000	3,7	882.185.291.701	3,3	1.088.917.379.413	3,5	1.365.980.661.542	3,5	1.653.917.559.097	3,7	1.621.661.507.655	3,7	2.143.035.333.358	3,8	2.476.652.198.880
Venezuela	2,4	83.622.191.419	2,3	112.451.400.423	2,3	145.913.488.602	2,3	183.477.932.124	2,0	230.364.012.376	1,9	315.600.000.340	1,9	332.419.979.536	2,0	393.807.311.437	1,9	316.482.190.000
Pakistan	2,5	83.244.881.083	2,1	97.977.766.168	2,1	109.690.000.000	2,2	127.500.000.000	2,4	143.171.100.842	2,5	163.891.692.022	2,4	161.919.031.346	2,3	176.869.569.604	2,5	211.091.984.819
China	3,4	1.640.958.702.775	3,4	1.931.644.321.142	3,2	2.268.902.390.826	3,3	2.712.950.886.898	3,5	3.494.065.944.791	3,6	4.521.207.088.304	3,6	4.991.265.406.762	3,5	5.930.329.470.799	3,6	7.318.499.289.769
Indonesia	1,9	234.772.458.918	2,0	266.006.883.326	2,2	285.869.810.017	2,4	364.570.329.287	2,3	432.216.797.775	2,6	510.244.548.960	2,8	539.579.959.063	2,8	708.026.340.456	3,0	846.832.283.151

Source: http://data.worldbank.org/indicator/NY.GDP.MKTP.CD and http://www.transparency.org/research/cpi/overview

Appendix

Table A2: Explanatory variables

Country/Year	1996		1997		1998		1999		2000		2001		2002	
	CPI	GDP	CPI	GDP	CPI	GDP	CPI	GDP	CPI	GDP	CPI	GDP	CPI	GDP
New Zealand	-1	1	-1	-1	1	-1	1	1	1	-1	1	1	1	1
Denmark	1	1	1	1	1	1	-1	1	-1	-1	-1	1	-1	1
Singapore	-1	1	-1	1	1	-1	1	-1	1	1	1	-1	1	-1
Finland	1	-1	1	-1	1	1	1	1	1	-1	-1	1	-1	1
Canada	1	1	1	1	1	-1	-1	1	-1	1	-1	-1	1	1
Sweden	1	1	1	-1	1	1	-1	1	-1	-1	-1	-1	1	1
Australia	-1	1	1	1	-1	-1	-1	-1	-1	1	1	-1	1	1
Switzerland	-1	-1	-1	-1	1	1	-1	-1	-1	-1	-1	1	1	1
The Netherlands	1	-1	1	-1	-1	1	-1	1	-1	-1	-1	1	1	1
Norway	1	1	1	-1	1	-1	-1	1	1	1	-1	1	-1	1
Ireland	-1	1	-1	1	-1	1	-1	1	-1	1	1	1	-1	1
United Kingdom	-1	1	-1	1	1	1	-1	1	1	-1	-1	-1	1	1
Germany	1	-1	-1	-1	-1	1	1	-1	-1	1	-1	-1	-1	1
Chile	-1	1	-1	1	1	-1	1	-1	1	1	1	-1	-1	-1
USA	-1	1	-1	1	-1	1	1	1	1	1	-1	1	1	1
Austria	1	-1	-1	-1	-1	1	1	-1	1	-1	1	-1	1	1
Hong Kong	-1	1	1	1	1	-1	-1	-1	1	1	1	-1	1	-1
France	-1	1	-1	-1	-1	1	-1	-1	1	-1	-1	1	-1	1
Belgium	-1	-1	-1	-1	1	1	-1	-1	1	-1	1	-1	1	1
Japan	1	-1	-1	-1	-1	-1	1	1	1	1	1	-1	-1	-1
South Africa	1	-1	-1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	-1
Portugal	1	1	1	-1	-1	1	1	1	-1	-1	-1	1	1	1
Malaysia	-1	1	-1	-1	1	-1	-1	1	-1	1	1	-1	-1	1
Argentina	-1	1	-1	1	1	1	1	-1	1	1	-1	-1	-1	1
Spain	-1	1	1	-1	1	1	1	1	1	-1	1	1	1	1
South Korea	1	1	-1	-1	-1	1	-1	1	1	1	1	-1	1	1
Hungary	1	1	1	1	-1	1	1	1	1	-1	1	1	-1	1
Turkey	-1	1	-1	1	1	1	1	-1	1	1	-1	-1	-1	1
Greece	1	1	1	-1	-1	1	-1	-1	-1	-1	-1	1	1	1
Colombia	-1	1	-1	1	1	-1	1	-1	1	1	1	-1	-1	-1
Mexico	1	1	-1	1	1	1	1	1	-1	1	1	1	-1	1
Italy	1	1	1	-1	-1	1	1	-1	-1	-1	1	1	-1	1
Thailand	1	1	-1	-1	-1	-1	1	1	1	1	1	-1	1	1
India	-1	1	1	1	1	1	-1	1	-1	1	-1	1	1	1
Philippines	-1	1	1	-1	1	-1	1	1	-1	-1	1	-1	-1	1
Brazil	1	1	1	1	1	-1	1	-1	-1	1	1	-1	-1	-1
Venezuela	-1	-1	1	1	-1	1	1	1	1	1	1	1	-1	-1
Pakistan	-1	1	1	-1	1	-1	-1	1	1	1	1	-1	1	-1
China	1	1	1	1	1	1	-1	1	-1	1	1	1	-1	1
Indonesia	1	1	-1	-1	-1	-1	-1	1	1	1	1	-1	1	1

Country/Year	2003		2004		2005		2006		2007		2008		2009		2010		2011	
	CPI	GDP	CPI	GDP	CPI	GDP	CPI	GDP	CPI	GDP	CPI	GDP	CPI	GDP	CPI	GDP	CPI	GDP
New Zealand	1	1	1	1	-1	1	-1	-1	-1	1	-1	-1	1	-1	-1	1	1	1
Denmark	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	1	-1	1	1	1	1
Singapore	1	1	-1	1	1	1	-1	1	-1	1	-1	-1	1	1	1	1	-1	1
Finland	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	-1	1	-1	1	1
Canada	-1	1	-1	1	-1	1	1	1	1	1	1	1	1	-1	1	1	-1	1
Sweden	1	1	-1	1	1	1	1	1	1	1	-1	1	-1	-1	1	1	1	1
Australia	1	1	-1	1	-1	1	-1	1	-1	1	1	1	1	-1	1	1	1	1
Switzerland	1	1	1	1	-1	1	-1	1	-1	1	-1	1	-1	-1	-1	1	1	1
The Netherlands	-1	1	-1	1	-1	1	1	1	1	1	-1	1	-1	-1	-1	-1	1	1
Norway	1	1	1	1	-1	1	-1	1	-1	1	-1	1	1	-1	1	1	1	1
Ireland	1	1	-1	1	-1	1	1	1	1	1	1	1	1	-1	-1	-1	-1	1
United Kingdom	-1	1	-1	1	-1	1	-1	1	-1	1	-1	-1	-1	-1	-1	1	1	1
Germany	1	1	1	1	-1	1	-1	1	-1	1	1	1	1	-1	-1	-1	1	1
Chile	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	-1	1	1	1	1
USA	-1	-1	1	1	1	1	-1	1	-1	1	1	1	1	-1	-1	1	-1	1
Austria	1	1	1	1	1	1	-1	1	-1	1	-1	1	-1	-1	-1	-1	-1	1
Hong Kong	-1	-1	1	1	1	1	-1	1	-1	1	-1	1	1	-1	1	1	1	1
France	1	1	1	1	1	1	-1	1	-1	1	-1	1	-1	-1	-1	-1	1	1
Belgium	1	1	-1	1	-1	1	-1	1	-1	1	1	1	-1	-1	1	-1	1	1
Japan	-1	1	-1	1	1	-1	1	-1	-1	-1	-1	1	1	1	1	1	1	1
South Africa	-1	1	1	1	-1	1	1	1	1	1	-1	-1	-1	1	-1	1	-1	1
Portugal	1	1	-1	1	1	1	1	1	-1	1	-1	1	-1	-1	1	-1	1	1
Malaysia	1	1	1	1	1	1	-1	1	1	1	-1	1	-1	-1	-1	1	-1	1
Argentina	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	1	1	1
Spain	-1	1	1	1	-1	1	-1	1	-1	1	-1	1	-1	-1	1	-1	1	1
South Korea	-1	1	1	1	1	1	1	1	1	1	1	-1	-1	-1	-1	1	-1	1
Hungary	-1	1	1	1	1	1	1	1	1	1	-1	1	-1	-1	-1	1	-1	1
Turkey	-1	1	1	1	1	1	1	1	1	1	1	1	-1	-1	-1	1	-1	1
Greece	1	1	1	1	1	1	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1
Colombia	1	-1	1	1	1	1	-1	1	-1	1	-1	1	-1	-1	-1	1	-1	1
Mexico	-1	1	-1	1	-1	1	-1	1	1	1	1	1	-1	-1	-1	1	-1	1
Italy	1	1	-1	1	1	1	-1	1	1	1	-1	1	-1	-1	-1	-1	-1	1
Thailand	1	1	1	1	-1	1	1	1	-1	1	1	1	-1	-1	1	1	-1	1
India	1	1	1	1	1	1	1	1	1	1	-1	-1	-1	1	-1	1	-1	1
Philippines	-1	1	1	1	-1	1	-1	1	-1	1	-1	1	1	-1	1	1	1	1
Brazil	-1	1	-1	1	-1	1	-1	1	1	1	1	1	1	-1	1	1	1	1
Venezuela	-1	-1	-1	1	-1	1	-1	1	-1	1	-1	1	1	1	1	1	-1	-1
Pakistan	-1	1	-1	1	1	1	1	1	1	1	1	1	-1	-1	-1	1	1	1
China	-1	1	-1	1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	1
Indonesia	1	1	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	1	1