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Do Business Cycles Trigger Corruption?

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Abstract

In the economic literature, the nexus between economic growth and corruption is well covered, but there are only few empirical studies on cyclical variation of corruption. Gokcekus & Suzuki (2011) in one such study. It finds that transitory income and corruption vary in parallel, thus confirming the famous claim of Galbraith (1997) that embezzlement flourishes in business booms and withers in recessions. This paper tests the general validity of the finding by using a more extensive dataset. The results are conflicting: corruption is found to shrink with the increase in transitory income and vice versa. In other words, economic booms foster integrity, and recessions make corruption bloom.

Keywords: embezzlement, permanent income, transitory income

JEL classification: D73, E32

1 Introduction

In the economic literature on corruption, there are many empirical studies on the correlation between economic development and corruption. Most of them also show that corruption tends to diminish as national income rises (e.g. La Porta *et al*., 1999; Mauro, 1995; Treisman, 2000; Mo, 2001). Still, only a few empirical studies have tackled the question about the correlation between business cycles and corruption. In recent years, this viewpoint has become more and more important due to the growing understanding that cycles and the behavioural patterns of economic agents are organically intertwined.

The original idea comes already from Keynes (1936), and e.g. Minsky (1975, 1986), and Akerlof & Shiller (2009) represent more recent contributions to the discussion. Behavioural analyses emphasize that the thought patterns of individuals, their constant 'rational' calculus, in a large extent dictate rent-seeking, which in turn considerably contributes to economic disruptions at given intervals of time. Quiggin (2010), and Varoufakis (2011) highlight the role of such biased behaviour during business cycles, which occasionally burst into earth quaking economic catastrophes, like that since the 2008 financial crisis.

The famous proposition by Galbraith (1997, p. 133) is that there always exists a considerable amount of undiscovered embezzlement in the business life, and that it varies with economic cycles. In good times, people are not only trusting but also greedy, which makes the 'bezzle' grow. In depression, people get cautious and suspicious, and money is audited meticulously. Improving business morality makes the 'bezzle' shrink.

Gokcekus and Suzuki (2011) is one of the few studies on the nexus between business cycles and corruption. Taking Galbraith (1997) as a starting point, it builds on the fact that embezzlement is a key element of corruption, and tests the proposition by using comprehensive measures of perceived corruption. The study also finds substantial proof for the proposition: the results show that, while long-term growth and integrity develop in parallel, corruption tends to boost in times of short-term booms, and shrink in economic recessions. This is exactly what Galbraith says in terms of the 'bezzle'.

The core idea of this paper is to examine, whether the proof by Gokcekus & Suzuki (2011) on the intuitively appealing proposition of Galbraith (1997) is valid in general. This is done simply by replicating the original study, but using a more extensive dataset. The dataset includes both considerably more numerous country observations and a somewhat longer and more up-to-date time coverage. In line with the original study, both economic growth (namely changes in permanent income) and business cycles (namely changes in transitory income) are tested as possible determinants of corruption.

The paper is organized as follows. Section 2 specifies the model as well as the data used. Section 4 describes the estimation techniques, and reports the estimation results. Alternative measures of corruption are used to check the robustness of the results, and to secure perfect comparability of the results to those of Gokcekus & Suzuki (2011). Section 5 discusses the findings, and maps paths for further study.

2 Modelling and data

To aim of the paper is to test the effects of changes in national income on corruption. Both the effects of long-term changes in permanent income and short-term fluctuations in transitory income are studied. The modelling technique follows Gokcekus & Suzuki (2011), which in turn is an application of the original formulation of Mélitz & Zumer (2002). The basic model can be written as follows:

$$(1): Cor_{i,t} = \gamma_0 + \gamma_1 PI_i + \gamma_2 TI_{i,t} + \mu_{i,t}.$$

In equation (1), all country variables are expressed in relation to the whole sample of countries. $Cor_{i,t}$ stands for the level of corruption in country i ($i = 1,\ldots,N$) in period t ($t = 1,\ldots,T$) relative to the average level of corruption over all countries in the sample. Thus, $Cor_{i,t}$ is derived by dividing the value of the corruption indicator in country i in period t by its average indicator value over the whole period T. On the right-hand-side, parameters g denote the coefficients to be estimated, and μ is the disturbance term.

Furthermore, PI_i denotes country i's permanent income, and $TI_{i,t}$ denotes transitory income, which captures temporary deviations from permanent income. Both PI_i and $TI_{i,t}$ are measured in terms of GDP per capita, relative to the whole sample. Thus, PI_i is derived by dividing country i's GDP per capita value at period t by the average of GDP per capita values over the time span $t = 1,\ldots,T$. To put it more simply, PI_i is the average of country i's income shares over time. Then, $TI_{i,t}$ is simply the possible difference between country i's income share and PI_i in any period t.

Note that γ_1 reflects the response of corruption to the development of long run average income PI_i. Thus, it captures permanent changes in $Cor_{i,t}$. Likewise, γ_2 reflects the response of corruption to the variations in transitory income thus capturing changes in the time profile of $Cor_{i,t}$. These two effects can be separated, since the permanent effect remains even when there is no deviations in the time series, whereas the transitory impact hinges entirely on such movements. Decomposing equation (1) yields

$$(2): Cor_{i,t} = \gamma_0 + \gamma_1 PI_i + \eta_{i,t}$$

$$(3): Cor_{i,t} - Cor_i = \gamma_2 TI_{i,t} + \varepsilon_{i,t},$$

where Cor_i is the average of $Cor_{i,t}$ over the time span $t = 1,\ldots,T$, and $h_{i,t}$ and $e_{i,t}$ are the new disturbance terms. Since equations (2) and (3) add up to equation (1), it follows that $h_{i,t} + e_{i,t} = \mu_{i,t}$. Furthermore, as it is quite plausible that the effects from changes in transitory income to corruption are not instant, possible lags in these influences should be taken into account, too. In order to do this, equation (3) can be re-written as follows:

$$(4): Cor_{i,t} - Cor_i = \sum_{j=0}^{K} \gamma_{2,t-j} TI_{i,t-j} + \upsilon_{i,t},$$

where $j = 0,\ldots,K$ denotes the number of lags, the cumulative sum of the time-specific coefficients $\gamma_{2,t-j}$ captures the cyclical behaviour of corruption, and $u_{i,t}$ is the error term.

In the estimations of models (2), (3), and (4), three types of data are used, namely one economic variable, two corruption indicators, and one instrument variable. The economic variable consists of country-wise time series of GDP per capita. This data come from World Economic Outlook (from the IMF website). The data are expressed in current USD prices, and they are available for 113 countries worldwide over the time span 1998–2013. Full list of the sample countries is in *Appendix*.

To measure the degree of corruption, the Control of Corruption (*CC*) indices are used. The indices come from World Bank's Worldwide Governance Indicators 2014 (WGI) dataset, and they are available over the years from 1996 to 2013. However, since there are no economic data for the years 1996 and 1997, and no *CC* indices for the years 1999 and 2001, the study covers only 14 time periods. In addition, data on Corruption Perception Index (*CPI*) provided by Transparency International are used, too. This is both for testing the robustness of the results from the *CC*-based estimations and for comparing the results to those of Gokcekus & Suzuki (2011), which operates solely with *CPI*. The indices are exclusively used for the same time span than the *CC* indices (that is for 1998–2013 except the years 1999 and 2001), but they are available only for 74 countries included in the *CC* panel[1]. Still, both the *CC* and *CPI* indices manage reasonably well to capture the same information.

The original *CC* indices score from -2.5 to 2.5, with integrity improving to the positive direction. For ease of interpretation, the *CC* indices are transformed by subtracting the original values from 3.5. This makes all the transformed index values vary from 1 to 6, with corruption getting worse as the score rises. The original *CPI* indices score from 0 to 10, with the lower bounds indicating utmost corruption and the upper bounds indicating perfect integrity. The *CPI* indices are also transformed by subtracting them from 11 to make them vary from 1 (perfect integrity) to 11 (utmost corruption).

Lastly, an instrumental variable for GDP per capita is needed to address the endogeneity issue. Following Chowdhury (2004), Keefer (2007), and Gokcekus & Suzuki (2011), the absolute geographic distance from the equator[2], denoted *Latitude*, is used for this purpose. The data are from the CIA website.

[1] Those countries that are not covered by the *CPI* indices are indicated in *Appendix* by the superscript *.

[2] The scaled distances are reported in *Appendix*.

3 Estimations and results

The estimations aim to test, whether permanent and/or cyclical changes in national income have statistically significant effects on perceived corruption. In order to do so, equations (2), (3) and (4) are estimated with appropriate techniques. In the estimations, all data are log-transformed in order to make them conform more closely to normal distribution. This helps to correct for skewed data, and increases the statistical validity of the empirical analyses. The findings, based on the use of *CC* as the corruption indicator, are reported in *Table 1*.

Table 1: Effects of permanent and transitory income on corruption, *CC* as the corruption variable (1998-2013)

Columns	Equation (2)		Equation (3)		Equation (4)		
	2	3	4	5	6	7	8
	OLS	IV-2SLS	OLS	2SGMM	2SGMM	2SGMM	2SGMM
Constant (γ_0)	2.791[a]	3.253[a]	-1.604[a]				
	(0.031)	(0.074)	(0.036)				
Permanent income (γ_1)	-0.196[a]	-0.250[a]					
	(0.003)	(0.008)					
Transitory income (γ_2)			-0.197[a]	-0.327[a]	-0.34	-0.35	-0.345
			(0.004)	(0.027)			
Transitory income ($\gamma_{2,t}$)					2.216[c]	2.892	4.095[c]
					(1.312)	(1.867)	(2.339)
Transitory income ($\gamma_{2,t-1}$)					-2.556[c]	-3.295	-4.618[b]
					(1.323)	(2.155)	(2.326)
Transitory income ($\gamma_{2,t-2}$)						0.053	0.133
						(0.597)	(0.462)
Transitory income ($\gamma_{2,t-3}$)							0.045
							(0.490)
Number of observations	113	113	113	2825	2825	2599	2373
Adjusted-R^2	0.650	n.a.[d]	0.519				
Wald test[e]		818.3[a]		146.48[a]	164.48[a]	157.09[a]	115.09[a]
Sargan test[f] (p-value)				1	1	1	1

Notes: The robust standard deviations are in parentheses below the estimated coefficients of the explanatory variables.
OLS = ordinary least squares; IV-2SLS = instrumental variables - two-stage least squares; 2SGMM = two-stage generalized method of moments.
a: Statistical significance at 0.1 percent error threshold
b: Statistical significance at 5 percent error threshold
c: Statistical significance at 10 percent error threshold
d: n.a. = not applicable; R^2 is not an appropriate measure of goodness of fit when using the estimator of 2SLS.
e: The null hypothesis of the Wald test checks whether permanent income (PI_i) = 0 for equation (2) is rejected.
f: The over-identifying restrictions test (Sargan test) postulates in its null hypothesis that instruments are not correlated with residuals. Here, the test is robust to autocorrelation (p-value > 0.05), thus instruments are valid.

In *Table 1*, columns 2 and 3 report the test results of equation (2), columns 4 and 5 report the results of equation (3), and columns 6, 7 and 8 report the results of equation (4). The two regressions on equation (2) in columns 2 and 3 tell about the effects of changes in permanent income on corruption. Column 2 reports test results derived by the Ordinary Least Squares estimator (OLS), and column 3 reports those derived by the Two-Stage Least Squares estimator (2SLS). In the 2SLS estimation, *Latitude* is used as an instrumental variable for GDP per capita income (ref. Gokcekus & Suzuki, 2011).

Recalling that the transformed *CC* indices get higher values as corruption increases, the clearly negative and highly significant coefficient estimates from both OLS and 2SLS unanimously say that integrity improves with the increase of permanent income, and vice versa. This corresponds to the finding of Gokcekus & Suzuki (2011). Most of the earlier empirical studies concerning economic growth and corruption also end up to the same conclusion (see e.g. Shleifer & Vishny, 1993; Mauro, 1995).

While the literature on corruption is very rich on the long-term effects of incomes on corruption, there are much less studies under the prism of business cycles. The estimation of equation (3) aims to tackle these economic realities. The first regression in column 4 is based on the OLS estimator, and the second regression in column 5 is based on the two-step system Generalized Method of Movement (2SGMM) technique proposed by Blundell & Bond (1998). The latter method incorporates the instrumental variable *Latitude* into the analysis. The method is also generally more efficient, offers rigorous control over the instrument matrix, and takes into account all the orthogonality conditions.

Both the OLS and 2SGMM methods yield results that suggest a clear link between transitory income and corruption. Moreover, the clearly negative estimates (-0.197 with OLS, and -0.327 with 2SGMM) are highly significant saying that an increase in transitory income unambiguously dampens corruption, and vice versa. In other words, this implies that business booms rather reduce than increase corruption. This is in strict contrast with the belief that booms should stimulate rent-seeking opportunities and pump up the 'bezzle', as described by Galbraith (1997), and supported by Gokcekus & Suzuki (2011)[3].

The estimations of equation (4) test whether the lagged effects of the changes in transitory income predict variations in corruption. Gokcekus & Suzuki (2011) also follows the same approach, but only with a one period lag (that is *K=1*). Here, equation (4) is estimated separately with one, two and three period lags. The 2SGMM method is used, and the results are presented in columns 6 (with *K=1*), 7 (with *K=2*), and 8 (with *K=3*). Recall that the effect of the transitory deviations in income on corruption is appraised through the cumulative sum of the estimates of the coefficient $\gamma_{2,t-2}$ in equation (4).

Starting from the regression results in column 6, the estimate of the coefficient of transitory income at period *t* is $\gamma_{2,t}$ = 2.216, while that in period *t-1* is $\gamma_{2,t-1}$ = -2.556. Both are statistically meaningful at 10 % threshold. It follows that the aggregate impact of transitory income (that is the cumulative sum of the two estimates) is -0.340. Likewise, with *K=2*, the cumulative impact is -0.350, but this time the estimated lagged coefficients stay insignificant. With *K=3*, the cumulative impact is -0.345, the coefficients are seldom significant, but the cumulative sum is still always negative. This is in line with the estimation results of equation (3) thus supporting the previous conclusions.

The last things to do are to test the robustness of the findings, and to verify perfect comparability of the results to those of Gokcekus & Suzuki (2011), which uses *CPI* as the corruption variable. Thus, both robustness and comparability can be simply guaranteed by performing the same tests again with same estimators, but with *CPI* as the corruption variable. The results of these alternative estimations are reported in *Table 2*.

[3] Note that Gokcekus & Suzuki (2011) examines only 39 countries over 13 years between 1995–2007.

Table 2: Effects of permanent and transitory income on corruption, *CPI* as the corruption variable (1998-2013)

Columns	Equation (2)		Equation (3)		Equation (4)		
	2	3	4	5	6	7	8
	OLS	IV-2SLS	OLS	2SGMM	2SGMM	2SGMM	2SGMM
Constant (γ_0)	4.502[a]	4.348[a]	-3.240[a]				
	(0.070)	(0.133)	(0.071)				
Permanent income (γ_1)	-0.318[a]	-0.301[a]					
	(0.007)	(0.015)					
Transitory income (γ_2)			-0.324[a]	-0.480[a]	-0.48	-0.48	-0.43
			(0.008)	(0.051)			
Transitory income ($\gamma_{2,t}$)					-0.844	-1.019	3.426[c]
					(2.030)	(2.101)	(1.979)
Transitory income ($\gamma_{2,t-1}$)					0.364	1.004	-4.242[c]
					(2.031)	(2.194)	(2.419)
Transitory income ($\gamma_{2,t-2}$)						-0.465	-0.245
						(1.136)	(1.033)
Transitory income ($\gamma_{2,t-3}$)							0.629
							(0.703)
Number of observations	74	74	74	1850	1850	1702	1554
Adjusted-R^2	0.617	n.a.[d]	0.562				
Wald test[e]				88.174[a]	88.330[a]	87.549[a]	93.342[a]
Sargan test[f] (p-value)				1	1	1	1

Notes: The robust standard deviations are presented in parentheses below the estimated coefficients of the explanatory variables. OLS = ordinary least squares; IV-2SLS = instrumental variables - two-stage least squares; 2SGMM = two-stage generalized method of moments.
a: Statistical significance at 0.1 percent error threshold
c: Statistical significance at 10 percent error threshold
d: n.a. = not applicable; R^2 is not an appropriate measure of goodness of fit when using the estimator of 2SLS.
e: The null hypothesis of the Wald test checks whether permanent income (PI_i) = 0 for equation (2) is rejected.
f: The over-identifying restrictions test (Sargan test) postulates in its null hypothesis that instruments are not correlated with residuals. Here, the test is robust to autocorrelation (p-value > 0.05), thus instruments are valid.

Comparison of the estimation results of *Table 1* and *Table 2* shows that the change of the corruption indicator from *CC* to *CPI* does not affect the results significantly. As to the effects of permanent income on corruption (γ_1), the relevant signs remain negative, the effects are even stronger, and statistical significance is again high. The same holds also for the effects of transitory income (γ_2). The cumulative lag effects are now -0.480 whether *K=1,* or *K=2*, and -0.430 with *K=3*, which follow closely the same pattern as those in *Table 1*. Thus, all the conclusions with respect to *CC* as the corruption index are confirmed.

To sum up, the results confirm the common view that permanent income and integrity develop in parallel. On the other hand, the results confront the intuitively appealing argument of Galbraith (1997) that economic booms should pump up the 'bezzle', and especially its empirical verification by Gokcekus & Suzuki (2011).

4 Conclusions and discussion

This paper is an econometric study on the possible correlation between the level of corruption and national income. The estimations concern the effects of permanent and transitory income on the perception of corruption for a maximum of 113 countries worldwide over 14 periods over 1998–2013. The benchmark for these investigations is Gokcekus & Suzuki (2011), which finds a positive correlation between permanent income and integrity, but a negative correlation between transitory income and integrity. In particular, the latter correlation would say that economic booms trigger corruption, and recessions dampen it. The result is noteworthy, because the important question about the link between business booms and corruption is rarely studied empirically, and because it confirms the famous description on the evolution of the 'bezzle' by Galbraith (1997).

This paper verifies the finding of Gokcekus & Suzuki (2011), and that of the majority of empirical research on the issue, that the increase of permanent income tends to reduce corruption (and *vice versa*). However, the paper contradicts the important finding that changes in transitory income and integrity should be negatively correlated. In contrast, the results unambiguously show that that short-term fluctuations in incomes are also positively correlated with integrity. This is to say that economic booms reduce corruption and recessions trigger it.

The result that corruption diminishes during economic upturns and increases during downturns has several implications. In particular, it means that the issue is highly data dependent. The fact that the results of this paper are generated from more extensive data than those of Gokcekus & Suzuki (2011) does not necessarily entitle rejection of the former ones. Moreover, the setting shared by both studies does not yield a solid proof for the proposition of Galbraith (1997). Embezzlement is only one character of corruption among other, maybe more visible factors. It may well be so that the extent of the 'bezzle' in the hidden operation of firms and banks is not properly monitored by the corruption perception indices.

There are alternative explanations for corruption, too. For example from the 'grease the wheels' viewpoint (Méon & Sekkat, 2005), it might be reasonable that such corruptive greasing would be especially necessary in downturns, but not so important when the business is booming in any case. The power of alternative explanations may also differ between countries. The 'bezzle' explanation might be relevant in more developed countries, while the 'grease the wheels' explanation might fit better in less developed countries. In the latter countries the role of economic booms in yielding resources to anti-corruption activities may also be crucial (Khan, 2004; Davigo & Mannozi, 2007).

Last but not least, the setting shared by Gokcekus & Suzuki (2011) and this paper may also be inappropriate from the beginning. First, the application of the model of Mélitz & Zumer (2002) may be misleading. The original model is used to study regional redistribution, which makes it reasonable to express all variables in relation to the whole sample of countries. In the present purpose, this may be too confusing thus blurring the findings. Second, the interpretation of e.g. Quiggin (2010), and Varoufakis (2011) is that corrupted behaviour and embezzlement, particularly in the financial sector, rather cause business cycles than the other way round. This is to say that corruption is a major driver of financial crises, which occasionally develop into economic catastrophes. Therefore, the direction of causality between business cycles and corruption should be examined carefully.

All in all, there certainly is need to dig deeper.

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Appendix: List of countries/territories in the sample

Albania*(0.4556)	Dominican Republic* (0.2111)	Lesotho* (0.3256)	Rwanda* (0.0222)
Argentina (0.3778)	Egypt (0.3000)	Luxembourg (0.5494)	Saudi Arabia* (0.2778)
Australia (0.3000)	El Salvador (0.1500)	Malawi (0.1478)	Senegal (0.1556)
Austria (0.5244)	Fiji* (0.2000)	Malaysia (0.0256)	Sierra Leone* (0.0922)
Bahrain* (0.2889)	Finland (0.7111)	Maldives* (0.0350)	Singapore (0.0136)
Bangladesh* (0.2667)	France (0.5111)	Mali* (0.1889)	South Africa (0.3222)
Barbados* (0.1456)	Gabon* (0.0111)	Malta* (0.3944)	Spain (0.4444)
Belgium (0.5611)	Gambia* (0.1476)	Mauritania* (0.2222)	Sri Lanka* (0.0778)
Belize* (0.1906)	Germany (0.5667)	Mauritius (0.2241)	Sudan* (0.1667)
Benin* (0.1033)	Ghana (0.0889)	Mongolia* (0.5111)	Swaziland* (0.2922)
Bolivia (0.1889)	Greece (0.4333)	Morocco (0.3556)	Sweden (0.6889)
Botswana (0.2444)	Guatemala (0.1700)	Mozambique*(0.2017)	Switzerland (0.5222)
Brazil (0.1111)	Honduras (0.1667)	Mexico (0.2556)	Syrian Arab Rep. (0.3889)
Brunei Darussalam* (0.0478)	Hong Kong (0.2461)	Nepal* (0.3111)	Taiwan (0.2589)
Bulgaria (0.4778)	Hungary (0.5222)	Niger* (0.1778)	Tanzania (0.0667)
Burundi* (0.0367)	Iceland (0.7222)	Namibia (0.2444)	Thailand (0.1667)
Cambodia* (0.1444)	India (0.2222)	Netherlands (0.5811)	Togo* (0.0889)
Cameroon (0.6667)	Indonesia (0.0556)	Norway (0.6889)	Trinidad and Tobago*
Canada (0.6667)	Iran* (0.3556)	New Zealand (0.4556)	(0.1222)
Central African Rep.* (0.0778)	Ireland (0.5889)	Pakistan (0.3333)	Tunisia (0.3778)
Chile (0.3333)	Israel (0.3478)	Panama* (0.1000)	Turkey (0.4333)
China (0.3889)	Italy (0.4722)	Paraguay (0.2556)	Uganda (0.0111)
Colombia (0.0444)	Jamaica (0.2017)	Peru (0.1111)	United Kingdom (0.6000)
Congo, Republic of* (0.0111)	Japan (0.4000)	Philippines (0.1444)	United States (0.4222)
Democratic Rep. of Congo*	Jordan (0.3444)	Poland (0.5778)	Uruguay (0.3667)
Costa Rica (0.1111)	Kenya (0.0111)	Portugal (0.4367)	Venezuela (0.0889)
Cote d'Ivoire (0.0889)	Korea, Republic of (0.4111)	Qatar* (0.2811)	Viet Nam (0.1778)
Cyprus* (0.3889)	Kuwait* (0.3256)	Romania (0.5111)	Zambia (0.1667)
Denmark (0.6222)	Laos* (0.2000)		

Notes: The total sample of countries (113 countries) is used in the estimations based on *CC*. The superscript * marks those 39 countries that are not covered by the estimations based on *CPI*, where the number of country observations is 113-39=74 countries. The absolute distance of each country from the equator is reported in parenthesis (the scale is from 0 to 1, with higher number indicating further distance from the equator).