Corruption – A Search for Causes

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In this paper I research different possible causes for corruption. I construct for this purpose a huge panel from several indices and cultural and political variables to control for as many as possible causes. The goal is to come close to a real causal relation. The results are pretty accurate.

1. Introduction

Corruption is behavior, which deviates from the formal duties of a public role because of private regarding.(K. Balachanduru 2006,p. 2) It has an obvious impact on the capability of a country to develop to become economically strong and democratic. Some countries have a constant problem with corrupt officials and that hinders them to grow into normal economically strong nations. This relevance is the reason why corruption is a favorite topic of researchers in economics. In this paper I will construct a big panel of very different variables over 175 states and 16 years. The variables include social variables with the goal to include the average character of the people of a country as well as economic variables, that could have a very direct impact on the level of corruption. As a measure of corruption I use the Transparency International Corruption Perception Index (CPI). This index is conducted in currently 175 states as a "poll of polls". I have data on it since 1998 making a total of 2800 observations. This much data is a bit unusual in a subjective and hidden field like corruption, which makes the CPI so interesting for econometric researchers.

2. Review of Literature

My main source will be "The causes of corruption – a cross-national study" by Daniel Teisman (2000). He researched a lot of the possible causes for corruption already, but in a cross-section-analyses of around 150 countries. Sadly he didn't get too good results, in my assessment due to the cross-sectional character of his analyses, which leads to small amount of data. His theoretical part however is very good. He tested for the following possible causes:

Common law system as opposed to civil law system. Common law was developed in defense against the sovereign, whereas civil law was made on the sovereigns bidding to

conduct nation building. The assumption is, that in common law systems, as it is designed to protect against oppression and abuse of power, there are probably a lot better mechanisms to deal with corruption. The main reason would be that the details of laws are not made by politicians, but by judges. That leads to a situation where there is a neutral control instance for officials that is not there in civil law societies.

Religious tradition might play a role. In more hierarchal traditions, like Catholicism, Orthodoxy or Islam officeholders could be more likely to get away with corruptions due to their higher authority, as opposed to e.g. Protestantism. Religions may also shape the way people feel about family with the danger of nepotism.

More democratic systems are likely to have a higher risk for officials that the corruption is revealed, because of freedom of speech and press, so there might be lower incentives. Also competitors might have an incentive to uncover the misuse of an incumbent in elections. In countries without elections, e.g. dictatorships, there are no possible competitors, so no one who would have a direct incentive to uncover misuse of power.

The costs of being caught might play a role, as a politician might take into account, if he would be legally prosecuted or lose his job. In this matter a better and longer lasting job with career opportunities makes it more painful for an official to lose his job and consequently diminishes the chance of corruption.

The level of economic development has most likely a very high influence on corruption in many ways. A higher development level increases the spread of education and literacy, which should raise the odds of getting caught, while performing corruption, ecause pople understand what is going on in politics. Such a higher level of development also leads to higher wages, which should reduce the need for corruption. Corruption can also be a phenomenon of officials standing low in the hierarchy, like e.g. policemen. These officials should have a higher urge to corruption to finance their daily live, when compared to higher ranking officials. The more developed a state economically, the more it can pay also it's lower ranking officials, which should decrease the urge for corruption. Treismann also argues that, with a better paying job, there is a higher risk involved, when performing corruption, as the official has more to lose.

Other authors suggest, that the economic power of a country or the growth of the last period have an influence on the level of corruption (Islam 1995). This argument follows the idea, that when the economy grows rapidly, the population of a country will be happy and more lenient towards corruption.

Leeson and Sobel argued 2008 that natural disasters could be a trigger for corruption, as the public is concerned with other news and a lot of money is put into the building sector, which is traditionally more corrupt than other sectors. I will not further follow this suggestion, as it is immensely difficult to measure the strength and frequency of disasters globally. Therefor I introduce potential bias into my results. But I believe the bias not to be too strong, as the money used on natural disasters is still relatively small compared to all other spendings.

Many authors (e.g. Treisman 2000, Lambsdorf 1999) argue that openness to international trade could have an impact on the level of corruption. As trade increases the possibilities of the people to substitute products that come from their own countries with products coming from other countries around the world, the power of the own firms over the home-market and with it the power of politicians over this market decreases. This would then lessen the incentive to be corrupt. Concerning this relationship however I see the worst endogeneity-problem in my paper: Theoretically corruption clearly causes closed markets. Politicians have an incentive from different sources to privilege home firms. They provide working places, taxes and the personal connections are typically stronger. A lot of the economy-focused politicians and the heads of big firms know each other.

Lastly federal states could be more vulnerable to corruption. Decisions in federal states are often made at a lower level. These levels are closer to firms that could have an interest in influencing these decisions. Corruption on lower levels of government is also less visible to normal people or the press, as they typically concentrate on monitoring the higher levels. Therefor the possibility of getting caught decreases and the incentive for corruption increases.

Political instability is named a lot of times as a possible factor. With a high degree of instability, the country might be in a chaotic state, where the chance of being caught

conducting corruption are slim. The country may even lack the necessary institutions to follow such crimes, making it impossible to catch the criminal.

3. General model

To obtain results as to which factors induce corruption in a country I build a panel-data model. The "dependent" variable will be the Transparency International Corruption Index from 1998 to 2013. This is an index that is calculated as a result of surveys conducted with approximately 1000 people from each of the 175 countries in the survey pool. The questions asked differ slightly over time. A potential bias due to changing questions however is ignored here, because the change in wording is very slight and is most likely balanced over the average of 13 questions. The use of obtaining and using more data here is a lot bigger than the risk of introducing additional bias.

The Corruption Index is also a highly subjective measure, as it rests on people trying to assess the level of corruption in their home-countries. This is for one necessary, as there simply is no objective data on corruption. Corruption is by nature a none-observable phenomenon. Also the ratings of the index are highly correlated between each other. That speaks to a certain consistency in the results of the index. In *table 1* we can see the correlation between periods. It is in all cases between 0.9 and 1.1.

I am suspecting a decent amount of endogeneity in my regression models. For example the level of development of a country does not only have a negative causal relation to corruption as mentioned above. It is most likely also the other way around, as corruption dampens the possibility to develop for a country. I will therefor introduce my various variables in different steps, starting from the suspected least endogenous and check on every stage for endogeneity of the new variables.

Because of the endogeneity problem I also have to be quite careful not to forget important variables that could influence all or some of the variables. That is why I will test a variety of variables to control for their effect on corruption.

4. Obtaining and reading data

4.1. Data

My dependent variable in all regressions is the CPI (Corruption Perception Index) of Transparency International as mentioned above. Differencing the CPI is not necessary as a panel unit root test shows that the CPI is stationary on level. Because of the stationarity of the CPI, it can also not be cointegrated with one of the independent variables.

I introduce an indicator for the legal system. For that purpose I devided the countries in 4 categories. Countries with an overall common-law-based legal system, countries with civil law, countries with a mix of the two and religious-based legal systems. When there was doubt, I decided for the system that the crime law is based on, because corruptive officials have to fear to be brought before criminal court most. I constructed 4 dummy variables that carry the information respectively with a 1 if the country has this specific system and a 0 if not.

An indicator for the cultural heritage obtained by colonization I took from Grier (1995). I coded the information in three dummy variables, that contain the information if a country used is a former colony of Great Britain, France or Spain, the three major colonial powers. I suspect these two measures to be highly correlated if not multicollinear, because most of the former colonies adopted the legal system of their respective master-state. That is however to check later.

The religious affiliation and tradition of a society is marked by several variables containing percentages of the population, who follow a certain religion. The Data comes from the Pew Research Center Global Religion Report (Hackett 2012). It does not take into account possible changes over the duration of the panel because I did not find good enough data for that. However the general idea which country has which major religion did not significantly change in this time. Nonetheless it has to be kept in mind, when speaking about the results later.

To control for federalism I introduce a dummy variable, whose value is 1, if the state is a federal state and 0 if not. I follow the definition of Elazar (1995), where at least two levels of government reign over the same area and each level has to have their own area in which it can make legislation by itself. There are around 30 federated states in the world. That

seems a low number at first sight. But most of the states in the world are fairly small, which decreases the need for a federated structure. Most of the big states in the world however are heavily federated including Russia, America and India.

I would like to use the Freedom House Internet Freedom Index for 65 countries (Freedom House 2014). In this Index, every country that has sufficient access to the internet is rated from 0 (free) to 100 (not free at all). In our modern world the distribution of information heavily depends on the internet and how accessible it is in your country. Freedom of information is key to unveiling corruption. But the data is a bit shallow on this topic, because studies about the accessibility of the internet just recently came out. So including this kind of variable can be a drawback as it limits my panel. We will in the section see what the results are.

I also use the Index from the Freedom Report 2015 from Freedom House. This is an index from 1 to 7, where 1 means the most political rights and 7 the least, no political participation and freedom at all. This variable is for obvious reasons correlated with the corruption variable. If people have political participation rights the country is most likely democratic and Treisman's argument from above applies, that democracies have control mechanisms for officials, e.g. elections.

To measure the political stability of a country I adopt Jon-A-Pin's method (2006). Jon-A-Pin recognizes four dimensions of instability. These dimensions are Violence, Protest, instability within the regime and instability of the regime. He argues, that the impact of these four factors might be different and therefor it would not be correct to put them together into one single index of instability. The downside is, that the indices itself are very much correlated. That and because I have to keep an eye on the number of my independent variables, I construct an index from the four categories, which would simply be the mean value of them. To prove I do not lose too much information through that I made a Crohnbachs-alpha reliability test. Crohnbachs alpha is 0.715 for the four different dimensions. The internal reliability therefor is big enough to mash the four values into one index. This index will be one of my regressors.

To measure the openness to foreign trade some authors suggest to use the value of imports of goods and services as a share of the GDP. The problem with this is, that bigger countries generally have a smaller share of import, because there is more trade inside of the country. The United States for example is by far the biggest economy on the planet, but it does not import or export the most. Countries like Liechtenstein or Luxemburg on the other hand have no choice but to import most things they need, because the production is not diversified enough to support the own people with what they want. Being big or small however does not automatically mean the countries are more or less corrupt. That is why I prefer a qualitative measure. Accessibility for international trade can be measured by absence of trade barriers like import taxes or indirect measures like standardizations. To measure trade barriers I adopt the Open Market Index by the International Chamber of Commerce, which is available for the years 2013 and 2011. This index is based on the possibility to conduct international trade in several aspects like infrastructure that is necessary or barriers by law. It's a measure from 1 (not open) to 5 (very open). The fact that data is only available for 2 periods makes my panel more unbalanced. We will see he result later.

4.2. Descriptives/Histogram

Let's have a quick look at our dependent variable first (Table 2). The CPI shows a lot of concentration in the region between 2 and 4. Most of the countries are relatively corrupt. The highest index number of 10 is only reached by the scandinavian countries Denmark and Norway. The median country has an index of 3.5, which is moderately corrupt. Jordan has an index of 3.5 in recent years. This pessimistic picture could result from there being relatively a lot of small corrupt countries e.g. in Africa, while the countries that are not as corrupt are bigger, like America or most European countries. Nevertheless: this is a picture that shows corruption is still a very big problem in the world.

Interesting are also the Statistics of the Freedom House Index displayed in table 3 in the appendix. Here we have a totally different picture. The most countries have a good freedom index rating while there is a slight other oncentration on the other end of the

scale. We can deduct that most countries are eather free or not, while less countries are in a grey zone between the two extrems.

5. Estimating the models

Now I will start estimating models with the method of linear regression. There was no specific functional form to see in the dependent variable. From theory it is also not demanded to transform this variable in a special way, for it is only an index, that is not comprised of growing data, but subjective measures. That is why I stick with the normal linear form of my variable on the left side. I will however try different forms of transforming the regressors, if they are not themselves subjective measures. To account for possible heteroskedasticity and serial correlation I use the diagonal White corrected standard errors. That is possible because I have a lot of observations. It is also necessary as my preferred analytic program eviews does not offer tests for serial correlation or heteroskedasticity in panels. It would have been possible to use the Durbin-Watson statistic to compare against generalized 5 percent points in panels, but that possibility is still very limited and not enough for a large and complicated panel like mine.[1] The diagonal White corrected standard errors should account for both problems between periods and cross-sections.

In a first step I include only the variables that in theory should be the least endogenous. The result can be seen in table 4 in the appendix. The effect of common law seems largly positive compared to the civil law which I left out as a control dummy to prevent multicollinearity. Even having a religious law seems slightly superior too civil law systems. A mixed law however shows no significant difference from civil law.

If a country was a former colony seems very important now. We will see if this is only due to the lower GDP per capita that most of the countries have in the next step. The same is true for the major religion. What surprises is that even in the first step if a country is

[1] For further information on the generalized Durbon-Watson test for panels see Bargava, A. et al., 1982, 'serial correlation and the fixed effects model', Review of Economic Studies 49 (4): 533-549.

federated or not does not play a significant role. As can be seen in table 5 the independent variables are not significantly correlated with the error term. That means I have not yet introduced endogeneity into my model. Now I try to add modifications. The dummy variables can not be transformed so that they still make sense. The religion variables however can be, as they are percentages of the population that have the specific religion. I try for every religion variable to take the logarithm of them and to square them to test for the specific effects. Testing the equation for omitted variables results in the logarithms not being significant enough to be included. The squares of the variables that show the percentage of population that is chrstian, muslim or Buddhist respectively however are significant. The adjusted R^2 of the resulting regression is also higher than before (see table 6). Also the three info criteria went down. That is another good sign.

In the next step I add the GDP per capita and the total population of each country and their log-values and their squares. The GDP per capita is a measure of level of development and I suspect a huge positive effect on the CPI. I included the squares to allow for a positive but possibly diminishing effect. The population variable is in the regression to measure how big a country is. It is possible that the sheer size of a country effects the corruption. Maybe it is harder for officials to hide their corrupt behavior when controlled by more people and maybe the world turns an eye more for the big countries, so corruption might be more visible globally. These 4 variables are all omitted according to the eviews omitted varibles test, so I include them. The new regression is in table 7. Now I test again for the endogenity by correlating the independent variables with the error term. There still seems to be no significant correlation (table 8).

In the last step I insert with political freedom (polfreedom) and political stability (polstab) the per theory most endogenous variables. My variable measuring the openness of a market can not be inserted, because I have only two periods of data. This would lead all in all to a total data valume of less than 200 obervations. With this small number of observations I can no longer distinguish the separate effects of the independent variables. In other words

a near singular matrix is the result. The lack of data in this area might be the reason why several authors took the import devided by GDP as a proxy for openness of trade. However this is not a good proxy in theory and therefor I will not use it. For example is Germany per index rater in the middle field concerning openness of trade, because it has many indirect barriers to protect the home market, like consumer protection regulations and standardizations. But in contrast to that, it is one of the first countries when it comes to trade. So my model stays without a variable measuring openness to trade and that might be not too bad because the causal direction between trade and corruption is not at all clear. Polfreedom and polstab however are both significant (table 9). They are also both not correlated with the new error term. In fact the error terms of the new regression are normally distributed (see table 9). Testing the remaining insignificant variables for redundancy results in them being redundant indeed as can be observed in table 11. The alternative model displayed has only significant regressors left, but the adjusted R^2 and the three quality criteria nearly don't change at all. I therefor choose to just let them be in the model, because the variables carry meaning in respect to the other variables. The dummy variables religiouslaw and frenchcol for example complete the other law or colony variables.

Fixed and random effects over the periods yielded no significant improvement of the regression. The same effects on the cross-sections were not possible because of the unbalanced nature of the panel and following that too few periods in some variables.

6. Conclusion

By including many variables that supposedly shape the character of the average population of a country like religion cultural heritage and law system, I can explain a lot of the relationship between those variables and the (subjective) level of corruption. But of course I was unable to find an appropriate measure for the openness for international trade that might interact with the corruption-variable and there might be countless other, maybe unobservable, variables that cause corruption. Nonetheless the panel-analyses with as

many distinguishing variables is our best shot at explaining corruption. To deduct a causal relationship however it is finally necessary to determine the direction of causality from the "independent" variables and the regressant. That should be in most cases impossible.

The single most influence on corruption seems to be the GDP per capita as the quality-measures for the regression went up a lot after adding this factor. The adjusted R^2 for example went 45 points up. Corruption seems to be a phenomenon of the poor countries. This can be explained in many different ways. Incentives might be higher, because of the low wages of officials. The fear of getting caught might be lower, because the state can not enforce the anti-corruption laws. But the relationship might as well be the other way around. Nearly no author denies the negative effects of corruption for the economic development of a contry. So it might just be the corrupt countries which don't develop fast enough to catch up and are therefor continually economically weak. While GDP per capita has the strongest impact, the cultural variables I introduced are mostly also significant, leading me to the conclusion, that they actually matter for corruption. A country that wants to fight corruption should consequently adopt commonlaw have as little muslims as possible adopt political freedom as much as possible and be as stable as possible in it's political system.

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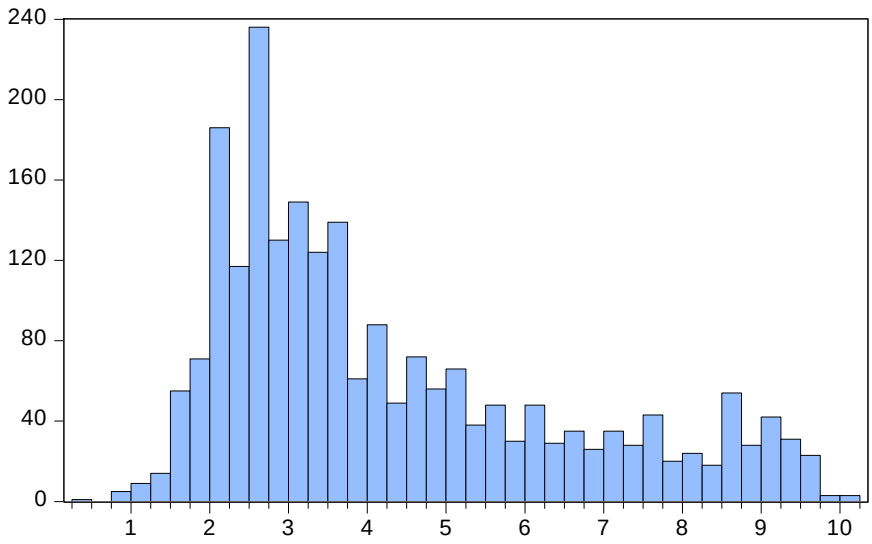
Appendix – Tables

Table 1 - correlation between periods of the Corruption perception index

	1998	1999	2000	2001	2002	2003	2004
1998	1	1.008595	0.992725	0.992954	0.986301	1.050063	1.065946
1999	1.008595	1	1.005785	0.996778	0.991482	1.043185	1.053453
2000	0.992725	1.005785	1	1.001015	0.998331	1.060764	1.079862
2001	0.992954	0.996778	1.001015	1	1.007113	1.068319	1.08378
2002	0.986301	0.991482	0.998331	1.007113	1	1.057135	1.070388
2003	1.050063	1.043185	1.060764	1.068319	1.057135	1	1.008368
2004	1.065946	1.053453	1.079862	1.08378	1.070388	1.008368	1
2005	1.080334	1.068193	1.090305	1.112436	1.096951	1.034141	1.027071
2006	1.061528	1.05077	1.07267	1.077697	1.061989	1.020546	1.014843
2007	1.071132	1.060929	1.091948	1.092648	1.074244	1.030618	1.022291
2008	1.028695	1.013208	1.049794	1.043734	1.029313	0.997157	0.995923
2009	1.050619	1.020797	1.055763	1.046244	1.029929	0.993857	0.991198
2010	1.053915	1.024118	1.060132	1.04843	1.035692	0.992104	0.999452
2011	1.05377	1.024264	1.063596	1.052114	1.036224	0.987366	0.987115
2012	0.989185	0.962214	0.999687	0.996494	0.983486	0.948739	0.952682
2013	0.97552	0.948397	0.979491	0.978513	0.973791	0.94286	0.947548
	2005	2006	2007	2008	2009	2010	2011
1998	1.080334	1.061528	1.071132	1.028695	1.050619	1.053915	1.05377
1999	1.068193	1.05077	1.060929	1.013208	1.020797	1.024118	1.024264
2000	1.090305	1.07267	1.091948	1.049794	1.055763	1.060132	1.063596
2001	1.112436	1.077697	1.092648	1.043734	1.046244	1.04843	1.052114
2002	1.096951	1.061989	1.074244	1.029313	1.029929	1.035692	1.036224
2003	1.034141	1.020546	1.030618	0.997157	0.993857	0.992104	0.987366
2004	1.027071	1.014843	1.022291	0.995923	0.991198	0.999452	0.987115
2005	1	1.022075	1.022896	0.999447	0.991453	0.998943	0.986662
2006	1.022075	1	1.013388	0.991318	0.985372	0.993103	0.983587
2007	1.022896	1.013388	1	1.000517	0.993795	0.995308	0.983923
2008	0.999447	0.991318	1.000517	1	0.992096	0.989206	0.977044
2009	0.991453	0.985372	0.993795	0.992096	1	0.997203	0.983974
2010	0.998943	0.993103	0.995308	0.989206	0.997203	1	0.992837
2011	0.986662	0.983587	0.983923	0.977044	0.983974	0.992837	1
2012	0.954964	0.947667	0.967323	0.967529	0.973251	0.979632	0.987613
2013	0.946268	0.944057	0.967302	0.964409	0.974723	0.974754	0.976918

	2012	2013
1998	0.989185	0.97552
1999	0.962214	0.948397
2000	0.999687	0.979491
2001	0.996494	0.978513
2002	0.983486	0.973791
2003	0.948739	0.94286
2004	0.952682	0.947548
2005	0.954964	0.946268
2006	0.947667	0.944057
2007	0.967323	0.967302
2008	0.967529	0.964409
2009	0.973251	0.974723
2010	0.979632	0.974754
2011	0.987613	0.976918
2012	1	0.987228
2013	0.987228	1

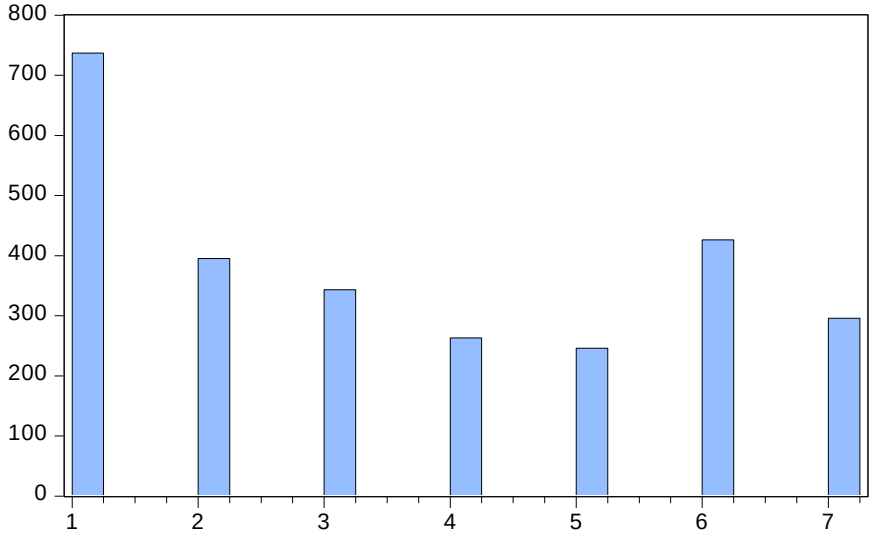
Table 2 – Histogram and Descriptives of the Corruption Perception Index



Series: CPI
Sample 1998 2013
Observations 2234

Mean	4.255058
Median	3.500000
Maximum	10.00000
Minimum	0.400000
Std. Dev.	2.196827
Skewness	0.922793
Kurtosis	2.779936
Jarque-Bera	321.5671
Probability	0.000000

Table 3 - Histogram and Descriptives of the Freedom House Index



Series: POLFREEDOM	
Sample 1998 2013	
Observations 2706	
Mean	3.498152
Median	3.000000
Maximum	7.000000
Minimum	1.000000
Std. Dev.	2.148678
Skewness	0.275375
Kurtosis	1.616799
Jarque-Bera	249.9183
Probability	0.000000

Table 4 – first Regression

Dependent Variable: CPI
Method: Panel Least Squares
Date: 02/08/15 Time: 13:08
Sample: 1998 2013
Periods included: 16
Cross-sections included: 130
Total panel (unbalanced) observations: 1711
White diagonal standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COMMONLAW	1.353547	0.140557	9.629877	0.0000
MIXCCLAW	0.031097	0.143508	0.216692	0.8285
RELIGIOUSLAW	0.520653	0.159456	3.265184	0.0011
BRITCOL	-0.431158	0.144923	-2.975087	0.0030
FRENCHCOL	-1.138354	0.162102	-7.022463	0.0000
SPAINCOL	-0.995603	0.126302	-7.882688	0.0000
FEDERATED	0.188790	0.133686	1.412187	0.1581
BUDDHIST	-5.557554	0.459571	-12.09292	0.0000
CHRIST	-4.791179	0.379673	-12.61921	0.0000
FOLKREL	-10.20377	0.829237	-12.30501	0.0000
MUSLIM	-6.977983	0.342598	-20.36786	0.0000
HINDU	-5.907673	0.516373	-11.44072	0.0000
C	9.212061	0.334806	27.51461	0.0000

R-squared	0.346382	Mean dependent var	4.594798
Adjusted R-squared	0.341762	S.D. dependent var	2.311692
S.E. of regression	1.875519	Akaike info criterion	4.103216
Sum squared resid	5972.834	Schwarz criterion	4.144586
Log likelihood	-3497.302	Hannan-Quinn criter.	4.118526
F-statistic	74.98714	Durbin-Watson stat	0.056090
Prob(F-statistic)	0.000000		

Table 5 – Correlation of independent variables with the error term

	RES1
RES1	1
COMMONLAW	4.26E-16
MIXCCLAW	1.68E-16
RELIGIOUSLAW	1.68E-16
BRITCOL	4.61E-16
FRENCHCOL	1.95E-16
SPAINCOL	1.57E-16
FEDERATED	4.97E-16
BUDDHIST	1.84E-16
CHRIST	1.87E-15
FOLKREL	2.28E-16
MUSLIM	7.26E-16
HINDU	5.24E-16

Table 6 – Regression 2

Dependent Variable: CPI
Method: Panel Least Squares
Date: 02/08/15 Time: 14:37
Sample: 1998 2013
Periods included: 16
Cross-sections included: 130
Total panel (unbalanced) observations: 1711
White diagonal standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COMMONLAW	1.508850	0.129492	11.65208	0.0000
MIXCCLAW	0.111708	0.146175	0.764207	0.4449
RELIGIOUSLAW	0.479703	0.163702	2.930341	0.0034
BRITCOL	-0.856139	0.137476	-6.227566	0.0000
FRENCHCOL	-1.241757	0.172063	-7.216880	0.0000
SPAINCOL	-0.958878	0.126811	-7.561453	0.0000
FEDERATED	0.031812	0.128908	0.246781	0.8051
BUDDHIST	8.971909	1.408006	6.372068	0.0000
CHRIST	7.821651	0.915061	8.547682	0.0000
FOLKREL	-9.416708	0.759698	-12.39533	0.0000
MUSLIM	-11.50431	0.740332	-15.53939	0.0000
HINDU	-2.575701	0.503330	-5.117317	0.0000
CHRIST*CHRIST	-10.04167	0.770205	-13.03765	0.0000
MUSLIM*MUSLIM	8.103600	0.781930	10.36358	0.0000
BUDDHIST*BUDDHIST	-13.18473	1.355553	-9.726463	0.0000
C	5.923464	0.321299	18.43597	0.0000

R-squared	0.409085	Mean dependent var	4.594798
Adjusted R-squared	0.403856	S.D. dependent var	2.311692
S.E. of regression	1.784866	Akaike info criterion	4.005872
Sum squared resid	5399.843	Schwarz criterion	4.056788
Log likelihood	-3411.023	Hannan-Quinn criter.	4.024715
F-statistic	78.22883	Durbin-Watson stat	0.062444
Prob(F-statistic)	0.000000		

Table 7 – Regression 3

Dependent Variable: CPI
Method: Panel Least Squares
Date: 02/08/15 Time: 14:50
Sample: 1998 2013
Periods included: 16
Cross-sections included: 129
Total panel (unbalanced) observations: 1691

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COMMONLAW	0.741856	0.084650	8.763817	0.0000
MIXCCLAW	0.289694	0.093386	3.102132	0.0020
RELIGIOUSLAW	0.139114	0.132170	1.052537	0.2927
BRITCOL	0.238462	0.093917	2.539077	0.0112
FRENCHCOL	-0.446367	0.143903	-3.101861	0.0020
SPAINCOL	0.350956	0.088244	3.977099	0.0001
FEDERATED	-0.062918	0.097092	-0.648031	0.5171
BUDDHIST	1.973940	0.870105	2.268622	0.0234
CHRIST	3.020378	0.637222	4.739913	0.0000
FOLKREL	-0.976709	0.580982	-1.681135	0.0929
MUSLIM	-4.323821	0.507539	-8.519195	0.0000
HINDU	0.262107	0.358499	0.731124	0.4648
CHRIST*CHRIST	-3.538241	0.513956	-6.884325	0.0000
MUSLIM*MUSLIM	3.560014	0.572576	6.217541	0.0000
BUDDHIST*BUDDHIST	-2.322285	0.916384	-2.534183	0.0114
GDPPC	0.000175	3.98E-06	43.95086	0.0000
GDPPC*GDPPC	-1.26E-09	5.09E-11	-24.72199	0.0000
POPULATION	-6.70E-09	7.78E-10	-8.620379	0.0000
POPULATION*POPULATION	5.16E-18	6.12E-19	8.426868	0.0000
C	3.005224	0.225109	13.35010	0.0000

R-squared	0.807222	Mean dependent var	4.583383
Adjusted R-squared	0.805030	S.D. dependent var	2.320641
S.E. of regression	1.024688	Akaike info criterion	2.898409
Sum squared resid	1754.524	Schwarz criterion	2.962668
Log likelihood	-2430.605	Hannan-Quinn criter.	2.922205
F-statistic	368.2640	Durbin-Watson stat	0.210815
Prob(F-statistic)	0.000000		

Table 8 – Correlations of second residuals with independent variables

	RES2
RES2	1
COMMONLAW	1.10E-15
MIXCCLAW	7.30E-16
RELIGIOUSLAW	1.12E-15
BRITCOL	1.51E-15
FRENCHCOL	7.02E-16
SPAINCOL	1.09E-15
FEDERATED	1.84E-15
BUDDHIST	1.04E-15
CHRIST	1.21E-14
FOLKREL	6.92E-16
MUSLIM	3.53E-15
HINDU	1.10E-15
CHRIST*CHRIST	-3.33E-15
MUSLIM*MUSLIM	1.54E-15
BUDDHIST*BUDDHIST	9.05E-16
GDPPC	3.08E-15
GDPPC*GDPPC	-4.01E-15
POPULATION	8.44E-16
POPULATION*POPULATION	7.08E-16

Table 9 – Regression 4

Dependent Variable: CPI
Method: Panel Least Squares
Date: 02/08/15 Time: 15:06
Sample: 1998 2013
Periods included: 16
Cross-sections included: 92
Total panel (unbalanced) observations: 1265

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COMMONLAW	0.369227	0.108923	3.389797	0.0007
MIXCCLAW	0.307556	0.105075	2.927003	0.0035
RELIGIOUSLAW	0.161868	0.156198	1.036299	0.3003
BRITCOL	0.628407	0.112883	5.566896	0.0000
FRENCHCOL	-0.114706	0.198119	-0.578975	0.5627
SPAINCOL	0.327310	0.100377	3.260809	0.0011
FEDERATED	-0.152442	0.104794	-1.454689	0.1460
BUDDHIST	1.383898	0.991030	1.396424	0.1628
CHRIST	2.475868	0.744753	3.324412	0.0009
FOLKREL	1.616600	0.745108	2.169618	0.0302
MUSLIM	-3.367822	0.651827	-5.166742	0.0000
HINDU	-0.730207	0.444821	-1.641574	0.1009
CHRIST*CHRIST	-2.956397	0.617530	-4.787452	0.0000
MUSLIM*MUSLIM	3.453331	0.712556	4.846402	0.0000
BUDDHIST*BUDDHIST	-1.335822	1.074639	-1.243042	0.2141
GDPPC	0.000158	4.87E-06	32.47978	0.0000
GDPPC*GDPPC	-1.13E-09	5.54E-11	-20.41131	0.0000
POPULATION	-4.31E-09	9.99E-10	-4.310112	0.0000
POPULATION*POPULATION	3.86E-18	7.56E-19	5.105410	0.0000
POLFREEDOM	-0.283510	0.023413	-12.10896	0.0000
POLSTAB	-0.244780	0.062733	-3.901945	0.0001
C	3.762627	0.258854	14.53570	0.0000

R-squared	0.829071	Mean dependent var	4.721739
Adjusted R-squared	0.826183	S.D. dependent var	2.410583
S.E. of regression	1.005006	Akaike info criterion	2.865102
Sum squared resid	1255.475	Schwarz criterion	2.954542
Log likelihood	-1790.177	Hannan-Quinn criter.	2.898706
F-statistic	287.0956	Durbin-Watson stat	0.209821
Prob(F-statistic)	0.000000		

Table 10 – Histogram of residuals of the Regression 4

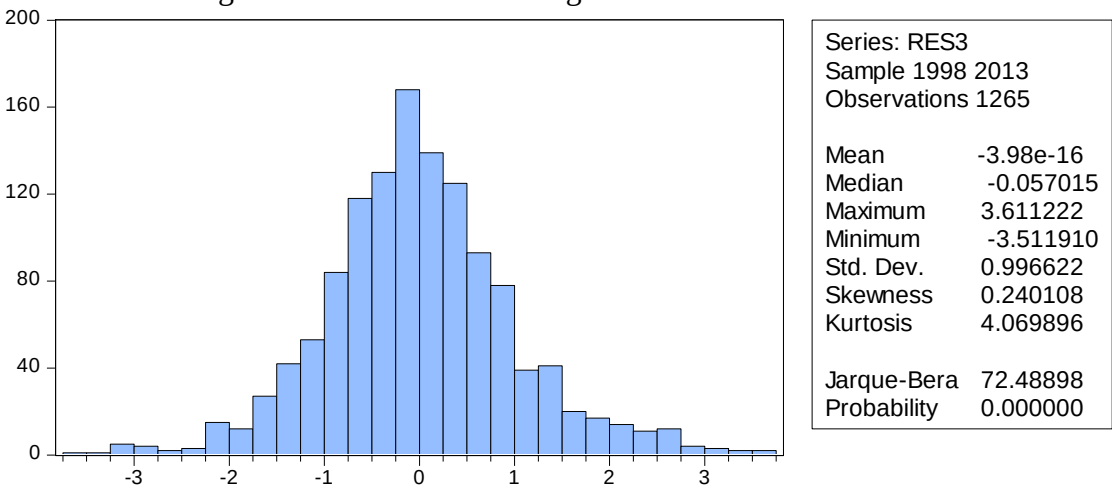


Table 11 – Test for remaining redundancy

Redundant Variables Test
Equation: EQ03
Specification: CPI COMMONLAW MIXCCLAW RELIGIOUSLAW BRITCOL FRENCHCOL SPAINCOL FEDERATED BUDDHIST CHRIST FOLKREL MUSLIM HINDU CHRIST*CHRIST MUSLIM*MUSLIM BUDDHIST*BUDDHIST GDPPC GDPPC*GDPPC POPULATION POPULATION*POPULATION POLFREEDOM POLSTAB C
Redundant Variables: RELIGIOUSLAW FRENCHCOL FEDERATED BUDDHIST BUDDHIST*BUDDHIST

	Value	df	Probability
F-statistic	1.080834	(5, 1243)	0.3692
Likelihood ratio	5.487896	5	0.3593

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	5.458407	5	1.091681
Restricted SSR	1260.934	1248	1.010364
Unrestricted SSR	1255.475	1243	1.010037
Unrestricted SSR	1255.475	1243	1.010037

LR test summary:

	Value	df
Restricted LogL	-1792.921	1248
Unrestricted LogL	-1790.177	1243

Restricted Test Equation:
Dependent Variable: CPI
Method: Panel Least Squares
Date: 02/08/15 Time: 15:39
Sample: 1998 2013
Periods included: 16
Cross-sections included: 92
Total panel (unbalanced) observations: 1265

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COMMONLAW	0.315331	0.102250	3.083908	0.0021
MIXCCLAW	0.312415	0.098612	3.168137	0.0016
BRITCOL	0.680459	0.105331	6.460187	0.0000
SPAINCOL	0.339665	0.097492	3.484020	0.0005
CHRIST	1.606089	0.519446	3.091926	0.0020
FOLKREL	1.610309	0.699068	2.303508	0.0214
MUSLIM	-3.239383	0.646472	-5.010865	0.0000
HINDU	-0.855088	0.430032	-1.988427	0.0470
CHRIST*CHRIST	-2.343838	0.515176	-4.549590	0.0000
MUSLIM*MUSLIM	3.123241	0.673501	4.637324	0.0000
GDPPC	0.000158	4.74E-06	33.39540	0.0000
GDPPC*GDPPC	-1.13E-09	5.45E-11	-20.76519	0.0000
POPULATION	-4.97E-09	8.12E-10	-6.118116	0.0000
POPULATION*POPULATION	4.31E-18	6.28E-19	6.857626	0.0000
POLFREEDOM	-0.279579	0.022018	-12.69801	0.0000
POLSTAB	-0.278053	0.059430	-4.678645	0.0000
C	4.039278	0.166065	24.32342	0.0000

R-squared	0.828327	Mean dependent var	4.721739
Adjusted R-squared	0.826126	S.D. dependent var	2.410583

S.E. of regression	1.005168	Akaike info criterion	2.861535
Sum squared resid	1260.934	Schwarz criterion	2.930648
Log likelihood	-1792.921	Hannan-Quinn criter.	2.887502
F-statistic	376.3533	Durbin-Watson stat	0.208957
Prob(F-statistic)	0.000000		