Causes Of Financial Crisis: An Empirical Analysis From Fourth-Generation Financial Crisis Model[1]

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Abstract:

Currency and financial crises have become regular phenomena since 1970s. In this study, the fourth generation crisis model, one of the models for explaining financial crises, is discussed. Financial crises, especially Krugman's works; it is categorized under three main headings: first generation, second generation and third generation crisis models. However, the fourth generation crisis model is mentioned as a crisis model that has come to the fore since the 2000s. This model emphasizes the importance of institutions in experiencing crises. Financial institutions shape the expectations of the actors in the market by sending signals about the future state of the economy. According to the new generation crisis model, the most important determinants of crises are, in addition to the other three models, political stability, state effectiveness, regulatory quality, the role of law and control of corruption. In this research, according to the fourth generation crisis model, the causes of financial crises in the period of 2002-2017 in 22 OECD countries will be evaluated with Panel Data Analysis. The Augmented Mean Group (AMG) estimator for cointegration is used to determine the long run effect. According to analysis results, government effectiveness index and rule of law index variables are effective on the exchange rate crisis; corruption index, regulatory quality and rule of law index variables are effective on financial crisis; corruption index, regulatory quality, government effectiveness and political stability are effective on sovereign debt crisis. In this direction economic development in institutional factors leads to a decrease in the emergence of financial crises.

Keywords: Financial crisis, exchange rate, stock market index, political stability, financial crisis models, panel data analysis

JEL Codes: E44, G01, F33, G28

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1. Introduction

Currency and financial crises have become regular phenomena since 1970s. Four generation models have been designed to understand the factors and variables responsible for currency crises and bankruptcy. The primary determination of the actions that trigger the crisis is accepted as the basic basis for distinguishing the types of crisis. In economic literature these are often referred to as the four-generation crisis model. The first generation models date from 1979 to 1993 and focus on the financial and monetary causes of the crises. Second-generation models functioned between 1994 and 1997 and focused mostly on the effects of anti-cyclical policies and self-fulfilling crises in mature economies. The third-generation models were formed after 1997 and focus on imperfect information and moral hazard.

Apart from the three generations mentioned, there is an increase in additional approaches to investigate the causes of financial crisis. Although no specific event may be attributed to this generation of currency crises, the occurrences of currency crises following the 1997-98 Asian Financial Crisis and Its Harmful Effects in Russia(1998), Turkey (2000-2001), and Argentina (2001-2002) have attracted stakeholders' interest in finding all possible causalities and connections, with the exception of three already known models of monetary crises that could lead to a monetary crisis. Also 'Money manager capitalism' and monetary policy in the financial markets all contributed to the crisis in the subprime crisis (global financial crisis) of 2007 with government budget deficits. There may be other factors and situations that could spark a complete unexpected and costly currency crisis in the economy. Money, banking and debt problems are likely to increase at the same time or very close to each other and possibly co-operate on exchange rate and asset development (Repisky, 2016). Where in the first two generation models emphasized on the current accounts, the third-generation model focused on capital accounts and capital flow across borders. After the first three generation models, Krugman gave the Fourth-generation Model extending the analysis from currency crisis to financial crisis (Pandit, 2014).

Krugman (2001) offered a fourth-generation crisis model similar to the third-generation model. The new models also take into account asset prices outside the exchange rate. These are more general models of financial crisis where other asset prices play a leading role. The other words Krugman (2001) designed the fourth-generation crisis model so that it may not be a monetary crisis model. The fourth generation models expand the previous literature by identifying the characteristics of the institutional environment that lay the groundwork for macroeconomic imbalances that lead to banking problems. The models are also relevant to previous studies where political indicators play an important role in crisis forecast. (Bussiere and Mulder, 2000). Breuer (2004) expresses a model in which crises are determined by institutional factors. Institutions affect currency crises in two ways. Firstly, institutions tend to influence and correlate the health of the national economy. Secondly, institutions inform market representatives that they can point to future economic fundamentals and thus shape market expectations (Li and Inclan 2001). Weak institutional factors appear to be the underlying cause of excessive borrowing and lending, unsustainable policies, and hyperinflation. Institutional factors appear to determine the conditions of economic outcomes.

The fourth-generation models emphasize the role of companies' balance sheets and capital flows in influencing the real exchange rate (Krugman, 1999) and emphasized shareholder rights, economic and financial rules and regulations, government distortions, supervision and transparency over the financial system. These models determines important economic outcomes such as cultural property rights, legal origin, political stability or instability, governance types, rule of law, regulatory quality, and quality of financial policies and sociological variables such as trust, ethic tension, corruption and culture, be it over the financial sector or the trade sector (Agenor and Aizeman, 1999; Alesina et al., 2002; Das et al., 2004).

The aim of this study is to evaluate the causes of financial crises within the framework of the fourth-generation crisis model. In accordance with this purpose, the indicators of financial crisis will be analyzed with panel data analysis method for 22 OECD countries in the 2002-2017 period, within the framework of fourth-generation crisis models. In addition to the other three crisis model variables, the factors to be considered in the fourth-generation crisis model include; political stability, level of corruption, regulatory quality, rule of law and government effectiveness. The rest of the paper is constructed as follows. The next section looks at the empirical models of fourth-generation financial crisis. Section 3 uses the panel data analysis to provide empirical results. Section 4 includes the results of the analysis. Finally, the last section provides some concluding comments and insights for areas of future research.

2. Literature

The increase in the number of crises and their impact on the economy led to the investigation of the causes of crises. At theoretical level, the literature distinguished between first, second, third and fourth-generation models. Krugman (1999) gave the fourth-generation model where he modified the third-generation model with additional asset classes and included political variables like type of governance, ethnic tension, corruption property rights, etc. Fourth-generation models extend the previous literature by defining the characteristics of the institutional environment. In the fourth-generation models, explanatory variables include variables such as political stability, regulatory quality, corruption, cultural property rights, legal origin, governance types, rule of law, and quality of financial policies, ethic tension, trust, and culture (Agenor and Aizeman, 1999; Alesina et al., 2002; Das et al., 2004).

De Nicolo, et al. (2003) and Bonin and Wachtel (2003) showed that institutional infrastructure affects the level of financial development, level of credit risk and depositor trust in the financial system. Leblang and Satyanath (2004) develop a theoretical framework that links political institutions to the expectations of speculators, and empirically demonstrate the superiority of their approach in their predictions. Their model implies the last turnover in the government, and the presence of the split government increases speculators' uncertainty about each other's beliefs, while increasing the likelihood of a currency crisis in turn. Breuer (2004) showed that currency crises were strongly influenced by political, bureaucratic and ethnic variables.

Many studies were done on fourth-generation for modeling financial crises resulting in significant modifications like Early warning signal and Agents based models based on different techniques (Eichengreen et al., 1995; Kaminsky et al., 1998; Furnam and Stiglitz, 1998; Kaminsky and Reinhart, 1999; Berg and Patillo, 1999; Goldstin et al. 2000, Kaminsky 2000; Thurner et al., 2009). The econometric approach and signal approach are two main approaches for constructing Early warning signal models. The signals approach is pioneered by Kaminsky and Reinhart (1999) and is a nonparametric approach to determining financial crisis risk. Whereas the econometric approach allows testing the statistical significance of the explanatory variables. This approach estimates the probability relationship between discrete dependent variables.

Kaminsky and Reinhart (1999) find variables using a nonparametric approach and compare the behavior of these variables in pre-existing crises. This model is studied to examine the behavior of variables during banking crises, balance of payments crises, and twin crises. The indicator has performed well in some currency crises in many emerging economies.

Kaminsky (2000) developed an early warning system based on the empirical regularities from a sample of 20 countries for banking and currency crises. In the study author used the important indicators of financial crises such as increase in net foreign debt as a percentage of GDP, current account as a percentage of GDP, deviation of the exchange rate from its PPP equilibrium level and growth rate.

Much of the literature on currency crises has used probit analysis to correlate the probability of a crisis with vectorizing variables. Such probit models implemented both the private and public sector. They normally include indicators of macroeconomic imbalances – current account deficits, rapid rates of credit growth, real Exchange rate overvaluation and budget deficits- and in some recent studies various indicators of structural vulnerability as well although the precise explanatory variables differ across models.

Pandit (2014), used Probit model to analyze the dependence of financial crises over development variables on emerging and developed nations according to the fourth-generation model. Financial Crises taken into the data is the aggregation of currency crises, inflation crises, stock market crises, sovereign debt crises (domestic and foreign), banking crises. The author determined useful indicators such as political stability, level of development, government effectiveness, quality regulatory, rule of law, control of corruption, voice and accountability for predicting crises. According to analysis results, political stability nand ations' level of development seems to play no role in financial crises. On the other hand, rule of law, government effectivenss, regulatory qualities and control of corruption has been found to be significantly related with the financial crisis.

Liu and Lindholm (2006) discussed the economic theoretical framework to evaluate early warning signals of financial crises. Frankly, financial markets are complex systems and involve human behavior and activities. Agent-based modeling explains the behavior of the economic systems, because it does not assume that the economy can reach an established balance.

3.Methodology

The empirical research on predicting currency crises has adopted a variety of econometric techniques. There are two main approaches: the signals approach(Eichengreen et al., 1995; Kaminsky et al., 1998; Furnam and Stiglitz, 1998; Kaminsky and Reinhart, 1999; Berg and Patillo, 1999; Goldstin et al. 2000, Kaminsky 2000; Thurner et al., 2009) and the econometric approach (Eichengreen et al. 1996, Liu and Lindholm 2006, Pandit 2014). The aim of this study is to evaluate the causes of financial crises within the framework of the fourth-generation crisis model. In accordance with this purpose, the indicators of financial crisis will be analyzed with panel data analysis method for 22 OECD countries in the 2002-2017 period, within the framework of fourth-generation crisis models. In addition to the other three crisis model variables, the indicators to be considered in the fourth-generation crisis model; political stability, level of corruption, regulatory quality, rule of law and government effectiveness.

For the purposes set out above three different models were created to identify the possible multiple varieties of crises. For each model, the methodology is repeated. In the first part of this study created models will be introduced. Data set and the estimation method to be used in the prediction of the models will be explained in sections 3.2 and 3.3 respectively. The estimation results obtained for each model will be presented in section 4.

3.1.Models of Study

In order to examine the causes of financial crises with the fourth-generation crisis model, three models have been established.

Model 1: $exc_{it} = \mu 0 + \mu 1 tr_{it} + \mu 2 cor_{it} + \mu 3 reg_{it} + \mu 4 gov_{it} + \alpha 5 rol_{it} + \mu 6 pol_{it} + \mu 7 bcap_{it} + \mu 8 gdp_{it} + \mu 9 rmg_{it} + \varepsilon 1_{it}$ (1)

In this model; exc, Exchange rate; tr, trade (% GDP); cor, corruption indexi; reg, regulatory quality indexi; gov, government effectiveness index; rol, rule of law index; pol, political stability index, bcap, bank capital to asset ratio; gdp, GDP per capita (constant 2010 US$); rmg, international reserves minus gold (US$); and ε refers to term error. Exchange rate crisis is evaluated in this model. Exchange rate is the value of one country's currency against the currency of another country or economic region. Exchange crisis emphasizes the role of unsustainable government policies that are not consistent with a fixed exchange rate. So In this model we used real effective exchange rate as a dependent variable.

The second model is presented in equation (2):

Model 2: $smi_{it} = \alpha 0 + \alpha 1 tr_{it} + \alpha 2 cor_{it} + \alpha 3 reg_{it} + \alpha 4 gov_{it} + \alpha 5 rol_{it} + \alpha 6 pol_{it} + \alpha 7 bcap_{it} + \alpha 8 gdp_{it} + \alpha 9 rmg_{it} + \varepsilon 2_{it}$ (2)

In this model, smi refers to the stock market index. The independent variables used in the model are the same as Model 1. This model assesses the crises in the financial sector. In order to evaluate the crises in the financial sector, the stock market index was chosen as the dependent variable. A stock market index is a stock market measure that helps traders compare current price levels with past prices to calculate market performance. On the other hand A stock market crash is when the stock index drops drastically within a day or two of trading, while also the often unexpected decline in stock prices. An unexpected economic event, catastrophic events, the collapse of a long term speculative bubble or crisis triggers the panic. The famous US stock market crashes include the housing and real estate market crash in the 2008.

The third model is presented in equation (3):

Model 3: $ted_{it} = \beta 0 + \beta 1 tr_{it} + \beta 2 cor_{it} + \beta 3 reg_{it} + \beta 4 gov_{it} + \beta 5 rol_{it} + \beta 6 pol_{it} + \beta 7 bcap_{it} + \beta 8 gdp_{it} + \beta 9 rmg_{it} + \varepsilon 3_{it}$ (3)

In this model ted refers to total external debt. The independent variables used in the model are the same as Model 1 and Model 2. Sovereign debt crisis are evaluated with this model. Sovereign Debt crisis is when a government (nation, state/province, county, or city etc.) is unable to pay its bill or its governmental debt. The government may enter into a debt crisis when the expenditures are more than its tax revenues for a long term. Some of the contributing to sovereign debt crisis included the financial crisis of 2007 to 2008, the Great Recession of 2008 to 2012, and property bubbles in several countries. After the crisis countries experienced high government debt and the collapse of financial institutions. So in order to evaluate the sovereign debt crisis, total external debt was chosen as the dependent variable.

The list of variables used in the models is given in Table 2.

Table 2. Short Description of the Variables

Variables	Description
exc	Exchange rate
smi	stock market index
ted	total external debt
tr	trade (% GDP)
cor	corruption index
reg	regulatory quality index
gov	government effectiveness index
rol	rule of law index
pol	political stability index

Gdp	GDP per capita (constant 2010 US$)
rmg	international reserves minus gold (US$)

They are grouped according to the symptoms the various generation models focus on. The first generation currency crisis models emphasize the inconsistency of expansionary macroeconomic policies with the stability of the fixed exchange rate regime. The second-generation models focus on countercyclical government policies. The literature on sovereign crises has mainly focused on a lot of debt and even debt concentrated in short terms (Kaminsky, 2000). To examine this variety of crises, we use six indicators: Exchange rate, stock market index, total external debt, trade (%GDP), real GDP per capita, international reserves minus gold. Finally, after the first three generation models, the fourth-generation model extends the analysis from currency crisis to financial crisis. The fourth-generation models broaden the previous literature by identifying the characteristics of the institutional environment and emphasizes political indicators which play an important role in crisis prediction. To examine institutional determinants, we use five indicators: political stability, level of corruption, regulatory quality, rule of law and government effectiveness There are a total of twelve indicators.

3.2. The Data

This study uses data from 22 OECD countries. The countries included in the analysis were presented in Table 3. In this context, OECD and World Bank database were used. The natural logarithm of the variables used in the study was taken. Analysis was performed using Stata 13 package program.

Table 3. Countries in the Analysis

1	Australia	12	Netherlands
2	Austria	13	Portugal
3	Canada	14	Slovak Republic
4	Czech Republic	15	Spain
5	Denmark	16	Turkey
6	Finland	17	United Kingdom
7	France	18	United States
8	Germany	19	Chile
9	Ireland	20	Estonia
10	Italy	21	Latvia
11	Luxembourg	22	Lithuania

3.3. Estimation Method

Using the data belonging to 22 countries taking place in OECD and the period of 2002-2007, in order to evaluate the causes of financial crises in the framework of fourth-generation crisis model, panel data analysis techniques were utilized.

Panel data analyses enable model founder to be informed about economic processes, considering the heterogeneity between individuals, firms, sectors, countries, etc, and movable effects that are seen in cross-sections (Greene, 2012). Although panel data analysis carries features belonging to both time series analyses and cross section analyses, they can eliminate disadvantages belonging to these analyses. Regression model formed for panel data and bringing together both the data of time and cross-section can be expressed as follows:

$$Yit = \beta 0 + \beta 1 Xit' + \varepsilon it \quad (4)$$

In the above model, $i = 1,2, \dots , N$ denotes cross section units and $t = 1,2, \dots , T$, the numbers of observation belonging to each unit of cross-sections. On the other hand εit error term in t period of ith economic unit. It is assumed that error terns are normally distributed in identical and independent way for all units of cross section and time dimensions with constant variance whose average is zero in all time periods and for all units $[IIN(0, \sigma\varepsilon 2)]$ (Maddala, 2002).

3.3.1. Static Panel Data Analysis

Static panel data analysis is a model, in which there is not any lagged values of the dependent and independent variables. Generally, static panel data models can be shown as classic model, fixed effects and random effects. A simple regression model can be shown as in the following equation (Greene, 2012):

$$yit = xit\,'\,\beta + zi'\alpha + \varepsilon it \quad (5)$$

$$yit = xit\,'\,\beta + ci + \varepsilon it \quad (6)$$

Here, there are K piece of explanatory variables in xit and no constant term. Heterogeneity or individual effect is indicated by $zi'\alpha$. Here, $zi'\alpha$ includes observable or unobservable but individual or group –specific variables that are constant along time t. The model, in this form, it is a classical regression model. If zi is observable for all units, under the assumption that there is no relationship between independent variables and error term, model is considered a linear model and predicted by the least square model. However, in case that ci has unobservable effects, predictor will not be a consistent predictor (Greene, 2012).

In panel data analysis, due to these problems, the different regression models were developed. In these models, unobservable variables taking place in error terms are dealt with the different forms. According to this, error term consists of three components. These are the variables depending on the time, units, and both time and units. In panel data analyses, making the consistent and effective predictions depends on these unobservable assumptions. First of these is that independent variables are definitely external $[(\varepsilon it|xi1, xi2, \dots) = 0]$. That is, error term of current period will be unrelated to independent variables in all of the past, present, or next periods. The second, perhaps the most important one, is heterogeneity and it is that a suitable assumption is the independence of the average $[(ci|xi1, xi2, \dots) = \infty]$.

In the classical model, also known pooled least squares method, if zi only includes constant term, the least squares method will be a consistent effective predictor for α and β. If zi is unobservable but related to xit, the least squares predictor of β is biased and inconsistent.

$$yit = xit\,'\,\beta + \alpha i + \varepsilon it \quad (7)$$

where, $\alpha i = zi'a$ includes all observable effects and determines a predictable conditional average. In fixed effects model, αi is considered as a group –specific constant term. Namely, due to the fact that it includes unit-specific effects, it changes according to the units. In case that unobservable individual heterogeneity is not related to independent variables, model;

$$yit = xit\,'\,\beta + E[zi'\alpha] + \{zi'\alpha - E[zi'\alpha]\} + \varepsilon it \quad (8)$$

$$yit = xit\,'\,\beta + \alpha + ui + \varepsilon it \quad (9)$$

In random effects model, it is suggested that ui is a random element depending on the group (Greene, 2012). To make a choose between fixed and random effects, the most frequently used test in the literature is Hausman Test. One of the most basic differences between fixed and random effects is the case whether or not the unit effects are correlational to independent variables. In Housman Test, null hypothesis is tested in the way that “there is no correlation between explanatory variables and unit effect". If null hypothesis is rejected, random effects model is not effective, and fixed effects model must be preferred (Baltagi, 2005).

In both fixed effects and random effects, the presence of problems with autocorrelation, cross sectional dependency, and heteroskedasticity was studied. Also in all models, the presence of autocorrelations was studied by means of Baltagi-Wu (1999) LBI (Locally Best Invariant). In the test, null hypothesis expresses that "there is no first degree autocorrelation" According to this, if the value of test statistics calculated is less than 2, null hypothesis is rejected, and this case means that there is autocorrelation in the model. On the other hand, the presence of cross sectional dependency in all models was studied by CD test developed by Pesaran (2004). This test, in case of $T <$, is valid, and CD test statistics is as follows:

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left(\sum_{i=1}^{N=1} \sum_{j=i+1}^{N} \hat{p}_{ij} \right) \tag{10}$$

where, $\hat{p}ij$ i, j is residual correlation coefficient. $\chi 2$ is distributed by freedom degree of test statistics $d = [(N - 1)\!/2]$. Under null hypothesis, where there is no interunit correlation, if $N \rightarrow \infty$ and T are magnificent enough, $CD\ d \rightarrow$ (0,1). For unbalanced panel, Pesaran (2004) suggested the following test statistics.

$$CD = \sqrt{\frac{2}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \sqrt{T_{ij}\hat{p}_{ij}} \right) \tag{11}$$

Tij i and j are the number of interunit observations of time series.

In fixed effect model, identification of the problem with heteroskedasticity was made by Modified Wald Test. Here, null hypothesis was established in the way that "variances are homoscedastic according to the units." Modified Wald Statistics is in the form of:

$$W = \sum_{i=1}^{N} \frac{(\sigma_i^2 \sigma^2)^2}{v_i} \tag{12}$$

where $\hat{\sigma}i2$ is predictor of residual variance of ith cross section unit and is expressed as follows:

$$\sigma_i^2 = \frac{1}{T_i} \sum_{t=1}^{T_i} v_{it}^2 \tag{13}$$

In addition, there is a equation:

$$v_i = \frac{(T_i - 1)}{T_i} \sum_{t=1}^{Ti} \left(v_{it}^2 - \sigma_i^2\right)^2 \tag{14}$$

Wald test statistics fits to N freedom degree and $\chi 2$ distribution.

In random effects model, the identification of heteroskedasticity was studied by Levene, Brown and Forsy tests. F tests derived to test equality of variances are based on Gauss distribution. Levene (1960), in case that normal distribution variance cannot be provided, suggested a resistant varying variance test. Brown and Forsythe (1974) suggested alternative local predictors based on clipped average, which provides a resistant structure against opposite observations, instead of average in test statistics of Levene. In this test, null hypothesis was established in the way " interunit variance equals".

In fixed effects model, in case that there are the problems with autocorrelation, heteroskedasticity, and cross sectional dependence, the frequently used predictor in the literature is Driscoll-Kraay predictor. Driscoll and Kraay (1998) derive the resistant standard errors for the series of cross section averages, making correction the kind of Newey-West. Driscoll-Kraay predictor can be used, while $N \longrightarrow \infty$ and unbalanced panels are also valid. In random effects model, these problems were eliminated by the resistant standard errors obtained by using Froot and Rogers predictors. This predictor developed by Arellano (1987), Froot (1989) and Rogers (1993) makes also predictions in case of the assumption that the residuals are independent distributed becomes flexible.

3.3.2. Dynamic Panel Data Analysis

In the study, in addition to the techniques of static data analysis, the techniques of dynamic data analysis were utilized.

Due to the fact that panel data models also include the dimension "time", first of all, it is necessary to make stationarity analysis. If the average of time series and variance depend the distance between two periods not the time of covariance observed variables between two periods, time series is stationary. If series is not stationary it cannot maintain its average in long term and, while the time approaches to eternal, variance value also goes to eternal. As lagging number increases, autocorrelation values keep away from zero, and R^2 values turn out high and t-statistics values, significant. Thus, model production obtained in long term do not give accurate result and spurious regression model emerges. Not to fall into trap of spurious regression, it is necessary to make series stationary (Kutlar, 2000). There are some tests to understand whether or not series is stationary. Unit root test, regarding to whether or not time series includes unit root, is one of the methods testing stationarity of series (Hurlin and Mignon, 2006:2). Since the number of observation increases, it is accepted that panel unit tests are statistically stronger than unit root tests of time series (Im, Pesaran and Shin, 2003; Maddala and Wu, 1999; Hadri, 2000; Levin, Lin and Chu, 2002). For making unit root test in panel data models, tests suggested by Maddala and Wu (1999), Choi (2001), Breitung (2000), Levin, Lin ve Chu (LLC) (2002), Im, Pesaran and Shin (IPS) (2003) and Pesaran (2007) are used. In these tests, establishing hypotheses and calculating tests statistics are based on Dickey-Fuller (1979) and Augmented Dickey Fuller (ADF) unit root tests (Şak, 2006). In Lin and Chu (LLC) (2002) test, In return to the assumption that autoregressive () is homogenous coefficient for all units, in Pesaran and Shin (IPS) (2003) test, it is allowed for coefficient to be heterogeneous. In IPS test, without combining, for each unit test, unit root test is individually applied to time series and, taking average of statistics obtained, IPS test statistics is obtained (Im, Pesaran, Shin, 2003:53). Maddala and Wu(1999) and Choi(2001) alternatively suggested Fisher type test based on combining unit root statistics for each non-parametric cross-section. In this test, as in LLC (2002), Breitung (2000) and IPS(2003) tests, there is no obligation to be a balanced panel. In addition, in ADF regression, the different lagging lengths can be used for each unit and applied for any derived unit.

In this study, stationarity of the variables dealt was examined in the framework of CIPS (CADF) panel unit root test. CADF unit root test developed by Pesaran (2007) is based on testing model (15).

$$\Delta yit = ai + biyit\text{-}1 + ci\overline{yt}\text{-}1 + di\Delta\overline{yt} + \varepsilon it \qquad (15)$$

In CADF unit root test of Pesaran (2007), null hypothesis tests the premise that "Series belonging to each cross-section forming panel includes unit root", while alternative hypothesis tests the premise that "a certain section of cross-sections forming the panel does not include unit root" (Pesaran, 2007). *bi* coefficients taking place in model (15) are CADF statistics. t-statistics obtained from here, being compared to the existent critical values presented by Pesaran (2007), it is decided whether or not the series belonging to each cross-sections includes unit root. In order to test whether or not panel data set is stationary, average of CADF statistics is taken. The value obtained is Cross-sectional augmented IPS-CIPS test statistics.

The obtained CIPS values are compared with the critical values given in Pesaran (2007) and thus the stationarity test is performed in the panel data set.

After researching unit roots, if series is stationary at the first level, in order to study whether or not there is a mutual relationship between series in long term, co-integration analysis is made. By means of co-integration analysis, long term stationary relationship between two or more non-stationary variables can be dealt with and, it enables to predict the coefficients, which perceive despite permanent shocks between non-stationary variables, and which show long term equilibrium relationship (Sevüktekin and Nargeleçekenler, 2010). As in panel unit tests, the strength of co-integration also increases in panel co-integration tests (Tatoğlu, 2013). In order to test whether or not there is co-integration for panel data, Kao (1999) and Pedroni (1999) panel co-integration test are commonly used. While Pedroni (1995, 1997) uses two-variables model for co-integration analysis, Pedroni (1999) enabled to use multivariable model, eliminating this limitation in his test (Pedroni, 1999). Kao (1999), in order to test the hypothesis in the form of "there is no co-integration " suggested DF and ADF-based unit root tests.

In the presence of co-integration relationship, there is a some approaches for dynamic panel predictions, whose N and T dimensions are big enough, were suggested. The first approach is Dynamic Fixed Effects /DFEs, where fixed parameter is allowed to vary from unit to unit, and where pooling is made for the other parameters. If slope coefficients are not the same for each unit, the results obtained from this approach are inconsistent and misleading. The other approach is Average Group Predictor (AGP), suggested by Pesaran and Smith (1995) and obtained by taking arithmetic average of the coefficients obtained after predicting model for each unit. This predictor allows for slope coefficients and error variances of constant term to vary from unit to unit and takes average (Pesaran, Shin and Smith 1999). And finally, Pesaran, Shin and Smith (1999) suggested Pooled Average Group (PMG) predictor, in which pooling and taking average are simultaneously made. While this predictor makes homogeneity limitation for long term coefficients (like Fixed Effects Predictor), it allows for error correction coefficients (error variance) and short term parameters to vary from unit to unit and takes average for all units (like Average Group Predictor). By means of Hausman test, one decides among these predictors. Hausman test presents homogeneity of long term coefficients. Under the assumption that long term coefficients are homogenous, while AG predictors are not effective, PMG predictors are consistent and effective (Pesaran, Shin and Smith 1999).

In the study, Augmented Mean Group (AMG) Estimator, developed by Bond and Eberhardt (2009), was used for estimating long term coefficients belonging to co-integration relationship. One of the reasons for selecting this estimator is that estimator considers cross-sectional dependency. Secondly, AMG estimator can be used in case that the series in the study are stationary in their first difference. Thirdly, when the internality problem originated from error term is considered, it is an effective estimator. In addition, for the case, where co-integration coefficients are heterogeneous; beside individual, namely, coefficients belonging to each intersection, for the case, where co- integration coefficients are homogenous, it also presents the coefficients belonging to the panel. Since it estimates by weighting arithmetical mean of individual co-integration coefficients, it is more superior than the other estimators taking place in the literature.

Bond and Eberhardt (2009) discussed and tested AMG estimation process in two stages, using Monte Carlo Simulation. The first stage was shown in (16) and, according to this, for non-stationary and unobservable variables not to lead to bias in the results, LS model is established by the first differences. Again, in the first differences, adding (T-1) time dummy variables, model is estimated coefficient belonging to dummy variable of time is obtained in this way.

$$\Delta y_{it} = b' \Delta x_{it} + \sum_{t=2}^{T} c_t \Delta D_t + e_{it}$$

$$\rightarrow c_t \equiv \mu_t \quad (16)$$

$$y_{it} = a_i + b' x_{it} + c_i t + d_i \mu_t + e_{it}$$

$$b_{AMG} = N^{-1} \sum_i b_i \quad (17)$$

The dummy coefficients obtained are used as independent variable including cross sectional dependency in the model taking place in (17). Later, the coefficients belonging to AMG estimator are obtained by taking weighed average of the coefficients individually estimated for each cross-section.

4. Empirical Results

In 22 OECD countries, by means of the data belonging to the period 2002-2017, for evaluating the causes of financial crisis in the framework of fourth-generation crisis model, panel data analysis techniques were utilized. In the study, both static and dynamic predictors were used.

In this framework firstly the results of static data analysis for Model 1, Model 2 and Model 3 will be evaluated in detail. Then dynamic panel data analysis results will be examined in detail.

4.1. Static Panel Data Analysis Results

4.1.1. Model 1 Estimation Results

For Model 1 formed to evaluate Inflation and Exchange Rate crises in the framework of fourth-generation crisis model, in static analysis, both fixed effects and random predictors were given place. As a result of tests realized, due to the problems with heteroscedasticity, autocorrelation, and cross section dependence, in fixed effects model Driscoll-Kraay predictor was used and, in random effects model Arellano, Froot and Rogers GLS predictor. The findings obtained in this framework were presented in Table 4. about Which of the fixed and random effects models to choose, Hausman Test was made. According to the results of Hausman Test, null hypothesis in the form of “There is no correlation between explanatory variables and unit effect” is not rejected. According to this, the findings obtained from random effects were taken into consideration. When regarded to the findings of F-test, it is seen that model is generally significant.

The estimated model 1 of 22 OECD countries as follows:

excit = 2.3 -0.18trit + 0.01corit -0.17$regit$ +0.90govit -1.20rolit -1.10polit + 0.15bcapit + 0.04gdpit + 0.02rmgit +$\varepsilon 1it$ (18)

Table 4. Model 1 Static Estimation Results for 22 OECD Countries

	Fixed Effects (Driscoll-Kraay)		Random Effects (Arellano, Froot and Rogers GLS)	
Variables	Coef.	Prob.	Coef.	Prob.
tr	-0.182	0.267	-0.165	0.081
cor	0.012	0.928	0.021	0.894
reg	-0.175	0.306	-0.156	0.628

gov	0.909***	0.000	0.899***	0.000
rol	-1.206***	0.000	-1.192**	0.004
pol	-1.109	0.178	-0.113	0.172
bcap	0.158**	0.004	0.157**	0.003
gdp	0.049	0.843	0.019	0.924
rmg	0.020*	0.030	0.021	0.479
constant	2.366	0.229	2.461	0.202
R^2	0.25		0.25	
F-test	63.59 (0.000)		-	
Hausman Test	1.90(0.99)			

Note: ***, ** and * express significant levels of 1%, 5%, and 10%, respectively. Those in parentheses are probability values.

According to the findings obtained from random effects model government effectiveness index coefficient is expressed as 0.899 and it is statistically significant at 1% level. According to this, 1% increase occurring in government effectiveness index increases exchange rate 0.899%. The coefficient belonging to Rule of Law index was obtained as – 1.192 and it was statistically significant at 5% level. According to this, 1% increase occurring in rule of law index leads to the decrease of 1.192% in exchange rate. On the other hand, the coefficients belonging to the variables of trade (%GDP), corruption index, regulatory quality index, political stability index, GDP per capita, and international reserves minus gold are not statistically significant. However, bank capital to asset ratio has a positive effect on exchange rate (0.157) , and it is statistically significant at the level of 5%. On the other hand, when regarded to the findings of fixed effects model, the coefficients and their signs that are significant shows consistency with the results of random effects model except for the variable of international reserves minus gold.

4.1.2. Model 2 Estimation Results

For Model 2 formed to evaluate the crises experienced in financial sector in the framework of fourth-generation crisis model, analysis findings are given in Table 5. According to this, when regarded to Hausman Test, null hypothesis in the form of "There is no correlation between explanatory variables and unit effect" is rejected. According to this, the findings obtained from fixed effects model are taken into consideration. F test providing the significance of the model is statistically significant at the level of 1%.

The estimated model 2 of 22 OECD countries as follows:

$$\text{smi}_{it} = -17.25 + 0.02\text{tr}_{it} + 1.02\text{cor}_{it} + 1.18\text{reg}_{it} - 0.09\text{gov}_{it} - 1.83\text{rol}_{it} - 0.03\text{pol}_{it} + 0.02\text{bcap}_{it} + 2.20\text{gdp}_{it} + 0.03\text{rmg}_{it} + \varepsilon 2_{it} \quad (19)$$

Table 5. Model 2 Static Estimation Results for 22 OECD Countries

	Fixed Effects (Driscoll-Kraay)		Random Effects (Arellano, Froot and Rogers GLS)	
Variables	Coef.	Prob.	Coef.	Prob.
tr	0.028	0.916	0.048	0.834
cor	1.029**	0.019	1.005**	0.010
reg	1.185*	0.068	1.070*	0.072
gov	-0.096	0.868	-0.325	0.582
rol	-1.839**	0.020	-1.660**	0.007
pol	-0.035	0.788	-0.156	0.261
bcap	0.022	0.920	0.091	0.625
gdp	2.202***	0.000	1.890***	0.000
rmg	0.036	0.340	0.040	0.526
constant	-17.25***	0.000	-13.039***	0.000

R^2	0.45	0.44
F-test	443.29 (0.000)	-
Hausman Test	111.12(0.000)	

Note: ***, ** and * express significant levels of 1%, 5%, and 10%, respectively. Those in parentheses are probability values.

According to the findings obtained from fixed effects model, corruption index coefficient was obtained as 1.029, it is statistically significant at 5%. According to this 1% increase occurring in corruption index increases stock market index by 1.029. Regulatory quality index is statistically predicted at the significance level of 10%. According to this, 1% increase occurring in Regulatory quality index increases stock market index by 1.185%. Rule of law index was predicted as negative and statistically significant at the significance level of 5% as in Model 1. According to this, 1% increase occurring in rule of law index leads to 1.839% decrease in stock market index. On the other hand, the coefficients belonging to the variables of trade (% GDP), government effectiveness index, political stability index, international reserves minus gold and bank capital to asset ratio are not statistically significant. However, the positive effect of GDP on stock market index is 2.202 and is statistically significant at the level of 1%. On the other hand, when regarded to the findings of random effects model, the coefficients and their signs that are significant show consistency with fixed effects model.

4.1.3. Model 3 Estimation Results

In 22 OECD countries, for Model 3 formed to evaluate sovereign debt crises in the framework of fourth-generation crisis model, in static analysis, both fixed effects and random effects predictors were given place. Static analysis findings for Model 3 were given in Table 6. According to the results of Hausman test, null hypothesis in the form of "There is no correlation between explanatory variables and unit root" is not rejected. According to this, the findings obtained from random effects model were taken into consideration. When regarded to the findings of F-test, it is seen that model is generally significant.

The estimated model 3 of 22 OECD countries as follows:

$$\text{ted}it = -3.89 + 0.04\text{tr}it - 0.49\text{cor}it - 0.04regit - 0.85\text{gov}it + 1.53\text{rol}it - 0.19\text{pol}it - 0.06\text{bcap}it + 0.72\text{gdp}it + 0.07\text{rmg}it + \varepsilon 3it \quad (20)$$

Table 6. Model 3 Static Estimation Results for 22 OECD Countries

	Fixed Effects (Driscoll-Kraay)		Random Effects (Arellano, Froot and Rogers GLS)	
Variables	Coef.	Prob.	Coef.	Prob.
tr	0.0461**	0.030	0.318**	0.003
cor	-0.499***	0.000	-0.492**	0.019
reg	-0.0485**	0.020	-0.614**	0.015
gov	-0.854**	0.002	-0.877**	0.002
rol	1.539***	0.000	1.630***	0.000
pol	-0.198**	0.002	-0.210**	0.012
bcap	-0.066	0.310	-0.035	0.658
gdp	0.724**	0.001	0.745***	0.000
rmg	0.071***	0.000	0.079**	0.027
constant	-3.899**	0.033	-3.429**	0.026
R^2	0.59		0.59	
F-test	480.32 (0.000)		-	
Hausman Test	8.21(0.000)			

Note: ***, ** and * express significant levels of 1%, 5%, and 10%, respectively. Those in parentheses are probability values.

According to the findings obtained from random effects model, trade (%GDP) coefficient was obtained as 0.338 and is statistically significant at 5%. According to this, 1% increase in trade (%GDP) increases total external debt by 0.318%. Coefficient belonging to corruption index was obtained as -0.492 and is statistically significant at the level of 5%. According to this, 1% increase occurring in corruption index leads to decrease of 0.492% in total external debt. GDP coefficient was predicted as statistically significant at the level of 1% as in Model 2. According to this, 1% increase leads to increase 0.745% in total external debt. Regulatory quality, government effectiveness and political stability was predicted as negative and statistically significant at the significance level of 5%. However, the positive effect of international reserves minus gold on total external debt is 0.079 and is statistically significant at the level of 5%. On the other hand, when regarded to the findings of fixed effect model, the coefficients and their signs that are significant show consistency the results of random effects model.

4.2. Dynamic Panel Data Analysis Results

After static panel data analysis, dynamic panel data analysis was applied to the model. In this direction, while the stationary properties of all variables belonging to three models are firstly examined, CADF panel unit root test, which was developed by Pesaran (2007) and which takes into consideration cross sectional dependence, was used and the results obtained for constant model are summarized in Table 7.

Table 7. The Results of CADF Unit Root Test

	Constant	
Variables	Level	First Difference
lnexc	-2.304**	-2.776***
lnsmi	-1.888	-3.491***
lnted	-1.066	-2.637***
lntr	-1.958	-3.084***
lncor	-2.034	-3.390***
lnreg	-2.463***	-4.057***
lngov	-1.910	-4.217***
lnrol	-1.696	-3.598***
lnpol	-1.989	-3.992***
lnbcap	-2.580***	-3.447***
lngdp	-1.491	-2.269***
lnrmg	-1.521	-2.921***

Note: Lagging lengths were taken as maximum 3. ***, ** and * express significant levels of 1%, 5%, and 10%, respectively. Critical values for CADF are -2.32; -2.15 and -2.07 at the significance levels of 1%, 5%, and 10%, respectively in the model with constant.

According to the table, lnexc is stationary at the significance level of 5%, while lnreg and lnbcap are stationary at the significance level of 1%. However, other variables become stationary when the first degree difference is taken. Much as there is not any consistency in all variables, when the first degree difference of all variables is taken, they become stationary. Therefore, accepting all variable as I(1) will not be wrong.

These results will be a guide to us in selecting estimator for estimating co-integration test and long term coefficients. Hence, co-integration test and estimator should be taken into consideration both cross-sectional dependency and the feature of variables to become stationary when taking first degree difference. Therefore, in the study, in estimating long term coefficients belonging to co-integration relationship AMG (Augmented Mean Group) estimator was used, which takes into consideration both cross-sectional dependency and the feature of variables to become stationary when taking first degree difference. In this direction, in 22 OECD countries, in order to evaluate causes of financial crises by means of fourth-generation crisis model, the results obtained from AMG (Augmented Mean Group) estimator, established for estimating the coefficients belonging to Model 1, Model 2, and Model 3 are presented in Table 8.

Table 8: AMG Estimation Results

	Model 1	Model 2	Model 3
lntr	0.379*** [0.074]	0.050 [0.201]	0.070 [0.072]
lncor	-0.353 [0.166]	0.087 [0.354]	0.058 [0.228]
lnreg	0.008 [0.095]	0.330 [0.502]	-0.007 [0.257]
lngov	0.032 [0.211]	0.367 [0.600]	-0.088 [0.233]
lnrol	0.021 [0.123]	-0.761 [0.785]	0.343 [0.263]
lnpol	0.014 [0.029]	-0.389** [0.163]	0.074** [0.037]
lnbcap	-0.101** [0.037]	0.224 [0.169]	-0.048 [0.093]
lngdp	-0.850 [0.130]	0.984** [0.414]	-0.030 [0.189]
lnrmg	-0.002 [0.011]	-0.031 [0.098]	-0.020 [0.021]
Constant	-0.017 [1.442]	-1.334 [6.746]	2.843 [2.673]
RMSE	0.0169	0.0565	0.0156
Wald $\chi 2$	128.26 (0.000)	27.18 (0.0013)	10.11 (0.3416)
Number of Observations	352	352	352

Note: . ***, ** and * express significant levels of 1%, 5%, and 10%, respectively. The values in brackets denotes standard errors and the ones in parentheses, probability values. RMSE; Root Mean Squared Error. Critical values for CADF are -2.32; -2.15 and -2.07 at the significance levels of 1%, 5%, and 10%, respectively in the model with constant.

In 22 OECD countries, when we look at Model 1 established to evaluate the relationship between independent variables, dealt with exchange rate, trade (%GDP) was obtained as 0.379. This situation is in line with our expectations. In the globalized world, the wealth of a nation is not only determined by business activities inside the country, but also abroad. Thus, the better it is the country's competitiveness, the better its economic performances will be; its currency's exchange rate will be more stable as well. This is how balance of trade affects exchange rate. The balance of trade impacts exchange rates as demand and supply. It can lead to an depreciation or appreciation of currencies. A country with high demand for its goods tends to export more than its imports and increases demand for the currency. Bank capital to asset ratio was estimated as – 0.101. So when bank capito increases exchange rate decreases. Showing that the local currency gets more powerful worth when banking sector improves. So reduce exchange rate stress. However, all other variables were not statistically significant. In addition, constant term is not statistically significant.

In 22 OECD countries, when we regard to the results of Model 2 dealing with the relationship between stock market and the other variables, political stability was estimated as – 0.389. Nowadays, when national economies become increasingly dependent on each other with the effect of globalization, the national and international investors as well as financial agencies are affected from the economic, political, and social conditions of country. As a result of the variations in national and international political conditions, the possible losses can occur in the returns of stocks and investments. On the other hand, GDP coefficient was estimated at high level as expected, because the stock markets of countries with high GDP performance tend to increase. In addition, the prices of stock should include the expectations of investors related to economic activities. According to this, if the investors expects that economic activities slow, the stock prices will fall and, otherwise, if they expect that economic activities increase, stock prices will rise.

Lastly, when the results of Model 3 dealing with the relationship between total debt and the other variables are examined, it is seen that political stability is estimated as 0.074. When political stability increases, the governments try to carry out more and more government expenditure for development. So they borrow more. So higher external debt.

Conclusion and Comments

All developed or developing countries are affected by financial crises. Financial crises are often described as the failure of financial institutions or sharp drops in asset prices. Financial crisis models are classified as first, second, third and fourth generation models.

In this study, the indicators of financial crisis will be analyzed with panel data analysis method for 22 OECD countries in the 2002-2017 period, within the framework of fourth-generation crisis models.

According to analysis results, government effectiveness index and rule of law index variables are effective on the exchange rate crisis; corruption index, requlatory quality and rule of law index variables are effective on financial crisis; corruption index, requlatory quality, government effectiveness and political stability are effective on sovereign debt crisis.

According to the results of the analysis, it is possible to say that market intervention by law or government is good for the economy and reduces the chances of a financial crisis. Effective policy implementation is required for a better financial system. The law in the economy should also be updated with the pace of financial development. Regulatory measures and transparency of governments and banks are important because they affect banks and government credibility, which can help to accurately identify and value paid debts. Government effectiveness and political stability also very important for economic development. Good governance, by promoting more productive investment, more efficient divisions of labor and faster implementation of economic and social policies, leads to higher economic growth, follows rule of law, helps fight corruption.

If we summarize, economic development in institutional factors leads to a decrease in the emergence of financial crises.

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Annex 1. AMG Individual Country Results for Model 1

	lntr	lncor	lnreg	lngov	lnrol	lnpol	lnbcap	lngdp	lnrmg	c
Australia	1.214* [0.642]	-0.702 [2.706]	0.409 [1.962]	3.921 [4.822]	-2.060 [7.060]	-0.071 [0.481]	0.341 [0.265]	-0.205 [1.027]	-0.608 [0.113]	-7.434 [30.471]
Austria	0.471** [0.184]	-0.439 [0.274]	0.087 [0.213]	0.064 [0.333]	0.959 [0.732]	0.054 [0.059]	0.031 [0.068]	0.040 [0.540]	-0.038 [0.029]	-4.930 [5.892]
Canada	-0.171 [0.550]	-2.172 [2.039]	1.294 [1.112]	1.451 [0.914]	0.197 [3.947]	0.363* [0.202]	-0.627** [0.238]	-1.554** [0.749]	0.159 [0.125]	10.035 [22.064]
Czech Republic	0.0323*** [0.070]	-0.251* [0.134]	-0.417** [0.141]	-0.049 [0.150]	0.256** [0.117]	-0.249*** [0.051]	-0.244*** [0.043]	-0.201* [0.112]	-0.016 [0.021]	7.729*** [0.874]
Denmark	0.575** [0.186]	0.374 [1.500]	0.123 [0.424]	-0.198 [0.456]	0.518 [1.053]	-0.131 [0.165]	-0.110* [0.064]	0.111 [0.655]	0.003 [0.041]	-4.802 [15.873]
Finland	0.580** [0.293]	0.182 [1.382]	0.332 [0.711]	0.022 [0.276]	-0.009 [0.976]	-0.018 [0.150]	-0.073 [0.050]	0.052 [0.551]	0.007 [0.133]	-5.266 [10.355]
France	0.804*** [0.151]	0.402 [0.355]	0.386* [0.218]	-0.152 [0.174	0.069 [0.378]	0.062** [0.022]	-0.034 [0.050]	-1.114** [0.428]	0.003 [0.027]	5.337 [4.150]
Germany	0.465*** [0.090]	0.921* [0.488]	-0.120 [0.134]	-0.374 [0.161]	0.445** [0.309]	0.160*** [0.029]	-0.230*** [0.045]	0.151 [0.172]	0.058** [0.026]	-9.158** [3.574]
Ireland	0.460*** [0.113]	-1.033** [0.344]	0.294* [0.163]	-0.060 [0.342]	-0.198 [0.523]	0.145 [0.126]	-0.074* [0.042]	0.099 [0.088]	-0.071* [0.034]	2.132 [4.727]
Italy	0.212 [0.192]	-0.145 [0.221]	0.043 [0.221]	0.111 [0.090]	-0.215 [0.287]	0.156** [0.078]	0.104 [0.161]	0.410 [0.445]	0.006 [0.035]	-5.214 [3.866]
Luxembourg	0.207 [0.179]	0.307 [0.472]	0.433 [0.714]	-0.601 [0.861]	-0.271 [1.654]	-0.126 [0.263]	0.110 [0.097]	-0.098 [0.612]	0.013 [0.026]	1.092 [10.189]
Netherlands	0.464*** [0.076]	2.142** [0.824]	-0.319 [0.284]	-0.452 [0.352]	0.091 [0.533]	0.126 [0.111]	-0.116** [0.052]	-0.084 [0.273]	-0.052 [0.074]	-7.016 [5.184]
Portugal	0.253** [0.115]	0.106 [0378]	-0.114 [0.153]	-0.297 [0.248]	0.049 [0.302]	0.060 [0.378]	0.016 [0.079]	0.012 [0.329]	-0.33 [0.040]	0.472 [4.063]
Slovak Republic	0.918*** [0.100]	0.131 [0.097]	-0.005 [0.226]	-0.072 [0.235]	0.088 [0.270]	0.010 [0.063]	-0.037 [0.044]	-1.123*** [0.109]	0.003 [0.007]	6.034*** [1.504]
Spain	0.259	0.191	-0.057	-0.306	0.149	0.058	-0.121	-0.037	0.002	-0.507

	[0.192]	[0.251]	[0.365]	[0.186]	[0.307]	[0.050]	[0.155]	[0.506]	[0.035]	[5.441]
Turkey	0.124 [0.923]	0.108 [0.286]	-0.887* [0.499]	-0.148 [1.033]	0.724 [0.818]	-0.172* [0.097]	-0.158 [0.832]	1.664* [0.865]	-0.078 [0.406]	-11.426* [6.761]
United Kingdom	0.519 [0.342]	-0.351 [2.348]	-0.576 [1.556]	-1.399** [0.677]	-0.686 [2.260]	-0.030 [0.134]	-0.188 [0.130]	0.000 [1.058]	0.090 [0.075]	9.414 [0.14.790]
United States	-	-	-	-	-	-	-	-	-	-
Chile	-0.436 [0.713]	0	-0.259 [1.045]	-0.412 [1.354]	-0.084 [1.474]	-0.170 [0.358]	-0.238 [0.384]	-0.047 [0.621]	-0.058 [0.181]	14.710 [10.157]
Estonia	0.376*** [0.083]	-0.373** [0.150]	-0.139 [0.205]	-0.154 [0.151]	0.232 [0.198]	0.036 [0.142]	-0.072 [0.075]	0.106 [0.076]	0.010 [0.008]	-1.069 [0.963]
Latvia	0.405*** [0.091]	0.131 [0.138]	-0.479 [0.764]	-0.015 [0.167]	0.041 [0.249]	-0.027 [0.057]	-0.231** [0.075]	0.090 [0.071]	0.027* [0.014]	-1.265 [2.416]
Lithuania	0.322** [0.116]	-0.307* [0.162]	0.155 [0.299]	-0.155 [0.251]	0.171 [0.355]	0.078 [0.131]	-0.055 [0.074]	-0.145 [0.183]	-0.024 [0.022]	0.737 [1.295]

Note: ***, ** and * express significant levels of 1%, 5%, and 10%, respectively. The values in brackets denotes standard errors .

Annex 2. AMG Individual Country Results for Model 2

	lntr	lncor	lnreg	lngov	lnrol	lnpol	lnbcap	lngdp	lnrmg	c
Australia	1.476 [1.337]	-0.300 [5.438]	-0.969 [4.095]	4.809 [6.956]	-3.215 [13.216]	-1.490 [1.084]	0.531 [0.598]	6.135** [2.489]	-0.271 [0.346]	-58.402 [59.963]
Austria	0.107 [0.936]	-0.933 [1.238]	0.540 [1.117]	0.601 [1.262]	4.270 [3.729]	0.304 [0.310]	0.121 [0.366]	1.363 [2.166]	-0.588*** [0.132]	-16.183 [22.240]
Canada	0.244 [1.108]	-1.480 [4.008]	0.860 [2.628]	-1.658 [1.621]	10.776 [9.557]	-1.058** [0.401]	0.940 [0.586]	1.608 [2.368]	0.136 [0.378]	-50.548 [55.889]
Czech Republic	0.630 [0.421]	-0.245 [0.754]	1.056 [0.809]	-2.223** [0.783]	-1.322* [0.737]	-0.232 [0324]	-0.707** [0.262]	2.365*** [0.487]	-0.372*** [0.109]	2.940 [5.277]
Denmark	0.329 [0.827]	-3.237 [5.788]	-0.605 [1.856]	-5.436*** [1.538]	-4.163 [3.183]	-0.869 [0.648]	0.654** [0.271]	1.655 [2.675]	0.205* [0.122]	44.710 [51.248]
Finland	0.374 [1.617]	0.690 [7.636]	1.656 [3.713]	-0.279 [1.346]	-0.967 [5.405]	-1.396* [0.795]	0.050 [0231]	-0.966 [3.019]	-0.130 [0.350]	20.313 [59.213]
France	-0.184 [0.666]	-1.727 [1.565]	-0.761 [1.046]	0.985 [0.815]	-2.409 [1.573]	-0.060 [0.087]	-0.294 [0.201]	2.273 [1.990]	-0.011 [0.137]	2.769 [23.624]
Germany	0.519 [1.242]	-1.194 [4.552]	1.319 [1.335]	-2.095 [1.691]	0.849 [2.976]	0.002 [0.351]	0.957** [0.440]	1.446 [2.577]	0.128 [0.251]	-13.447 [36.147]
Ireland	-0.756 [1.639]	-0.106 [3.390]	2.525 [2.007]	6.953 [3.722]	-0.450 [5.108]	-1.479 [1.386]	-0.266 [0.632]	1.221 [0.803]	0.423 [0.283]	-43.489 [37.598]
Italy	-0.078 [0.362]	1.109** [0.453]	1.542*** [0.426]	-0.775*** [0.214]	0.661 [0.439]	-0.125 [0.114]	-0.038 [0.155]	-2.659** [0.884]	-0.871*** [0.0.082]	49.243*** [8.706]
Luxembourg	-0.457 [0.356]	3.080*** [0.836]	0.600 [1.772]	1.329 [1.111]	-5.717* [3.358]	0.648 [0.553]	-0.175 [0.203]	0.563 [1.232]	-0.103** [0.036]	5.549 [17.808]
Netherlands	0.126 [0.298]	-3.535 [2.890]	2.618** [1.008]	-4.530*** [1.240]	-3.295* [1.883]	0.663 [0.505]	0.324** [0.131]	-1.585 [0.995]	-0.235** [0.110]	63.689*** [14.313]
Portugal	-1.422*** [0.370]	3.442** [1.320]	0.334 [0.597]	0.860** [0.970]	-1.989 [0.971]	0.644 [0.516]	-0.241 [0.322]	-0.573 [1.407]	-0.186** [0.091]	10.547 [15.335]
Slovak Republic	-1.851** [0.942]	0.012 [0.845]	3.427** [1.360]	0.152 [1.721]	0.915 [1.958]	-0.366 [0.396]	-0.247 [0.350]	2.592** [0.843]	0.232 [0.064]	-33.014 [7.698]
Spain	-0.707 [0.497]	0.946 [0.761]	-2.656** [1.163]	-0.417 [0.543]	1.154 [0.802]	0.021 [0.160]	0.350 [0.299]	1.818 [1.395]	-0.091 [0.099]	-1.500 [14.490]
Turkey	-1.775 [2.032]	0.555 [0.689]	-2.491** [1.205]	1.937 [2.309]	2.042 [1.921]	-0.551** [0.272]	2.206 [1.847]	4.240** [2.124]	-0.648 [0.916]	-18.111 [11.814]
United Kingdom	0.596 [0.438]	0.935 [3.441]	0.955 [2.042]	-0.736 [1.066]	-0.399 [3.340]	-0.101 [0.181]	0.022 [0.239]	-0.649 [2.407]	0.179 [0.122]	5.278 [25.797]
United States	0.023 [0.131]	0.284 [0.709]	1.171** [0.373]	-0.405 [0.714]	-3.108*** [0.963]	0.313*** [0.075]	-1.430*** [0.287]	1.207*** [0.362]	0.571*** [0.070]	-7.572 [7.517]

Chile	1.435 [1.098]	0	1.403 [2.867]	4.002 [3.460]	-7.566* [3.914]	0.278 [0.952]	0.093 [1.038]	-0.181 [1.997]	1.333** [0.598]	-18.564 [20.971]
Estonia	1.527 [1.047]	-0.097 [2.144]	1.449 [2.478]	1.638 [2.038]	-0.375 [1.786]	-1.694 [1.777]	0.945 [0.959]	-0.523 [1.030]	-0.087 [0.105]	-1.960 [12.321]
Latvia	-0.057 [1.119]	1.571 [1.868]	-7.865 [12.760]	0.586 [2.424]	-0.253 [3.806]	-1.476 [1.414]	1.654 [1.303]	0.055 [1.280]	-0.372** [0.183]	41.227 [46.875]
Lithuania	1.013** [0.447]	1.154* [0.627]	1.158 [1.113]	2.777** [01.165]	-2.180** [1.061]	-0.547 [0.372]	-0.424 [0.298]	0.242 [0.588]	0.067 [0.056]	-12.825** [4.647]

Note: ***, ** and * express significant levels of 1%, 5%, and 10%, respectively. The values in brackets denotes standard errors.

Annex 3. AMG Individual Country Results for Model 3

	lntr	lncor	lnreg	lngov	lnrol	lnpol	lnbcap	lngdp	lnrmg	c
Australia	-0.207 [0.201]	-0.996 [1.103]	-0.627 [0.609]	-3.362 [1.178]	3.537** [2.182]	0.011 [0.158]	0.181* [0.107]	1.283** [0.652]	0.013 [0.044]	-2.055 [12.994]
Austria	0.235 [0.241]	-0.017 [0.327]	0.189 [0.290]	-0.485 [0.328]	-1.715* [1.037]	-0.026 [0.076]	-0.020 [0.102]	-1.348** [0.614]	0.055 [0.034]	26.402*** [5.809]
Canada	0.238* [0.122]	1.728** [0.551]	-0.004 [0.286]	0.469 [0.263]	0.305 [1.085]	0.006 [0.051]	0.036 [0.059]	-0.208 [0.309]	0.120*** [0.032]	-7.675 [8.003]
Czech Republic	-0.034 [0.259]	-0.347 [0.438]	-0.022 [0.581]	-0.684 [0.531]	0.099 [0.449]	0.232 [0.223]	0.631 [0.408]	-0.003 [0.382]	0.013 [0.061]	6.157 [4.640]
Denmark	0.151 [0.233]	-2.739 [2.665]	0.933 [0.576]	1.569** [0.545]	0.670 [0.982]	0.181 [0.219]	-0.004 [0.098]	-0.330 [0.749]	0.079 [0.116]	4.122 [16.254]
Finland	0.049 [0.413]	2.349 [1.870]	-0.208 [1.023]	-0.451 [0.410]	2.690* [1.503]	-0.125 [0.254]	-0.003 [0.069]	-0.656 [0.844]	-0.084 [0.089]	-5.851 [15.216]
France	-0.380 [0.236]	0.530 [0.672]	-0.062 [0.382]	0.161 [0.317]	-0.297 [0.659]	-0.076** [0.031]	0.248*** [0.070]	0.972 [0.662]	-0.083 [0.060]	-3.346 [6.613]
Germany	0.388 [0.278]	1.420 [1.150]	0.124 [0.306]	0.040 [0.351]	0.189 [0.715]	0.007 [0.069]	-0.131 [0.122]	-0.798* [0.473]	0.314*** [0.073]	-3.542 [8.523]
Ireland	-0.318 [0.248]	-0.271 [0.608]	-0.012 [0.293]	0.051 [0.808]	0.682 [0.866]	-0.136 [0.224]	0.011 [0.105]	-0.609*** [0.177]	-0.068 [0.073]	13.365 [8.951]
Italy	0.061 [0.173]	-0.348 [0.218]	0.272 [0.208]	-0.168 [0.123]	-0.445* [0.255]	0.070 [0.053]	0.161** [0.067]	-1.185** [0.401]	-0.045 [0.062]	20.744*** [3.823]
Luxembourg	0.289* [0.152]	-0.437 [0.435]	1.437** [0.613]	-0.444 [0.620]	2.582 [1.578]	0.379** [0.180]	0.065 [0.066]	0.745 [0.574]	0.061 [0.041]	-22.577** [8.456]
Netherlands	-0.068 [0.179]	1.860 [1.842]	-0.678 [0.692]	1.008 [0.830]	0.485 [1.223]	0.039 [0.240]	-0.141* [0.080]	0.241 [0.769]	0.076 [0.084]	-10.499 [16.775]
Portugal	0.338*** [0.049]	0.088 [0.148]	0.141** [0.051]	-0.191** [0.089]	0.154* [0.092]	-0.095* [0.053]	0.037 [0.027]	-1.010*** [0.114]	-0.002 [0.008]	13.523*** [1.508]
Slovak Republic	0.714* [0.426]	-0.274 [0.373]	-1.507** [0.580]	2.292** [0.868]	-0.458 [0.965]	0.213 [0.228]	0.691*** [0.161]	2.052*** [0.561]	-0.172*** [0.053]	-16.463** [8.032]
Spain	0.110 [0.082]	0.147 [0.253]	-0.456** [0.200]	-0.042 [0.102]	-0.074 [0.124]	0.023 [0.026]	0.112 [0.115]	-0.264 [0.268]	-0.021 [0.015]	9.385** [3.459]
Turkey	-0.046 [0.279]	-0.263** [0.100]	-0.428** [0.190]	0.526 [0.345]	-0.407 [0.309]	-0.011 [0.043]	-0.676** [0.275]	-0.526* [0.315]	0.007 [0.144]	13.093*** [2.567]
United Kingdom	0.239 [0.191]	0.220 [1.156]	-1.255 [0.929]	0.326 [0.365]	0.024 [1.401]	0.016 [0.079]	-0.063 [0.069]	0.992 [0.695]	0.032 [0.058]	-3.909 [9.535]
United States	0.020 [0.058]	-0.747** [0.270]	0.098 [0.204]	0.274 [0.399]	-0.456 [0.497]	-0.112*** [0.030]	-0.157** [0.079]	-0.994** [0.351]	-0.087** [0.031]	22.540*** [4.468]
Chile	-0.264 [0.263]	0	-0.230 [0.701]	-0.140 [1.039]	-1.030 [1.083]	-0.057 [0.254]	0.079 [0.265]	0.707 [0.552]	0.034 [0.131]	4.099 [8.793]

Estonia	-0.524 [0.274]	-0.306 [0.552]	-2.043*** [0.617]	-0.097 [0.534]	1.095 [0.671]	0.412 [0.502]	-0.596** [0.262]	0.585** [0.262]	0.052* [0.030]	5.521 [3.378]
Latvia	0.849*** [0.235]	-0.093 [0.359]	4.256** [2.071]	-1.568*** [0.468]	-0.660* [0.839]	0.311 [0.169]	-1.491*** [0.170]	-0.355* [0.189]	0.168** [0.065]	-7.126 [6.076]
Lithuania	-0.301 [0.402]	-0.214 [1.103]	-0.072 [1.124]	-1.020 [1.404]	0.592 [0.944]	0.369 [0.390]	-0.032 [0.263]	0.041 [0.721]	-0.020 [0.047]	6.651* [3.945]

Note: ***, ** and * express significant levels of 1%, 5%, and 10%, respectively. The values in brackets denotes standard errors