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Macroeconomic Indicators to Evaluate Economic Crises in Emerging Economies

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〈Abstract〉

As major economic crises have significantly affected emerging economies, country/sovereign risk factors have been also reviewed to evaluate any kinds of economic crises. Through empirical data analysis based on cases of major economic crises over 1974-2010, not only leading variables such as real GDP (*per capita*) growth, exchange rate (depreciation), exports growth, capital and financial account and budget deficit deteriorated one year before the crises, but also coincident variables such as real GDP *per capita* growth, depreciation, inflation, capital and financial account, public debt and external debt exacerbated in the crises. Additionally, major economic crises of emerging economies, (*e.g.* Argentina 2001, Greece 2010, Indonesia 1997, Korea 1997, Mexico 1994, Russia 1998 and Turkey 2000) prove to be the data analysis, and the selected principal indicators can diagnose current economic situation through statistical simulation of countries in crises.

*Key Words: Country Risk, Emerging Economies, Economic Crises, Principal Indicators, Empirical Data Analysis

Ⅰ. Introduction

The Federal Reserve (Fed) in the United States has increased policy interest rate again since 2015, which means substantial changes of monetary policy from quantitative easing (QE) to quantitative tightening (QT). Based on historical experience, emerging economies[1] have

1) Emerging economies are the countries that have not met standards to be developed

depressed in economic crises and have frequently faced in economic difficulties due to rapid increase of interest rate. It is important to manage macroeconomic situation and to prepare or get over economic crises because no country is exceptional in economic crises. This paper aims to analyze empirical data of economic crises in emerging economies, and to suggest policy implications for economic management and risk prevention.

A variety of research papers have presented about economic crises in emerging economies. For instance, Feldstein (2003) asserts that management capacity such as fixed exchange rate system, current account deficit, accumulated external debt, convertible capital and financial account, financial supervision, foreign reserves, exchange stabilization policy, interest rate level, market openness, loan regulation, and role as lender of last resort can affect risks of financial crisis. In particular, he suggests five available prevention measures against possible risks; controlling appreciation permit of floating exchange rate system, keeping level of foreign reserves over three months to cover monthly averaged imports, managing short-term debt within foreign reserves, establishing sound financial system, and reducing dollar-denominated private debt. Goldstein (1998) also explains phenomena of net foreign asset flight (converting into minus position or increasing the minus net position) before and in economic crises. In reality, such phenomena prove to the crises cases in Argentina 2001, Brazil 2002, Indonesia 1997, Malaysia 1997, Mexico 1994, the Philippines 1997, Russia 1998, Thailand 1997 and Turkey 2000. Krugman (2009) analyzes that financial institutions in Asia is unendurable of short-term debt repayment burden with funding mismatch phenomena as a result of short-term borrowing and long-term lending methods. Frenkel et al (2004) demonstrate that policy interest rate of the Fed is very statistically significant to forecast exchange rate fluctuation, and they estimate variables of currency crisis based on 105 countries over

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economies, in terms of level of development and income, and they are commonly listed at the IMF, S&P EMI, FTSE, Dow Jones and MSCI Index.

1971-1992. The analysis implies that financial markets have been highly volatile resulting from increase of policy interest rate of the Fed. Additionally, Reinhart *et al* (2009) argues that currency crisis influences on external debt crisis with sovereign debt default.

As a representative international organization playing a role to resolve imbalance phenomena of balance of payment, the International Monetary Fund (IMF) surveys about risk assessment on sovereign debt repayment of 47 emerging economies over 1970-2002 (Manasse *et al*. 2005, 21). Based on 50 available macroeconomic indicators, around 10 major indicators can classify economic crises level and explain to predict the crises as follows; external debt-to-GDP, short-term debt-to-foreign reserves, real GDP growth, public debt-to-public revenue, inflation rate, number of general election year, Treasury Bill rate of the United States, external financing needs[2], overestimated currency (real effective exchange rate) and exchange rate volatility. In particular, the IMF classifies types of economic crises as insolvency crisis or debt unsustainable level induced by external debt, external financing needs and currency-budget imbalance; liquidity crisis linked with political instability and liquidity deterioration of international capital markets; exchange rate crisis triggered by weak macroeconomic fundamentals. In addition, the IMF (2004) suggests proxy variables to evaluate as risks; public debt-to-public revenue as management risk, public repayment-to-external debt as rollover risk, external debt-to-exports as external debt capacity risk, (short-term debt + foreign currency deposits) to foreign reserves as currency risk. Recently, historical experience analyzed by the IMF suggests that crises result from the collision between economic or financial vulnerabilities and specific events, which is thus a necessary, but not a sufficient, condition for a crisis (Ahuja *et al*. 2017, 5-9).

This paper structures with introduction in Section Ⅰ, Section Ⅱ overviews country/sovereign risk factors including those of the Organization for Economic Cooperation and Development (OECD),

2) (current account balance + short-term debt)/foreign reserves

Standards & Poor's (S&P) and Moody's, Section Ⅲ analyzes empirical data about 38 economic cases of emerging economies which received the IMF bailout credits over 1974-2010, Section Ⅳ studies cases of major economic crises based on actual data, and Section Ⅴ closes with policy implications.

Ⅱ. Country/Sovereign Risk Factors

Global economic crises have influenced on significant negative effects in the perspectives of capital markets and economic development. In this regard, country/sovereign risk classification has been argued to measure economic crises amongst country/sovereign risk evaluation entities. Many entities including economic experts have tried to predict or monitor any kinds of economic crises in capitalistic history. In this way, country/sovereign risk classification has a pivotal role to evaluate any possibilities of economic crises until now.

In general, country risk covers political risk[3] and economic risk, defined by traditional and expert country risk evaluation entities.

$$CR(t) = PR(t) + ER(t) \quad (1)$$

Where CR(t), PR(t), and ER(t) are respectively country risk, political risk, and economic risk at time (t) in economic crisis, political risk cannot be measured to express mathematical score easily and is difficult to compare with related data to political risk, even if it is calculated.

First of all, the Organization for Economic Cooperation and Development (OECD) has evaluated country risks since 1998. According to Arrangement on Officially Supported Export Credits under the Trade Directorate of the OECD, countries shall be classified by the likelihood of whether they will service their external debts (OECD 2010, 13). The

3) In the perspectives of country risk, it covers generally social and cultural risk as well as pure political risk.

country credit risks ("probability of default") of the OECD cover moratoriums on repayments, political events and/or economic difficulties, legal provisions as a result of fluctuations in exchange rates, any other measure or decision to prevent repayment, and case of *force majeure* (*e.g.* war, expropriation, revolution, riot, civil disturbances, floods, earthquakes, eruptions, tidal waves and nuclear accidents). In practice, country credit risks of the OECD have been evaluated amongst export credit agencies (ECAs) established to support export in a form of government subsidy, which is exceptionally recognized without any violation of fair trade rules provided by the World Trade Organization (WTO). Countries nominated to evaluate have been classified into one of country risk categories[4], through country risk experts meetings of ECAs based on Country Risk Assessment Model outcome[5]. The OECD classifies country risk categories to take into account not only political situation, but also economic situation: four main assessment fields such as macroeconomic situation (growth potential, policy performance, vulnerability); financial and external debt situation; payment experience (all ECAs of the OECD participants to the Arrangement with the country); and dummy variables about whether or not the nominated country is into transition stage of economy or the European Union (EU) membership.

As for sovereign[6] risk classification, Standards & Poor's (S&P) and Moody's have large share of reference or quotation in international financial markets. Both institutions have represented to evaluate sovereign risks as well as corporate credit risks. S&P has started to provide financial information (*e.g.* cooperate bond rating) in the perception of right to know of investors since 1860. In particular, S&P has focused on repayment capacity and willingness of government to evaluate dollar-denominated long-term government bond. S&P assesses sovereign risk ratings to take into account five main fields such as institutional

4) 0-7 eight category level, zero (lowest risk level) to seven (highest risk level)
5) Country Risk Assessment Methodology of the OECD (OECD Methodology covers all risks of sovereign, public entities, corporate and banking sector)
6) Unlike country risk, Ministry of Finance and/or Central Bank is representative.

factors (effectiveness, stability and predictability of policy, transparency and accountability of institution, debt payment culture, external security risks), economic factors (income levels, economic growth prospects, economic diversity and volatility), external factors (currency status in international transactions, external liquidity, external indebtedness), fiscal factors (fiscal performance and flexibility, debt burden), and monetary factors (exchange rate regime, monetary policy's credibility). On the other hand, Moody's established in 1841 has evaluated corporate credit level to provide capital information. Unlike S&P, Moody's has much focused on probability of sovereign default and financial loss of dollar-denominated long-term government bond. The sovereign default is defined as the failure of a government to meet principal repayments or interest payments on the due date of its external or domestic debt obligations or both (Reinhart et al. 2009, xxvi). Moody's also assesses sovereign risk ratings to take into account four main fields such as economic strength (growth dynamics, scale of economy, national income), institutional strength (framework and effectiveness, policy credibility and effectiveness), fiscal strength (debt burden, debt affordability), and susceptibility to event risks (political risk, government liquidity, banking sector, external vulnerability).

The three representative country/sovereign risk evaluation entities such as OECD, S&P and Moody's take into considerations individual indicators respectively under the main fields. Table 1 summarizes comparison of macroeconomic indicators to evaluate country/sovereign risks. Based on economic risk, twelve indicators of OECD, seventeen indicators in S&P, and eight indicators of Moody's can be selected for major macroeconomic indicators with mark (ⅹ), apart from qualitative assessment. What's interesting is such macroeconomic indicators as gross domestic product (GDP), GDP *per capita*, real GDP growth, real GDP *per capita* growth, real effective exchange rate, domestic saving-to-GDP, domestic investment-to-GDP, foreign reserves in months of imports, inflation rate, unemployment rate, terms of trade, current account balance-to-GDP(or exports), exports growth, capital and financial account balance-to-GDP,

budget balance-to-GDP, public debt-to-GDP(or public revenue), public interest payment-to-public revenue(or GDP), external debt-to-GDP(or exports), short-term debt-to-foreign reserves(or exports), debt service ratio (DSR)[7] are nominated to evaluate country/sovereign risks in detail. Macroeconomic indicators such as GDP *per capita*, inflation rate, current account balance-to-GDP (or exports) and public interest payments-to-public revenue (or GDP) are commonly referred to all three entities of the twenty indicators at Table 1.

〈Table 1〉 Comparison of Macroeconomic Indicators to Evaluate Country/Sovereign Risks

Indicators	OECD	S&P	Moody's
gross domestic product (GDP), GDP			x
GDP *per capita*, GDPc	x	x	x
real GDP growth, rGDP		x	x
real GDP *per capita growth*, rGDPc	x	x	
real effective exchange rate, rEX		x	
domestic saving/GDP, DS	x	x	
domestic investment/GDP, DI	x	x	
foreign reserves/imports, FR	x		
inflation rate, IR	x	x	x
unemployment rate, UR		x	
terms of trade, TT		x	
current account balance/GDP (or exports), CA	x	x	x
exports growth, E		x	
capital and financial account balance/GDP, CFA		x	x
budget balance/GDP, BD	x	x	
public debt/GDP (or public revenue), PD		x	x
public interest payments/public revenue (or GDP), PI	x	x	x
external debt/GDP (or exports), ED	x	x	
short-term debt/foreign reserves (or exports), SD	x	x	
debt service ratio (DSR), DSR	x		

Sources: www.oecd.org, www.standardandpoors.com, www.moodys.com

7) (principal repayments + interest payments) external debt /exports

Most of the country/sovereign risk assessment entities above-mentioned tend to analyze not so much predictable as realized risks at time (t) of crisis. When economic risk based on macroeconomic indicators reflected into OECD, S&P and Moody's can be a form of function,

$$ER(t) = (\Delta GDP(t), \Delta GDPc(t), \Delta rGDP(t), \Delta rGDPc(t), \Delta rEX(t), \Delta DS(t), \Delta DI(t), \Delta FR(t), \Delta IR(t), \Delta UR(t), \Delta TT(t), \Delta CA(t), \Delta E(t), \Delta CFA(t), \Delta BD(t), \Delta PD(t), \Delta PI(t), \Delta ED(t), \Delta SD(t), \Delta DSR(t)) + \phi \quad (2)$$

Where Δ is change rate[8], calculated by increase or decrease of the indicators compared to previous year, before one year (t-1) and the year (t) in economic crises, ϕ is a residual error term, and the other notations, e.g. GDP(t) are the same as the expression of indicators at Table 1, given at time (t) of crisis.

〈Table A〉 Thresholds of Crises Symptom of Major Macroeconomic Indicators

Indicators	Thresholds	References
depreciation	over 15%	Carmen M. Reinhart & Kenneth S. Rogoff
	over 25%	Jeffrey Frankel & Andrew Rose
inflation rate	over 20%	Carmen M. Reinhart & Kenneth S. Rogoff
budget balance/GDP	below -3%	EU (Maastricht Convergence Criteria)
foreign reserves/Imports	below 3 months	Institute of International Finance
external debt/exports	over 200%	OECD
external debt/GDP	over 35%	Institutional Investor
	over 50%	IMF
public debt/GDP	over 60%	EU (Maastricht Convergence Criteria)
	over 90%	Carmen M. Reinhart & Kenneth S. Rogoff
short-term debt/ foreign reserves	over 100%	The Economist
	over 130%	IMF
debt service ratio	over 30%	OECD

8) Individual data value of average t-1 and t cannot represent general weight of the crises.

Table A of APPENDIX refers thresholds[9] of major macroeconomic indicators to measure economic symptom which often can be nominated in a few literatures. For example, Reinhart et al (2009) estimate; if inflation rate of any country is over 20%, if depreciation is over 15% compared to that of previous year, or if public debt-to-GDP is over 90%, it is possible that economic crises will take place in that country. Another opinion has been suggested as "currency crash" if depreciation of the nominal exchange rate is at least 25% (Frankel et al. 1996, 2-3). On the other hand, the OECD has simulated probability of default toward a variety of valuables and countries so that default risk increases if external debt-to-exports is over 200% and/or debt service ratio is over 30%.[10] For reference, if external debt-to-exports ratio reaches 200%, it means that the probability of default increases very rapidly. The EU also set a provision to introduce Euro currency with the Maastricht Convergence Criteria in the Treaty of European Union agreed on February 1992. The criteria have recommended any country keeping at or entering to Euro zone (the EU member countries using Euro as legal currency), including within -3% of budget balance-to-GDP and below 60% of public debt-to-GDP. Furthermore, Institute of Institutional Finance has alerted foreign reserves to cover imports less than three months. Institutional Investor and the IMF suggest controlling the level below 35% and 50% respectively of external debt-to-GDP, and the Economist and the IMF have also warned red alert over 100% and 130% respectively of short-term debt-to-foreign reserves.

In fact, several economic crises in emerging economies prove to be the thresholds at Table A of APPENDIX. For example, budget balance-to-GDP before the economic crises has deteriorated in Greece 2009, Indonesia 1996, Korea 1996, Mexico 1993, Russia 1997 and Turkey 1999. In addition,

9) "crisis-prone" and/or "red alert" versus "safe"

10) The critical values by the OECD were estimated econometrically based on data for 74 countries for the entire period 1980-2011, whereby large IMF-led bail-out rescue packages were considered as a crisis situation so close to default that they should be predicted.

cases for macroeconomic indicators one year before the crises over the thresholds at Table A of APPENDIX were budget balance-to-GDP (-3.6%), external debt-to-exports (381.2%), external debt-to-GDP (51.7%) and debt service ratio (71.3%) before the Argentina 2001 crisis; budget balance-to-GDP (-14.5%), foreign reserves to cover imports (0.2 months) and public debt-to-GDP (129.3%) before the Greece 2010 crisis; external debt-to-exports (219.3%), external debt-to-GDP (56.7%), short-term debt-to-foreign reserves (166.2%) and debt service ratio (36.6%) before the Indonesia 1997 crisis; foreign reserves to cover imports (2.3 months) and short-term debt-to-foreign reserves (194.9%) before the Korea 1997 crisis; short-term debt-to-foreign reserves (143.3%) and debt service ratio (35.8%) before the Mexico 1994 crisis; budget balance-to-GDP (-6.1%) and foreign reserves to cover imports (1.7 months) before the Russia 1998 crisis; inflation (64.9%), budget balance-to-GDP (-13.0%), external debt-to-GDP (55.2%) and debt service ratio (35.3%) before the Turkey 2000 crisis. Most currencies have been depreciated countries in crises, before and in the crises except for the case of Argentina which operated fixed exchange rate system.

As for cases of major emerging economies in the economic crises based on commonplace experience, inflation has deteriorated in Argentina 2001, Greece 2010 and Russia 1998; external debt-to-GDP in Argentina 2001, Indonesia 1997, Korea 1997, Mexico 1994, Russia 1998 and Turkey 2000; public debt-to-GDP in Argentina 2001, Greece 2010, Korea 1997, Mexico 1994, Russia 1998 and Turkey 2000. For reference, cases for macroeconomic indicators in the year (t) of the crises over the thresholds at Table A of APPENDIX were budget balance-to-GDP (-6.6%), external debt-to- exports (391.1%), external debt-to-GDP (52.2%), short-term debt-to-foreign reserves (107.7%) and debt service ratio (49.3%) in the Argentina 2001 external debt crisis; budget balance-to-GDP (-10.6%), foreign reserves to cover imports (0.2 months) and public debt-to-GDP (144.9%) in the Greece 2010 fiscal crisis; external debt-to-exports (206.9%), external debt-to-GDP (63.1%) and short-term debt-to- foreign reserves (187.9%) in the Indonesia 1997 financial crisis; foreign reserves to cover imports (1.4 months) and short-term

debt-to-foreign reserves (262.8%) in the Korea 1997 financial crisis; foreign reserves to cover imports (0.8 months) and short-term debt-to-foreign reserves (610.5%) in the Mexico 1994 financial crisis; inflation (87.7%), budget balance-to-GDP (-4.6%), foreign reserves to cover imports (1.3 months), external debt-to-exports (201.8%), external debt-to-GDP (62.9%) and short-term debt-to-foreign reserves (124.4%) in the Russia 1998 fiscal crisis; inflation (54.8%), budget balance-to-GDP (-11.5%), external debt-to-GDP (58.4%), short-term debt-to-foreign reserves (128.6%) and debt service ratio (36.1%) in the Turkey 2000 financial crisis.

Looking at the macroeconomic indicators to evaluate country/sovereign risks at Table 1, function (1) and Table A of APPENDIX, it is of course possible that the indicators cannot include all variables. Furthermore, country/sovereign risk evaluation entities have assessment methods generally in secret so that detailed methodology or function such as incorporating process into classification outcome could not have been made public. In reality, all variables cannot be reflected into methodology to forecast economic crises, and macroeconomic indicators cannot be measured easily and precisely before the crises.

Ⅲ. Empirical Data Analysis

The IMF is a representative international organization with financial support on occasions of economic crisis. The IMF has played critical roles to assist depressed counties since the end of World War II, and it has extended emergent bailout credits (*e.g.* Stand-By Arrangements[11], Extended Fund Facilities[12]).

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11) Historically, for emerging and advanced market economies in crises, the bulk of IMF assistance has been provided through Stand-By Arrangements (SBA) to address short-term or potential balance of payments problems.

12) The Extended Fund Facility (EFF) was established to provide assistance to countries: (1) experiencing serious payments imbalances because of structural impediments; or (2) characterized by slow growth and an inherently weak balance of payments position.

Table B of APPENDIX shows lists of countries in economic crises with the IMF credits as Stand-By Arrangements and/or Extended Fund Facilities as of July 31, 2017. Although every country has not been depressed in economic crises, most countries have overcome the crises before any kinds of default through the IMF credits. The nominated years in economic crises reflect 38 cases with bold characters (countries and years) in the column under the economic crises at Table B of APPENDIX (The year of the crisis can be called "t", and therefore one year before the crisis can be called "t-1").

Each 38 cases in economic crises cover 25 countries over the world since the establishment of the IMF. The nominated countries and years in economic crises are selected as Algeria 1991, Argentina 2001 and 2003, Brazil 1998, Chile 1983, 1985 and 1989, Dominican Republic 2003 and 2005, Ecuador 1994 and 2000, El Salvador 1998, Gabon 2004, Greece 2010, Hungary 2008, Indonesia 1997, 1998 and 2000, Ireland 2010, Israel 1974, Korea 1983 and 1997, Lithuania 1994, Mexico 1994, Paraguay 2003, the Philippines 1991 and 1998, Russia 1995, 1996 and 1998, South Africa 1976, Spain 1978, Thailand 1997, Turkey 1999 and 2000, Uruguay 2002, Venezuela 1989 and 1996 based on financial position data of the IMF (Table B of APPENDIX).

〈Table B〉 Countries with the IMF Credits and Economic Crises

Countries	Stand-By Arrangements	Extended Fund Facilities	Economic Crises
Albania		2006 2014	
Algeria	1991 1994	1995	1991
Angola	2009		
Antigua and Barbuda	2010		
Argentina	2000 2003		2001 2003
Armenia, Republic of		2010 2014	
Australia	1961		
Azerbaijan		1996	
Barbados	1982 1992		
Belarus, Republic of	1995 2009		
Belgium	1952		
Belize	1984		
Bolivia	2003		
Bosnia and Herzegovina	2009 2012	2016	

Countries	Stand-By Arrangements			Extended Fund Facilities		Economic Crises		
Brazil	1998	2001	2002			1998		
Bulgaria	2002	2004		1998				
Cabo Verde	1998							
Chile	1983	1989		1985		1983	1985	1989
China	1981	1986						
Congo	1989							
Costa Rica	1993	1995	2009					
Cote d'Ivoire				2016				
Croatia, Republic of	2001	2003	2004					
Cyprus	1980			2013				
Czech Republic	1993							
Djibouti	1996							
Dominica	2002							
Dominican Republic	2003	2005	2009			2003	2005	
Ecuador	1994	2000	2003			1994	2000	
Egypt	1996			1993	2016			
El Salvador	1998	2009	2010			1998		
Equatorial Guinea	1985							
Estonia, Republic of	1996	1997	2000					
Fiji	1974							
Finland	1952	1967	1975					
France	1956	1958	1969					
Gabon	2004	2007		2017		2004		
Georgia	2012	2014		2017				
Greece	2010			2012		2010		
Guatemala	2002	2003	2009					
Honduras	2010	2014						
Hungary	1993	1996	2008			2008		
Iceland	1961	1962	2008					
India	1991			1981				
Indonesia	1997			1998	2000	1997	1998	2000
Iran, Islamic Republic of	1956	1960						
Iraq	2007	2010	2016					
Ireland				2010		2010		
Israel	1974	1975	1976			1974		
Italy	1974	1977						
Jamaica	2010	2016		2013				
Japan	1962	1964						
Jordan	2002	2012		2016				
Kazakhstan, Republic of	1995			1996	1999			
Kenya	2015	2016						
Korea	1983	1985	1997			1983	1997	
Kosovo	2010	2012	2015					
Latvia, Republic of	1999	2001	2008					
Lesotho	1996							
Liberia				2008				

Countries	Stand-By Arrangements	Extended Fund Facilities	Economic Crises
Lithuania, Republic of	2000 2001	1994	1994
Macedonia	2003 2005		
Maldives	2009		
Mauritius	1981 1983 1985		
Mexico			1994
Moldova, Republic of		2016	
Mongolia	2009	2017	
Myanmar	1977 1978 1981		
Netherlands	1957		
New Zealand	1967		
Nigeria	1989 1991 2000		
Pakistan	2008	2013	
Panama	1995 2000	1997	
Papua New Guinea	1991 1995 2000		
Paraguay	1969 2003 2006		2003
Peru	2002 2004 2007		
Philippines	1991 1998	1994	1991 1998
Portugal	1978 1983	2011	
Romania	2009 2011 2015		
Russian Federation	1995 1999	1996	1995 1996 1998
Samoa	1979 1983 1984		
Serbia, Republic of	2009 2011 2015		
Seychelles	2008	2009 2014	
Slovak Republic	1994		
Somalia	1985 1987		
South Africa	1976 1982		1976
Spain	1959 1960 1978		1978
Sri Lanka	2009	2016	
St. Kitts and Nevis	2011		
Sudan	1982 1983 1984		
Suriname	2016		
Syrian Arab Republic	1960 1962 1964		
Thailand	1982 1985 1997		1997
Trinidad and Tobago	1989 1990		
Tunisia	2013	1988 2016	
Turkey	1999 2002 2005		1999 2000
Ukraine	2010 2014	2015	
United Kingdom	1969 1975 1977		
United States	1963 1964		
Uruguay	2000 2002 2005		2002
Uzbekistan	1995		
Venezuela	1960 1996	1989	1989 1996
Vietnam	1993		
Zimbabwe	1998 1999	1992	

Source: IMF, Financial Position in the Fund as of July 31, 2017

The data analysis of this paper focuses on any variation of macroeconomic indicators of one year before and the year in economic crises. It is necessary to differentiate leading variables, coincident variables and lagging variables. Most data present a type of percentages, as in % of GDP; others indicate a volume of data, as in amount US Dollars. In this regard, the data cannot be compared or evaluated directly, which means any kinds of methodology cannot be satisfied sufficiently. Under these circumstances, this data analysis aims to measure change rate (Δ of function (2) and (3)), and the analysis also measures average data by indicator over the 38 cases and 25 countries.

Table C of APPENDIX indicates predicting available data before and contemporary years in economic crises respectively. It means that possibility of economic crises increase proportionately, if an indicator deteriorates before the crises. This paper analyzes change rate of 38 cases of economic crises listed at Table B of APPENDIX rather than econometric model. For reference, data at Table C of APPENDIX present individual change rate versus macroeconomic indicators related to the economic crises. As a result, if change rate (Average t-1 and Average t by 43 indicators, sum of 38 cases of the Table C of APPENDIX) fluctuates more on average, it implies that it influences on the crises more importantly. However, certain data cannot be reflected into the empirical data analysis on account of unavailable or unreliable data. For example, non-performing loans (NPL) ratio as a proxy variable to measure soundness of banking sector predicting economic crises cannot be clear or reliable before and in economic crises in reality. Similar phenomena have happened, looking at the data such as real effective exchange rate, terms of trade, inward portfolio investment and so on, because those data cannot be informed accurately at the proper time of any crisis.

〈Table C〉 Predicting Available Indicators before and in Economic Crises

Indicators t-1/Change Rate(Average t-1)		Indicators t/ Change Rate(Average t)	
gross domestic product (GDP) (m USD)	0.0621	gross domestic product (GDP) (m USD)	-0.0069
GDP *per capita* (USD)	0.0488	GDP *per capita* (USD)	-0.0202
real GDP growth (%)	-0.3906	real GDP growth (%)	0.0458
real GDP *per capita* growth (%)	-0.5663	real GDP *per capita* growth (%)	-0.1869
nominal exchange rate (per USD)	0.1456	nominal exchange rate (per USD)	0.3468
real effective exchange rate	0.0169	real effective exchange rate	-0.0241
domestic saving/GDP (%)	-0.0071	domestic saving/GDP (%)	0.0891
domestic investment/GDP (%)	-0.0059	domestic investment/GDP (%)	-0.0093
government expenditure/GDP (%)	0.0147	government expenditure/GDP (%)	-0.0298
private consumption/GDP (%)	0.0053	private consumption/GDP (%)	-0.0124
foreign reserves (m USD)	0.0334	foreign reserves (m USD)	0.1184
foreign reserves/imports (months)	-0.0068	foreign reserves/imports (months)	0.1158
foreign assets (net) (m USD)	0.0939	foreign assets (net) (m USD)	0.0831
government bond yield	0.0106	government bond yield	0.0725
interest rate (lending)	-0.0208	interest rate (lending)	-0.0177
non-performing loans (NPL) ratio (%)		non-performing loans (NPL) ratio (%)	
Share Prices Index (2005=100)	-0.0314	Share Prices Index (2005=100)	-0.0648
inflation rate (%)	-0.0370	inflation rate (%)	0.1089
industry production growth (%)	0.1104	industry production growth (%)	0.2730
unemployment rate (%)	0.0885	unemployment rate (%)	0.0667
Unit Labour Costs Index	0.0030	Unit Labour Costs Index	-0.0114
labour productivity growth (%)	0.1777	labour productivity growth (%)	0.4339
terms of trade	0.0038	terms of trade	0.0264
current account balance/GDP (%)	0.0883	current account balance/GDP (%)	0.3853
trade balance/GDP (%)	0.1807	trade balance/GDP (%)	0.4884
exports of goods and services (m USD)	0.0653	exports of goods and services (m USD)	0.0760
imports of goods and services (m USD)	0.0385	imports of goods and services (m USD)	0.0094
exports and imports/GDP (%)	0.0060	exports and imports/GDP (%)	0.0471
exports/GDP (%)	0.0221	exports/GDP (%)	0.0749
exports growth (%)	-0.1932	exports growth (%)	0.3390
imports/GDP (%)	0.0240	imports/GDP (%)	0.0224
imports growth (%)	-0.6383	imports growth (%)	-0.4015

Indicators t-1/Change Rate(Average t-1)		Indicators t/ Change Rate(Average t)	
capital and financial account/GDP (%)	-0.3449	capital and financial account/GDP (%)	-0.5116
foreign direct investment (m USD)	0.4454	foreign direct investment (m USD)	0.2561
inward portfolio investment (M USD)		inward portfolio investment (M USD)	
budget balance/GDP (%)	-0.4169	budget balance/GDP (%)	0.1323
public debt/GDP (%)	0.0445	public debt/GDP (%)	0.1338
public interest payments/public revenue (%)	-0.0823	public interest payments/public revenue (%)	-0.0064
external debt/GDP (%)	0.0406	external debt/GDP (%)	0.0952
external debt/Exports (%)	0.0232	external debt/Exports (%)	-0.0052
short-term debt/total debt (%)	0.0431	short-term debt/total debt (%)	-0.0943
short-term debt/foreign reserves (%)	0.0725	short-term debt/foreign reserves (%)	-0.0869
debt service ratio (DSR) (%)	0.0490	debt service ratio (DSR) (%)	-0.0076

The data analysis infers as follows. Firstly, nine indicators with bold characters (indicators and change rate) at Table C of APPENDIX are important to measure economic crises in one year before the crises, such as real GDP *per capita* growth, budget balance-to-GDP, real GDP growth, capital and financial account balance-to-GDP, exports growth, nominal exchange rate (depreciation), unemployment rate, short-term debt-to-foreign reserves and debt service ratio in order in the magnitude of change rate. On the basis of change rate (over six principal indicators, t-1 (Table 2) about real GDP growth, real GDP *per capita* growth, depreciation, exports growth[13], capital and financial account-to-GDP and budget balance-to-GDP were selected before the crises. Secondly, nine indicators such as capital and financial account balance- to-GDP, depreciation, real GDP *per capita* growth, public debt-to-GDP, inflation rate, external debt-to-GDP, government bond yield, unemployment rate and Share Prices Index are available in the year of economic crises as the manner as well. Through the same procedure, six principal indicators, t (Table 2) were selected as real GDP *per capita*

13) Even in euro area, the economic downturn set off export rapidly falling in the beginning of 2008 just before the 2008 Global Financial Crisis.

growth, depreciation, inflation[14], capital and financial account-to-GDP, public debt-to-GDP and external debt-to-GDP[15] in the crises. We could find out that real GDP *per capita* growth, depreciation[16] and capital and financial account-to-GDP were very important both before and in the crises; real GDP growth, exports growth and budget balance-to-GDP deteriorated before the crises; and inflation, public debt-to-GDP and external debt-to-GDP exacerbated conspicuously in the crises.

〈Table 2〉 Selected Principal Indicators before (t−1) and in (t) Economic Crises

Principal Indicators, t-1	Principal Indicators, t
real GDP growth (%), rGDP(t-1)	
real GDP *per capita* growth (%), rGDPc(t-1)	real GDP *per capita* growth (%), rGDPc(t)
depreciation (%), D(t-1)	depreciation (%), D(t)
	inflation rate (%), IR(t)
exports growth (%), E(t-1)	
capital and financial account/GDP (%), CFA(t-1)	capital and financial account/GDP (%), CFA(t)
budget balance/GDP (%), BD(t-1)	
	public debt/GDP (%), PD(t)
	external debt/GDP (%), ED(t)

14) The soundness of macroeconomic policies related to particularly in inflation and current account deficits during the crisis is very important in explaining the severity of the impact in the emerging European economies. Not surprisingly, inflation performance is a significant factor more in explaining cross-country differences in the crisis impact on sovereign bond spreads (IMF 2009).

15) The significant of household debt constitutes a novel feature in European financial crisis, in contrast to the relative greater importance of sovereign debt in Latin American and Russian crises, and corporate debt in the Asian financial crisis (Liu et al. 2013, 5).

16) Prior to sovereign default, real exchange rate depreciation, originated from a sequence of low tradable goods shocks with the sovereign's large share of foreign currency debt, increases the burden of debt service payments and ultimately trigger defaults. In post-default periods, the resulting output costs and loss of market access due to default or restructuring lead to further real exchange rate depreciation (Asonuma 2016b, 1-5).

If economic crises are available to express focusing on economic risk, economic crisis relation with principal macroeconomic indicators based on this empirical data analysis can be epitomized as below a form of function,

$$EC(t) = (\Delta rGDP(t\text{-}1), \Delta rGDPc(t\text{-}1), \Delta D(t\text{-}1), \Delta E(t\text{-}1), \Delta CFA(t\text{-}1), \Delta BD(t\text{-}1)) + (\Delta rGDPc(t), \Delta D(t), \Delta IR(t), \Delta CFA(t), \Delta PD(t), \Delta ED(t)) + \omega \quad (3)$$

Where EC(t) is economic crises, Δ is change rate, calculated in comparison with the data the previous year, ω is another residual error term, and the other notations, e.g. rGDP(t-1) are the same as the expression of indicators at Table 2, given at time (t-1) before the crisis and (t) in the crisis, mainly based on ER(t-1) and ER(t), expressed at function (1), subject to: PR(t) = 0.

Ⅳ. Case Studies of Major Economic Crises

It is necessary to scrutinize aforementioned selected principal indicators if they are workable to explain before and in economic crises. Table D-1 and Table D-2 of APPENDIX show evidences for case studies of simulation with actual data before and in major economic crises of emerging economies. Major seven countries selected to review have been based on representative economic crises of the country and the region respectively, for example, Argentina and Mexico (Latin and North America), Greece and Russia (South and East Europe), Turkey (Middle East), Indonesia and Korea (South and East Asia). In addition, country risk categories under the OECD and S&P of the case studies have been downgraded during their economic crises.[17] Table D-1 of APPENDIX

17) OECD has evaluated with downgrading the country risk categories of Argentina (2001) 6 to 7, Indonesia (1997) 6 to 7, Korea (1997) 1 to 3, Russia (1998) 6 to 7, and Turkey (2000) 5 to 6, whereas S&P has downgraded sovereign risk category of Greece (2010) BBB+ to CC, and Mexico (1994) BB+ to BB (OECD 2017).

gives evidence seven cases of Argentina 2000, Greece 2009, Indonesia 1996, Korea 1996, Mexico 1993, Russia 1997 and Turkey 1999 before the notorious economic crises, and it applies six selected principal indicators, t-1 with real GDP growth, real GDP *per capita* growth, depreciation, exports growth, capital and financial account-to-GDP and budget balance-to-GDP, notified by function (3) and Table 2. Before their crises in reality, real GDP growth and real GDP *per capita* growth in Turkey, Greece and Argentina were depressed; exchange rate of Turkey and Russia was depreciated; exports growth was deteriorated also in Turkey and Russia; budget deficit was severed in Greece, Turkey, Russia and Argentina.

In addition, Table D-2 of APPENDIX also shows seven cases evidence in the economic crises of Argentina 2001, Greece 2010, Indonesia 1997, Korea 1997, Mexico 1994, Russia 1998 and Turkey 2000 respectively, and it also applies six selected principal indicators, t with real GDP *per capita* growth, depreciation, inflation rate, capital and financial account-to-GDP, public debt-to-GDP and external debt-to-GDP, notified by function (3) and Table 2. By selected principal indicators in the crises, real GDP *per capita* growth[18] in Argentina, Greece and Russia was much depressed; exchange rate of Russia, Turkey, Indonesia and Korea was severely depreciated; inflation[19] was double digit in Russia, Turkey, Argentina and Mexico; capital and financial account-to-GDP recorded deficit in Argentina, Russia, Korea and Indonesia; public debt-to-GDP was over 60% in Greece; external debt-to-GDP was deteriorated Russia, Indonesia, Turkey and Argentina.

18) A very good growth level of GDP *per capita* on a linear line is defined as 3% or more a year, while a negative growth level of -3% or less is defined as very bad (OECD 2004, 29).

19) If more than 10%, the evaluation follows a logarithmic pattern; if inflation on a logarithmic function reaches 100%, the probability of default increases (ibid, 27).

〈Table D-1〉 Evidence for Case Studies before Major Economic Crises

	rGDP(t-1)	rGDPc(t-1)	D(t-1)	E(t-1)	CFA(t-1)	BD(t-1)
Argentina 2000	-0.8	-2.1	0.0	12.3	2.8	-3.6
Greece 2009	-3.2	-4.5	5.9	25.7	11.8	-14.5
Indonesia 1996	7.8	6.1	4.2	7.3	4.8	1.2
Korea 1996	6.8	6.5	4.3	4.0	4.5	0.1
Mexico 1993	2.0	0.5	1.0	10.7	8.4	0.5
Russia 1997	0.9	1.0	13.0	-1.9	0.6	-6.1
Turkey 1999	-4.7	-7.9	60.6	-16.2	2.8	-13.0
Average t-1	0.9	-0.4	14.6	7.2	1.6	-4.4

Notes: rGDP=real GDP growth(%), rGDPc=real GDP *per capita* growth(%), D=depreciation(%), E=exports growth(%), CFA=capital and financial account-to-GDP(%), BD=budget balance-to-GDP(%).

〈Table D-2〉 Evidence for Cases Studies in Major Economic Crises

	rGDPc(t)	D(t)	IR(t)	CFA(t)	PD(t)	ED(t)
Argentina 2001	-5.7	0.0	27.7	-5.5	32.4	52.2
Greece 2010	-5.5	5.6	4.7	5.8	144.9	-
Indonesia 1997	0.3	24.2	6.7	-0.3	25.9	63.1
Korea 1997	4.9	18.3	4.4	-2.1	7.1	28.7
Mexico 1994	3.1	8.3	20.4	3.8	18.9	33.3
Russia 1998	-4.8	67.8	87.7	-4.2	42.9	201.8
Turkey 2000	5.1	49.3	54.8	4.3	27.8	58.4
Average t	0.1	34.7	24.7	-1.8	43.3	64.1

Notes: rGDPc=real GDP *per capita* growth(%), D=depreciation(%), IR=inflation rate(%), CFA=capital and financial account-to-GDP(%), PD=public debt-to-GDP(%), ED=external debt-to-GDP(%).

Based on the history of economic crises, severely deteriorated macroeconomic indicators (leading variables) before the Argentina 2001 external debt crisis were capital and financial account-to-GDP, and

deteriorated macroeconomic indicators (coincident variables) in Argentina 2001 with real GDP *per capita* growth, inflation rate, capital and financial account-to-GDP, public debt-to-GDP and external debt-to-GDP respectivel y.[20] For the reason of the crisis, external debt repayment burden deteriorated in comparison with economic volume: external debt-to-GDP (52.2%) in the crisis. In reality, Argentina has introduced Currency Board System, a sort of fixed exchange rate system, since 1999, and Argentina has implemented economic policy of inflation and foreign reserves control, but Argentina had difficulty in keeping export competitiveness of the currency appreciation. As a result, balance of payment of Argentina deteriorated and external debt accumulated not to repay, and finally Argentina declared moratorium January 2002.

As for the Greece 2010 fiscal crisis, deteriorated leading variables were real GDP growth, real GDP *per capita* growth, depreciation, exports growth, capital and financial account-to-GDP and budget balance-to-GDP, and deteriorated coincident variables with real GDP *per capita* growth, depreciation, inflation rate, capital and financial account-to-GDP, public debt-to-GDP and external debt-to-GDP in Greece 2010 crisis. At the end of 2009 before the crisis, budget deficit against GDP reached to 14.5%, which was generally due to corruption of public entities, manipulation of fiscal statistics, and moral hazard including chronic tax evasion behavior. For the reason of the crisis, economic structural problems of less unbalanced industrial structure, lower labor productivity, weaker external competitiveness than those of core countries of the EU membership were fundamentally imminent. Actually, larger external debt at the outset of a crisis tends to extend its duration. Countries with higher levels of initial external debt are likely to endure more extended periods of financial stress because the probability of exiting the crisis state remains low for

20) Exchange rate had not changed due to adoption of currency board system until Argentina abandoned the fixed exchange rate regime in January 2002 in the midst of severe economic and political turmoil (Corbacho et al. 2003, 6-7). However, Real exchange rate moments consistent with in the case of Argentina's default in 2001, a particularly a higher average real exchange rate in post-default period than in pre-default period (Asonuma 2016b, 5).

longer (IMF 2009).

In case of the Indonesia 1997 financial crisis, deteriorated leading variables were real GDP growth, GDP *per capita* growth, depreciation, exports growth, capital and financial account-to-GDP and budget balance-to-GDP. Additionally, deteriorated coincident variables were GDP *per capita* growth, depreciation, capital and financial account-to-GDP and external debt-to-GDP as well. Based on weaken export price competitiveness, financial turbulence and political instability, Indonesia could not cope with exposed external shocks. As a matter of fact, the crisis resulted from weaker external competitiveness and balance of payment, increased capital market volatility, rigid exchange rate system and appreciation of the currency, lower profitability of corporate and insolvency of banking sector. In the middle of the crisis, overheating assets in real estate and increasing short-term private debt triggered external debt repayment burden.

In case of the Korea 1997 financial crisis, deteriorated leading variables were real GDP growth, real GDP *per capita* growth, depreciation, exports growth and budget balance-to-GDP, and deteriorated coincident variables were the same as the leading variables except for capital and financial account-to-GDP, even though inflation rate was improved compared to previous year. In particular, international trade position including capital and financial account has deteriorated resulting in rapid depreciation of exchange rate despite sound macroeconomic fundamentals. Additionally, the IMF analyzed the 1997 Asian financial crisis stressing impact of wide swings of the yen/dollar exchange rate since the early 1990s on the adverse effects on the export competitiveness and terms-of-trade shocks of the crisis countries (Kochhar et al. 1998, 5-6).

In Mexico 1994, leading variables before the financial crisis were real GDP growth, real GDP *per capita* growth, depreciation and budget balance-to-GDP, and coincident variables with depreciation, capital and financial account-to-GDP, public debt-to-GDP and external debt-to-GDP. At that time, short-term debt was 143.3% before the crisis and 610.5% in the crisis respectively against foreign reserves which covered less than

one month of import payment. However, Mexico has not managed well foreign reserves and external debt, and already experienced sovereign debt default in August 1982 earlier than the 1994 financial crisis. Finally, the sovereign debt problems of Mexico have been solved through the Baker plan (liquidity support by bailout credits) in advance, and the Brady plan (reduction of debt repayment) later.

In Russia, deteriorated leading variables were depreciation and exports growth, and deteriorated coincident variables with GDP *per capita* growth, depreciation, inflation rate, capital and financial account-to-GDP, public debt-to-GDP and external debt-to-GDP in the 1998 fiscal crisis. While Russia has transformed Soviet social economic system into capitalism since 1991, Russia could not introduce capitalism sufficiently and inherently, which exposed to external shocks. After rapid drop of international oil price, budget revenue and current account deficit deteriorated, and finally foreign capital leaked to repay insufficiently short-term debt resulting in request bailout toward the IMF July 1998 and declaration of moratorium August of the year. The indicators of budget balance-to-GDP (-6.1%) before the crisis, and inflation rate (87.7%) and external debt-to-GDP (62.9%) in the crisis demonstrate the situation.

Lastly, the case of the Turkey 2000 financial crisis, real GDP growth, real GDP *per capita* growth, depreciation, exports growth and budget balance-to-GDP were deteriorated before the crisis, and depreciation, public debt-to-GDP and external debt-to-GDP were deteriorated in the crisis. Turkey was fundamentally exposed to weak economic structure, high inflation with vicious circle, accumulated current account deficit and chronic budget deficit. Furthermore, there were severe problems of rapid increasing speculation finance into the local market and irrational borrowing by financial institutions before the crisis. Macroeconomic indicators at that time demonstrate budget balance-to-GDP (-13.0%) before the crisis, and inflation rate (54.8%) and external debt-to-GDP (58.4%) in the crisis.

Ⅴ. Policy Implications

There have also been many arguments on economic crises whether crises are possible to be predicted, and whether they can take place repeatedly. The IMF has analyzed sovereign debt default probability in which the equilibrium probability of default for a given debt-to-GDP level is weakly increasing with the number of past sovereign defaults, consistent with empirical observations (Asonuma 2016a, 4-36). It means that probability of default increase in the countries with much more experience, and the OECD country risk assessment model also focuses exclusively on payment experience with ECAs.

Recently, the Fed has changed its monetary policy from QE to QT since May 2015 and started to increase the policy interest rate since December 2015. Looking at historical experience of economic crises, the rapid increase of policy interest rate often triggered any kinds of economic crises, e.g. 1982 Mexico external debt crisis[21] after high interest rate in 1979 in the Fed chairmanship of Paul Volker (1979-1987), 1997 Indonesian financial crisis after increase of policy interest rate in 1994 arranged by Alan Greenspan (1987-2006). Furthermore, the Fed is going to increase policy interest rate steadily, apart from comparatively long run low interest level in the Fed chairmanship of Ben Bernanke (2006-2014) as well as Janet Yellen (2014-current) since December 2008 to get over the Global Financial Crisis.

Backward empirical economic crises, as any country endows stronger macroeconomic fundamentals without sovereign default, then greater sustainable economic development. In general, sovereign defaults events are much associated with deep recession and negative effects on economic development.[22] On the other hand, as the Fed is going to

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21) The rise in US interest rates initiated capital outflows, which aggravated by maturity and currency mismatches in public-debt management (Kalter et al. 1999, 3-4).

22) The observations of Levy-Yeyati and Panizza (2006) show that default events coincide with large GDP drops in an event analysis for 39 developing countries covering the 1970-2005 period. In addition, Tomz and Wright (2007) have studied

increase policy interest rate, it is inevitable to follow to increase policy interest rate of emerging economies vulnerable to external shocks. When policy interest rates on sovereign debt reach their peak, GDP hits its trough and sovereign defaults occur simultaneously, e.g. 1929 Great Depression. Unless a measure or a policy works well on the markets, any country can be exposed to capital flight and exchange rate fluctuation astatically. In particular, if large depreciations are contradictory, and access to international credit is lost, a default tends to take place in emerging economies.[23)]

For reference, this paper tries to consider macroeconomic indicators in order to predict economic crises, and it tends to explain structural problems of macroeconomic phenomena. In addition, this paper has also much more focused on macroeconomic empirical data analysis rather than such arguments as probability of forecasting economic crises, reiterated breakout phenomena of the crises, contagion effect of economic crises, asset bubbles of capital markets, and so on. There is a presumption that deteriorated selected principal indicators suggested in function (3) and Table 2; leading variables and coincident variables could explain considerably probability of any kinds of economic crises.

Table E-1 of APPENDIX diagnoses current conditions (assumption of t-1=2016, t=2017) of five countries (Argentina, Indonesia, Mexico, Russia and Turkey), and Table E-2 of APPENDIX shows another cases with current conditions (assumption of t-1=2016, t=2017) of three countries (Iraq, Ukraine and Venezuela). Both tables apply nine selected principal indicators into sample cases whether or not any country is in a situation of economic crises. Looking at Table E-1 of APPENDIX, countries of indicators were problematic as follows; Argentina and Russia of real GDP growth (t-1) and real GDP *per capita* growth (t-1), Argentina and Mexico of depreciation (t-1), Turkey of depreciation (t), Argentina of inflation rate

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defaults from 1820 to 2004 and have found the maximum default frequency when output is at least 7 percent below trend (Mendoza et al. 2011, 3).

23) This is consistent with the behavior of credit rating agencies, which downgrade a country following a currency crisis, recognizing the increased probability of default (Kruger et al. 2004, 7).

(t), Indonesia, Mexico, Russia and Turkey of exports growth (t-1), Argentina and Russia of budget balance-to-GDP (t-1), Mexico, Russia and Turkey of external debt-to-GDP (t). In fact, Argentina and Russia were in a situation of economic crises in 2016 (t-1)[24], the other cases were not clear in the situation. Another sample case of possible economic crises at Table E-2 of APPENDIX represents current conditions whether or not the countries to be analyzed in a situation of economic crises. Venezuela of real GDP growth (t-1) and real GDP *per capita* growth (t-1), Iraq and Venezuela of real GDP *per capita* growth (t), Ukraine and Venezuela of depreciation (t-1), Venezuela of inflation rate (t), Iraq, Ukraine and Venezuela of exports growth (t-1), Iraq and Venezuela of budget balance-to-GDP (t-1), Iraq and Ukraine of public debt-to-GDP (t), Iraq, Ukraine and Venezuela of external debt-to-GDP (t). Particularly, Venezuela was severely in situation of economic crises in as well 2016 (t-1) as 2017 (t), while debt repayment burden is also concerned about Iraq and Ukraine in 2017 (t)[25].

〈Table E–1〉 Diagnosing Economic Crises for Emerging Economies

	Argentina		Indonesia		Mexico		Russia		Turkey	
	t-1	t	t-1	t	t-1	t	t-1	t	t-1	t
real GDP growth (t-1)	-2.2		5.0		2.3		-0.2		3.2	
real GDP *per capita* growth (t-1,t)	-3.4	1.1	3.7	3.8	1.2	1.1	-0.2	1.8	1.5	1.7
depreciation (t-1, t)	59.9	12.1	-0.6	0.4	17.7	-12.0	-10.0	-12.9	11.0	17.7
inflation rate (t)		26.9		4.0		5.9		4.2		10.9
exports growth (t-1)	51.8		-2.3		-0.9		-13.4		-4.5	
capital and financial account/GDP (t-1,t)	0.3	..	-0.0	..	0.5	..	1.8	..	0.4	..
budget balance/GDP (t-1)	-5.8		-2.5		-2.9		-3.7		-2.6	
public debt/GDP (t)		49.4		28.2		54.8		17.4		35.8
external debt/GDP (t)		33.7		32.1		41.1		36.0		67.2

Notes: t-1=2016, t=2017.

24) Feasible reasons: Argentina with dispute the IMF; Russia due to economic sanctions

25) Incumbent risk factors: Iraq of Civil war entangled with Islamic States; Ukraine of War against Russia in Donbas region; Venezuela due to decrease of oil revenue and price

〈Table E-2〉 Sample Cases of Economic Crises

	Iraq		Ukraine		Venezuela	
	t-1	t	t-1	t	t-1	t
real GDP growth (t-1)	11.0		2.3		-16.5	
real GDP *per capita* growth (t-1,t)	8.1	-3.3	2.6	3.5	-19.6	-9.0
depreciation (t-1, t)	1.3	0.8	17.0	3.2	47.5	7.8
inflation rate (t)		2.0		12.8		652.7
exports growth (t-1)	-10.9		-1.3		-26.3	
capital and financial account/GDP (t-1,t)	..	..	0.2	..	0.1	..
budget balance/GDP (t-1)	-14.1		-2.4		-14.6	
public debt/GDP (t)		63.8		91.4		17.3
external debt/GDP (t)		45.9		133.3		67.3

Notes: t-1=2016, t=2017.

From a policy perspective, economic crises should be managed with sound macroeconomic fundamentals, invulnerable to external shocks (e.g. rapid increase of policy interest rate triggered by the Fed); otherwise, any country is inevitable to face any kinds of economic crises. As mentioned above, principal macroeconomic indicators such as real GDP growth (per capita) growth, exchange rate (depreciation), exports, capital and financial account and budget deficit are to be controlled and monitored with attention particularly before the crises. If any country cannot help coping with economic difficulties in the periods of economic crises, the country should overcome and improve principal macroeconomic indicators such as deteriorated GDP growth *per capita* growth, overestimated exchange rate (fluctuated depreciation), high inflation, capital and financial account deficit (capital flight), public debt and external debt burden to pay in the crises.

Although it is natural that a variety of variables to evaluate economic crises are to be considered, macroeconomic indicators selected on this paper involve meaningful implications of economic management and risk prevention. In reality, since all of economic crises cannot be illustrated to review, this paper has much focused on similar patterns rather than dissimilar patterns of special factors in a country, based on

country/sovereign default events. Therefore, this paper tries to infer similar pattern of the crises historically, and to select common factors of economic crises. This paper concludes as follows; it is essential to well sustain real GDP growth and exports before economic crises, and to control inflation and exchange rate even in the economic crises as the aforementioned arguments by Feldstein (2003), Frenkel et al (2004) and Manasse et al (2005). For risk management of balance of payments, capital and budget deficit should be managed to prevent and overcome the crises as well as the arguments by Goldstein (1998), Feldstein (2003) and Reinhart et al (2009). If not, debt structure has deteriorated to trigger severe crises.

In the perspectives of practical approaches, this paper implies two main arguments. Firstly, sustainable economic growth through exports is very critical in emerging economies. Like developed economies, emerging economies should manage potential growth capacity and develop growth engine with industrial innovation. Secondly, emerging economies should reinforce economic fundamentals and structure against economic crises. Emerging economies generally tend to be more exposed to external shocks compared to developed economies, and it is highly possible economic crises in emerging markets historically. Hence, principal indicators such as inflation, exchange rates, budget and capital balance, and public/external debt should be managed continuously and systematically for sustainable development and growth in emerging economies.

References

Ahuja, Ashvin, Murtaza Syed, and Kevin Wiseman. 2017. "Assessing Country Risk-Selected Approaches-Reference Note." IMF Technical Notes and Manuals: TNM/17/08, 5-9.

Asonuma, Tamon. 2016a. "Serial Sovereign Defaults and Debt Restructurings." IMF Working Paper: WP/16/66, 4-36.

Asonuma, Tamon. 2016b. "Sovereign Defaults, External Debt, and Real Exchange Rate Dynamics." IMF Working Paper: WP/16/37, 1-5.

Corbacho, Ana, Mercedes Garcia-Escribano, and Gabriela Inchauste. 2003. "Argentina: Macroeconomic Crisis and Household Vulnerability." IMF Working Paper: WP/03/89, 6-7.

Feldstein, Martin. 2003. *Economic and Financial Crises in Emerging Market Economies*. London: The University of Chicago Press.

Frankel, Jeffrey A. and Andrew K. Rose. 1996. "Currency Crashes in Emerging Markets: An Empirical Treatment." NBER. International Finance Discussion Papers: No.534, 2-3.

Frenkel, Michael, Alexander Karmann and Bert Schotens. 2004. *Sovereign Risk and Financial Crises*. Berlin: Springer.

Goldstein, Morris. 1998. *Asian Financial Crises: Causes, Cures, and Systemic Implications*. Washington, DC: Institute of International Economics.

IMF. 2004. "Debt-Related Vulnerabilities and Financial Crises - An Application of the Balance Sheet Approaches to Emerging Markets." http://www.imf.org/en/publications/policy-paper/issues/2004/07/01 (downloaded 13 December 2017).

IMF. 2009. "Regional Economic Outlook: Europe-Addressing the Crisis." http://www.imf.org/en/publications/REO/EU/Issues/2017/01/07/Regio9nal-Economic-Outlook-Europe (downloaded 20 December 2017).

Kalter, Eliot and Armando Ribas. 1999. "The 1994 Mexican Economic Crisis: The Role of Government Expenditure and Relative Prices." IMF Working Paper: WP/99/160, 3-4.

Kochhar, Kalpana, Prakash Loungani, and Mark R. Stone. 1998. "The East

Asian Crisis: Macroeconomic Developments and Policy Lessons." IMF Working Paper: WP/98/128, 5-6.

Kruger, Mark and Miguel Messmacher. 2004. "Sovereign Debt Defaults and Financing Needs." IMF Working Paper: WP/04/53, 7.

Krugman, Paul. 2009. *Return of Depression Economics and the Crisis of 2008*. New York: W.W. Norton.

Lie, Yan and Christoph B. Rosenberg. 2013. "Dealing with Private Debt Distress in the Wake of the European Financial Crisis." IMF Working Paper: WP/13/44, 5.

Manasse, Paolo and Nouriel Roubini. 2005. "Rules of Thumb for Sovereign Debt Crises." IMF Working Paper: WP/05/42, 21.

Mendoza, Enrique G. and Vivian Z. Yue. 2011. "A General Equilibrium Model of Sovereign Default and Business Cycles." IMF Working Paper: WP/11/166, 3.

OECD. 2004. "Manual for the Country Risk Assessment Model." Paris: OECD, 27-29.

OECD. 2010. *Export Credit: Arrangement on Officially Supported Export Credits, Country Risk Classification*. Paris: OECD, 13.

OECD. 2017. "Country Risk Classifications of the Participants to the Arrangement on Officially Supported Export Credit." http://www.oecd.org/trade/xcred/cre-crc-historical-internet-english.pdf (downloaded 31 December 2017)

Reinhart, Carmen M. and Kenneth S. Rogoff. 2009. *This Time Is Different: Eight Centuries of Financial Folly*. New Jersey: Princeton University Press.

국문요약

신흥경제권의 경제위기 예측을 위한 중점 평가요인에 관한 분석

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역사적으로 글로벌 경제위기는 신흥경제권에 적지 않은 영향을 미쳤다. 그러나 경제협력개발기구(OECD), 스탠더드앤드푸어스(S&P), 무디스(Moody's) 등 주요 신용평가기관의 국가위험(또는 정부채권위험) 평가체계는 경제위기 예측에 미흡하다는 평가다. 이에 본 연구는 1974~2010년에 국제통화기금(IMF)으로부터 긴급 구제금융(차관)을 지원받은 38건의 경제위기 사례를 대상으로 실증통계분석을 통해 위기발생 직전의 선행변수와 위기진행중의 동행변수를 선정해 보았다. 그 결과, 위기발생 1년 전에 악화된 선행변수는 (1인당)경제성장율, 환율(통화가치 하락), 수출증가율, 자본수지/GDP 및 재정수지/GDP이었으며, 위기발생 연도에 악화된 1인당 경제성장률, 환율(통화가치 하락), 인플레이션(물가 상승), 자본수지/GDP, 공적채무/GDP 및 총외채/GDP가 동행변수로 분류되었다. 또한, 신흥경제권의 주요 경제위기 발생사례(2001년 아르헨티나 외채위기, 2010년 그리스 재정위기, 1997년 인도네시아 외환위기, 1997년 우리나라의 외환·금융위기, 1994년 멕시코 외환위기, 1998년 러시아 재정위기, 2000년 터키 와환위기)에 대해서도 검증(시뮬레이션)해 보았다. 신흥경제권의 경제위기 예측을 위한 중점 평가요인(선행변수 및 동행변수)에는 국가간 차별적 요인이 모두 고려되지 않았으나, 경제위기를 예방하고 관리하는 데 중요한 시사점을 발견할 수 있었다. 즉, 신흥경제권의 지속가능한 성장을 위해서는 수출 등을 통한 경제성장 잠재력과 동력을 혁신적으로 제고하고, 물가, 환율, 재정, 채무 등에 대한 체계적인 관리가 더욱 요구된다.

주제어: 국가위험, 신흥경제권, 경제위기, 중점 평가요인, 실증통계분석

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