Euro Zone Crises: A Review of Literature

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Abstract

The euro crisis is sparked by the US subprime crisis 2007-08. Greece is the first country to feel the effect of crisis like situation in aftermath of US crisis. Then the crisis diffused in other nations of Eurozone collectively known as PIIGS nations. These five PIIGS nations (Portugal, Ireland, Italy, Greece and Spain) were severely affected by the crisis. The story did not end here. the crisis then spread to other economically linked countries like BRIC nations. BRIC nations (Brazil, Russia, India and China) share a strong economic and cultural link with Eurozone countries. The contagion effect of crisis on them is much obvious. The present paper tries to find out the exact year of structural breaks in different economic variables in both set of countries, i.e. in PIIGS and in BRIC nations. This will enable us to spot out the origin years of crisis in both PIIGS and BRIC nations.

Keywords: Euro Zone Crises, Models, Contagion Effects, Economic Variables, Financial Variables, Social Variables

JEL Code: D53, E24, H63

INTRODUCTION

A lot of study has already been done in the area of Eurozone sovereign debt crisis covering its different aspects like causes, reforms undertaken, effects of crisis on different economies, success of Economic and Monetary Union (EMU), convergence in the EMU, contagious effects of crisis, success of euro as a common currency and so on. In the present

part of literature review we tried to incorporate maximum empirical as well as theoretical literature in context of Eurozone crisis. It consists different estimators used to analyses various aspects of the crisis covering from origin of the crisis to labour market reforms, determinants of sovereign bond spreads, crisis channelization, economic integration, empirical methodology adopted in various studies related to Eurozone crisis and so on.

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The review of literature is done in two parts namely:

- i) Literature Review of Empirical papers.
- ii) Literature Review Related to Underlying Variables of Crisis

LITERATURE REVIEW OF EMPIRICAL PAPERS

Literature Review of empirical papers consists of various Methodology adopted by various researchers so far. Like Panel Corrected Standard Error, Feasible

Generalised Least Square Estimates, Ordinary Least Square etc. this section also consist of Literature Review Related to Use of Principal component Analysis in Context of Euro crisis, adopted to study different aspects of Euro-crisis. The details of 30 papers is summarized in Table 1. Table 1 summerized various dependent and independent variables used, frequency of data, time period of data, the methodology adopted along with the conclusion of the research papers.

Table 1 : Empirical Literature Review

S. No.	Study	Empirical Model and Method	Dependent Variable	Independent Variable	Conclusion
1.	Arghyroua and Kontonikas (2011)	OLS-HAC and Fixed-effects panel data model estimated using Generalised Least Squares (GLS)-based cross-section weights	Monthly 10-year government bond yield spread in relation to Germany for ten euro-area states	Spread (t-1), Real effective exchange rate, CBOE Volatility Index, expected gross debt differentials, 10-year Greek government bond yield spread relative to Germany, expected budget balance, vector of additional explanatory variables: liquidity, and a proxy for the state of business cycle (output growth differentials)	The study did not find considerable speculation effect initiating from CDS market. Greece is found to generate contagion effect of crisis to other European countries and from November 2009 the market expectations become specific to country rather than the whole zone.
2.	Adascalitei and Morano (2015)	OLS-PCSE, GLS and negative binomial regression model (NBRM)	Unemployment and employment rates	Tax Rate, Inflation (difference), Country Dummies, Year Dummies, Gap Growth, Trade Openness, GDP Growth, Reform Stance, GDP per Capita and Government Net Debt	The study concludes the negative effect of deregulation on employment as it declines employment rates in both developing and developed nations after its execution. Also it conveys that the reforms were inclined to relaxing labour

S. No.	Study	Empirical Model and Method	Dependent Variable	Independent Variable	Conclusion
					regulation in developed states and inclined to increase workers' protection in developing countries.
3.	Heimberger, Kapeller and Schütz (2016)	OLS-PCSE	Non-accelerating inflation rate of unemployment	Gross unemployment benefit replacement rate, Change in the inflation rate; long-term real interest rate, employment protection legislation, net unemployment benefit replacement rate, housing boom/bust proxy, total factor productivity, active labor market policies, trade union density, tax wedge, minimum wage, terms of trade shock and capital accumulation	NAIRU is not a good substitution for structural unemployment.
4.	Alessandrini et al. (2012)	PCSE corrected for heteroscedasticity, disturbances contemporaneously correlated across panels and, within panels, first-order autocorrelation-Panel Specific AR(1)	Yields on 10-year government bonds of PIIGS and Germany from 2007 to the end of March 2012	Global risk aversion, Primary balance, Public Debt, Inflation, Labor productivity, growth, Bid-Ask, Trade balance, Liabilities to German banks, Post 2010 (0,1), Greece x Post 2010, PIIS x Post 2010 and Liabilities to German banks	The study finds fiscal irresponsibility of south Eurozone countries and current account imbalances between north and south Eurozone countries. both as the reason quite responsible for the crisis eruption and broadening the gap of sovereign spreads among Eurozone nations.
5.	Albonico, Paccagnini and Tirelli (2015)	The model is log-linearized across its steady state and assessed with Bayesian estimation of DGSE (Dynamic stochastic general equilibrium) model	Output growth	Various supply and demand shocks. Supply shocks contain standard temporary technology shocks and shocks to the productivity growth trend. Demand shocks contain a "risk premium" shocks, standard investment-specific shock, and shocks to the households subjective discount factor	The irregularities between core and peripheral Eurozone countries arise with the onset of the Eurozone crisis in 2010
6.	Brutti and	Poisson pseudo-	Position of	Proxy for Crisis, which	In Eurozone countries

S. No.	Study	Empirical Model and Method	Dependent Variable	Independent Variable	Conclusion
	Sauré (2014)	maximum-likelihood (PPML) estimator	sovereign debt supplied by borrower nation and received by the banks of creditor nation at time t.	equals one if the debtor nation is in crisis and zero otherwise, variable Own is taken as one if the lending country is same to the borrower country and zero otherwise, the percentage change of domestic banks' positions of local debt as states enter the crisis	severely affected by the crisis have seen the episode of the repatriation of debt utterly and sovereign debt becomes victim of the repatriation of debt more intensely than private debt.
7.	Prochniak and Wasiak (2016)	1. Barro regression (Barro and Sala-i-Martin 2003), but because of auto-regression and endogeneity the analysis has moved on another estimator. 2. Instrumental variables methodology can be employed or normally the generalized method of moments. Study uses Blundell and Bond's GMM system estimator (Blundell and Bond 1998) of dynamic panel data growth regressions.	Growth rate of real GDP per capita at purchasing power parity (PPP)	Financial sector development (stability) variable (calculated by domestic credit provided by financial sector, market capitalization of listed companies, Initial log GDP per capita level, Bank nonperforming loans, turnover ratio of stocks traded, bank capital to assets ratio, and the monetization ratio) and the squared form of Financial sector expansion	The study affirmatively substantiated its hypotheses of non-linear relation between economic growth and financial arena growth, negative relation between GDP dynamics and extremely large dimension of financial system and confirms development of new insights of the nature of the association between economic growth and financial system.
8.	Bratis, Laopodis, and Kouretas (2014)	OLS Rigid	Bond spreads (nation's 10 year yield less an symbolic risk free rate)	German 10 year bond spread to Estonia, the Irish current account to GDP ratio, the Irish target repo rate spread to 3 month Irish t-bill, and the US 10 year spread amid AAA rated companies and 10 year t-bill.	It verified presence of moral hazard in macroeconomic level in context of sovereign debt market. The study has taken starting of the Eurozone financial crisis on November 2008 with the starting of Irish baking crisis and considers onset of EMU debt crisis from November 2009.
9.	Grauwe and Yuemeiji (2013)	Fixed Effect Model	Interest rate spread of nation	Current account position, Debt to GDP ratio, the real effective	The common monetary union Eurozone has some specifications

S. No.	Study	Empirical Model and Method	Dependent Variable	Independent Variable	Conclusion
				exchange rate, the rate of economic growth, and the fiscal space	which ignited the sovereign debt crisis
10.	Hobolt and Leblond (2014)	Fixed effect estimator with a Prais-Winsten transformation and also PCSE Estimator	Public backing for euro in the Eurozone nations based on data from the Eurobarometer (EB)	US-euro exchange rate, inflation, interest rate, Confidence of Consumer, growth, unemployment, and EU membership a good thing.	In the crisis period the support for euro still remained stable and high within the EMU and the EU is take as better equipped to tackle the crisis situations.
11.	Barrios (2009)	PCSE with AR-1 autocorrelation in disturbance terms founded on the Durbin Watson method	10-year government bond spread (assessed by OLS separately for every PIIGS nation with clustering efficient robust standard errors)	Current Account balance in % of GDP, Debt in % of GDP, Risk aversion indicator (denoted by the summary variable obtained by principal components), Fiscal balance in % of GDP, Debt square, Bid-ask spread, and Interest payment	Country specific variables like sovereign and liquidity risk play a vital role in determination of bond yield spreads during crisis period.
12.	Baccaro and Tober (2017)	Weighted OLS and PCSE	Determinants of German, Italian bilateral trade and Determinants of Australian and Dutch bilateral export differently (1999 to 2014)	1st diff. of log demand 1st diff of log (ULC _c /ULC _p), (man_ULC _c /man_ULC _p) and (GDPD _c /GDPD _p). where; p: partner country, c: specific country and Gross-domestic-product deflator	The study finds out relevance of internal devaluation (real exchange rate depreciation and wage moderation) for the current account balance but does not finds its suitability to solve the crisis.
13.	ÁlvarezFernández et al. (2014)	Panel Corrected Standard Errors (PCSE) Estimator and Estimated Generalized Least Squares (EGLS) Estimator	Quarterly Risk premium (difference between ten-year bond yield of nation in the sample and ten-year German bond yield)	Liquidity Risk (Liquidity Premium), Risk aversion (VIX index, Difference between the yield of the private and public bonds, Short-term Interest rate, Euro-yen ex. rate), Credit Risk (public deficit, sovereign debt and current account balance (in % of GDP)), Macroeconomic Variables (Unemployment and	The deterministic variables of risk premium change over time so the study does not enable us to find out future understanding of behavior of risk premium.

S. No.	Study	Empirical Model and Method	Dependent Variable	Independent Variable	Conclusion
				Inflation), Economic growth (GDP, Industrial Production Index), and Contingent factors (Greek risk Premium, Ex. rate)	
14.	Giordano, Linciano and Soccorso (2012)	Generalised Least Square Estimator	Monthly 10-year yield spreads of ten Eurozone nations (Austria, Belgium, Finland, France, Netherlands and PIIGS) relative to Germany during the period from January 2002 to May 2012.	Fiscal space (Ratio of sovereign debt to tax revenues), External competitiveness (Current Account Balance in % GDP, real effective exchange rate), Global risk aversion is an indicator of international risk, ity (GDP Growth rate, industrial production, Share of country public debt over the total debt outstanding in the euro area at time t.	The study details the contagion element of sovereign spreads since the starting of US crisis (2007-08) and shows that this element explains one third and ten percent of spread dynamics in 2009-10 and 2011 respectively. The study has preferred GLS (Generalised Least Square) estimator to OLS estimator, as the later one is inefficient in presence of autocorrelation.
15.	Ahearne, Schmitz and Hagen (2009)	Contemporaneous cross-sectional correlation, heteroskedasticity, and auto correlation efficient FGLS AR-1 and Prais-Winsten-OLS estimator with PCSE	Trade balance to GDP versus the euro area (intra balance) and versus the rest of the world (extra balance)	Real per-capita GDP “Dummy EMU” “Dummy Non-EMU” “DKSEUK” (equals to one for Denmark, Sweden, and the UK). Control Variables: general government balance in % of GDP and the real price of oil in US\$ and real exchange rate and real per-capita GDP in the EU	Study concluded in increased elasticity of net capital flow between EMU states and EMU with respect to per capita income. It also preferred PCSE estimator than FGLS second one estimator gives overly optimistic for panel size of 10 to 40 time periods.
16.	Nieminen (2015)	Prais-Winsten estimation with PCSE modified for panel-level heterogeneity, a common AR(1) serial correlation and contemporaneously correlated panels	Intra balance and Extra Trade balance	GDP per capita, Fiscal balance, Dependency ratio (aged), Oil price, , Dependency ratio (child), Bureaucracy quality, Real interest rate, Domestic credit by banks, Change in real unit labor costs, Hofstede’s individualism and Change in Target balances	The sophistication of the banking segment influences positively the intra current account balances and negatively the extra current account balances.

S. No.	Study	Empirical Model and Method	Dependent Variable	Independent Variable	Conclusion
17.	Furceri and Zdzienicka (2013)	OLS with serial correlation and panel-specific heteroskedasticity efficient PCSE Estimator	Channels of output smoothing	Capital depreciation, Net international taxes and transfers, International factor income flows, Public and Private Saving and Unsmoothed	The study reveals less effectiveness of risk sharing system in the EMU as compared to US and Germany and its down gradation in the crisis period. It finds out need for a supranational fiscal stabilization system to immune the EMU in recessionary period.
18.	Hanssen (2014)	GLS-with Fixed Effect and OLS PCSE	FDI stocks per GDP	Tax, Growth, Exchange rate, Inflation (lagged), Trade (share of GDP), GDP per capita (log), Total FDI, Motorway per sq.km., Employment, Corruption, and Union density	It finds out significance of institutions, political variables, general activity, infrastructure, economic variables and government output in investors' decision to invest. The study supports PCSE estimator for small time points taken in the sample as OLS and FGLS provide overconfident outcome with underestimated standard errors.
19.	Eichhorst, Feil and Marx (2010)	Fixed Effect Panel Model with (Heteroskedasticity Efficient FGLS, PCSE, Heteroskedasticity and Autocorrelation AR1 Efficient FGLS, Autocorrelation AR1 efficient PCSE)	Lagged Unemployment Rate	Macro Shocks, Labor Market Institutions, Interaction: Shocks-Institutions and Bargaining Coordination	It finds out crisis impacted each of the country among Continental Europe, Anglo Saxon and Southern Europe differently.
20.	Hasaj (2012)	GLS (Generalized Least Square) random effects model and Binary Logistic Model	Debt to GDP – 60% (Maastricht Rule) in GLS Model and Crisis in Logistic Model	Government Effectiveness, Labor Productivity, Gross Savings as % of GDP, Domestic Credit to Private Sector as % of GDP, Index of GDP per person employed, Expense as % of GDP, C = Crisis as an event, 1 if there is Government Debt Crisis, 0 otherwise and Rule of Law	The study reveals that government effectiveness, Public Spending are responsible variables behind debt to GDP ratio (with the help of GLS estimator) whereas; domestic credit and rule of law increases the likelihood of crisis (with the help of logistic model).
21.	Eberhard and Ljungqvist	Fixed effects (FE) and Feasible Generalized	Current account balance (substitute for	REER*EMU, Relative income*EMU,	These two estimators have given different contradictory results.

S. No.	Study	Empirical Model and Method	Dependent Variable	Independent Variable	Conclusion
	(2015)	Least Squares (FGLS)	intra-EU balance of goods trade) in % of nominal GDP	EMU*Crisis Dummy Variables: EMU and Crisis, Economic growth, Net Foreign Asset, Fiscal balance, Oil Trade Balance, Interest rate, Young dependency and Old dependency	On one hand FGLS estimator signals income convergence in EU and EMU; on the other hand the fixed effect estimator denied income convergence. This contradiction made the conclusion part of the study less reliable.
22.	UsóCapella (2015)	OLS	European exports to BRICS in thousands of dollars, European exports of Agricultural Product to BRICS in thousands of dollars and European exports of manufacturing products to BRICS in thousands of dollars	GDP of European nations, GDP of the BRICS countries (importing nations), average distance amid capitals of European countries and the BRICS in kilometers	The income of both European and BRICS nations are positively correlated and the distance between countries' capitals are negatively correlated with the European exports
23.	Ahmad, Sehgal and Bhanumurt hy (2013)	Multivariate DCC-GARCH model, The contagion effects between stock markets of BRIICKS and PIIGS are assessed by evaluating dynamic conditional correlations	Dynamic conditional correlation between stock market returns of BRIICKS with PIIGS, Japan, US and UK	Daily Stock market returns	Italy, Ireland and Spain emerge to be peak contagious for BRIICKS markets in comparison to Greece (among PIIGS nations) and BRICS countries are toughly stroked by the contagion shock during the sovereign debt crisis period taken for the analysis. South Korea and Indonesia are not hit by contagion element of the crisis.
24.	Rengasamy(2012)	Average return and variances of return calculation	Monthly share index returns(%),Stock market volatility (variance) and Student's 't' test	Daily data collected for the beginning and end of the respective months, average stock return and sample size	Overall inference is that BRICS is the rapidest developing, profit making and promising market at the World level
25.	Pereira	i. Johansen co-	Co-integration	Log of daily stock	Each of the BRICS

S. No.	Study	Empirical Model and Method	Dependent Variable	Independent Variable	Conclusion
	(2018)	integration ii. Granger causality test and Vector Error Correction Model (VECM)/Gonzalo-Grangerstatistic and iii. Forecast-error variance decomposition(FEV D)	and causality between various BRICS stock market indices	market index of BRICS nations	nations except China faced financial contagion primarily due to their high degree fragility in the short-run. The contagion effect of US and European crisis has affected BRICS stock market sturdily hence BRICS nations were unable to deliver portfolio diversification.
26.	Fabozzi, Giacometti and Tsuchida (2015)	Principal component analysis and Independent component analysis	Independent Components and Principal Components based on Log returns of CDS spreads	Global stock implied volatility (VIX), Eurozone stock implied volatility (VSTOXX), Stock index of core countries, Eurozone corporate CDS index, Redenomination risk of core countries, Stock index of peripheral countries,, Global sovereign CDS Index, Eurozone financial CDS index, and Redenomination risk of peripheral countries	In year 2009 the source of risk was the global, in 2010 moved to the peripheral specific variables and lastly in 2012 shifted to the Eurozone common specific variables
27.	Guerreiro (2015)	Principal Component Analysis and Regression Analysis	Germany Sovereign Bond Spot rate of two, five and 10 years maturity	France, Italy and Spain Sovereign Bond Spot rate of two, five and 10 years maturity	The convergence within the Euro zone increased with euro and convergence outline is structural in zero coupon yields of Eurozone nations. This convergence diverged after crisis (2008) due to risk aversion of investors, which resulted, into separation of core countries from peripheral countries.
28.	Nordal (2015)	Correlation between Norwegian swap of different maturities, Correlation between euro swap of different maturities and Principal Component Analysis applied on the Norwegian and euro swap market during	Principal component of Norwegian and euro swap market	Norwegian and euro swap of different maturities from one quarter to a decade during 2000 to 2014.	Movements in the euro swap curve is less impulsive than Norwegian swap curve

S. No.	Study	Empirical Model and Method	Dependent Variable	Independent Variable	Conclusion
		(2000 to 2014)			
29.	Ehrmann, Osbat, Strasky and Uusküla (2013)	Exponential GARCH econometric model is employed that take care of non-normality, serial correlation and heteroskedasticity issues of the euro spot exchange rate changes.	Principal component derived out of the euro exchange rate returns versus the main world currencies like the U.S. dollar, the Swiss franc, Japanese yen and the British pound	i) Movements at the EU level and by the ECB, rating notices by the S&P, Fitch, and Moody's ii) Statements of macroeconomic figures. iii) Public declarations by policy makers.	Policy actions at the EU level and by the ECB are among few determining variables of euro exchange rate during crisis period. The paper shows public debate by policy makers affected financial market to less extent and suggested that policy makers should converse prudently in crisis period to avoid unwanted financial market responses.
30.	Badarau and Levieuge (2010)	Principal Component Analysis	Four Principal Components were formed on the basis of eleven variables	Bank Capital/Total asset, Cash and interbank deposits/total assets, Bank profitability, Interest paid/loans, Interest rates on bank loan, non financial corporations, Stock market capitalization/GDP, Outstanding corporate debt securities/GDP, Bank loans to non financial corporations/GDP, Herfindahl Index, Interbank deposits/total liabilities, Bank shares' and Participations/ Total assets	Inside the European Union the bank capital channels are heterogeneous.
31.	Aussenegg, Goetz, and Jelic (2013)	Principal Component Analysis and factor model for bond returns proposed by Fama and French (1993), orthogonal model, augmented orthogonal model and 4-factor orthogonal model	European corporate bond indices	Term risk premium and default risk	The sensitivity of corporate bond returns to default risk altered after the crisis

S. No.	Study	Empirical Model and Method	Dependent Variable	Independent Variable	Conclusion
32.	Neri and Ropele (2013)	Factor Augmented Vector Autoregressive model and Principal Component Analysis	139 Macroeconomic variables	Sovereign Debt Tension Shock	Due to inflated cost of new loan and thus in credit crunch situation the industrial production was negatively affected in core as well as peripheral countries of Eurozone during crisis.
33.	Kolstad (2013)	PCA applied on CDS spreads and Bond Spreads, and regression model used is Classical Linear Regression Model corrected for heteroscedasticity, autocorrelation, multicollinearity and normality of error term	Δ CDS and Δ Bond Spreadsof France, Germany, Greece, Portugal, Spain and Italy	Country Specific Variables: Inflation, Debt/GDP, Private debt/GDP, Government fiscal balance/GDP, Current account balance/GDP, Local stock market return (MSCI index to proxy local equity return), Liquidity, Credit Rating, Political Risk Global Variables: Euro swap rate is used to proxy the risk-free rate, S& P 500 index as proxy for state of the US economy, Volatility and Contagion effect	The CDS market found to have leading role to direct bond market. But the price determination process starts from the bond market and govern the derivatives market.
34.	Angelopoulou, Balfoussia and Gibson (2013)	Principal Component Analysis to find out Financial conditions Indices for Portugal, Ireland, Greece, Spain and Germany	4 Principal Components were derived on the basis of 24 variables	Loans to households (HHs, flows), Spread between interest rates on overdrafts etc and deposits to NFCs, Loans to non-financial corporations (NFCs, flows), Spread between interest rates on consumptions loans and deposits to HHs, Spread between interest rates on other loans and deposits to NFCs, Spread between interest rates on mortgage loans and deposits to HHs, Growth net liquidity provision by Eurosystem, Debt securities issued by NFCs, Net liquidity provision by Eurosystem, Rate of	On financial conditions the influence of monetary policy is not found entirely symmetric across the EMU. The financial states also varied across the euro area and there is disorder in transmitting the monetary policy across the Euroarea.

S. No.	Study	Empirical Model and Method	Dependent Variable	Independent Variable	Conclusion
				change of residential property prices, Debt securities issued by monetary financial institutions, Average spreads on long-term government debt relative to Germany, Rate of change of stock prices, Rate of change of Harmonised Index of Consumer Prices, 3-month - overnight spread, 2-year - 3-month spread, 10-year - 3-month spread, Volatility of stock prices, Volatility of bond prices, Survey question on banks' liquidity position, Survey question on housing market prospects, Survey question on banks' access to market financing, Survey question on consumer creditworthiness and ECB refinancing rate	
35.	Reddy Syamala and Wadhwa (2016)	Principal Component Analysis	6 Principal Components were derived from daily closing stock indices data of 16 different nations	Daily closing stock indices data of Argentina, Australia, India, France, Germany, Hong Kong, Israel, Jakarta, Japan, Malaysia, Mexico, Netherlands, Singapore, Srilanka, UK and US	The pattern of world market is different in pre (1 April 2000 to 1 September 2008) and post crisis (1 September 2008 to 31 March 2015) period. Germany, Jakarta, Malaysia, Israel and Mexico represents best portfolio for Indian investors.
36.	Stracca (2013)	Principal Component Analysis and Pooled Fixed Effect OLS Regression	Equity return, Government bond yields and Exchange rates vs. the euro, Financial equity returns	Euro area debt crisis dummy, Financial equity return, Change in bond yield, Equity return, Country risk factor*crisis event, Trade openness*Crisis event, Exchange rate appreciation vs. euro, Trade and economic link with the euro area*Crisis	Increase in the tendency of global risk aversion and decrease in the equity returns in developed countries as US and UK (contrast to developing countries) are major influences of euro debt crisis. The study finds out major role of trade in

S. No.	Study	Empirical Model and Method	Dependent Variable	Independent Variable	Conclusion
				event, Financial development and openness*Crisis event, Country risk factor (excluding public debt to GDP)*Crisis event, Financial integration with the euro area*Crisis event, Financial integration with the euro area high yield*Crisis event, Trade and economic link with the euro area high-yield*Crisis event, Financial openness*Crisis event, EU non-euro area*Crisis event and Euro peg*Crisis event, Financial development*Crisis event,	transmitting the crisis effect as compared to role of finance in channelizing the crisis effects.
37.	Kappler and Schleer (2013)	To govern the number of dynamic and static factors processes by Bai and Ng (2002) and Bai and Ng (2007) are employed before the dynamic factor model and	Financial Stress Indices (FSIs), Periphery Banking Crisis factor, Stress factor and Yield Curve factor	Interbank Rate Spread, Excess Reserves, Euro bond Spread, Inverse Marginal Lending Facility, TED Spread, Main Refinancing Rate Spread, Short/Long term Debt, Bank lending to Private Sector, Write-offs, Total Assets/Liabilities, Money Market Spread, Bank Stock Market Returns, CMAX/PB and Inverted Term Spread) the Securities Market (Share Price Return, Beta of Banking Sector, Share Price Return Volatility, Corporate Spread and Government Bond Volatility), Corporate Debt Spread, and the Foreign Exchange Market (Foreign Exchange Market Volatility)	Maximum of variation in Eurozone financial segment variables can be described by "Periphery Banking Crisis" factor, a "Stress" factor and a "Yield Curve" factor. The variables responses are different for fundamental shocks to financial markets. Similarly each of the sample country found responding differently to these shocks. The "Periphery Banking Crisis" factor is thoroughly linked to economic sentiments in southern Eurozone area and the "Stress" factor is thoroughly linked to industrial production.
38.	Stefan Armeanu et	Principal Component Analysis and AR(2)	One Principal Component	Stock Exchange Indexes in Bulgaria (SOFIX),	During global financial crisis and Brexit episode

S. No.	Study	Empirical Model and Method	Dependent Variable	Independent Variable	Conclusion
	al. (2016)	GARCH(1,1) model	derived	Hungary (BUX), Poland (WIG20), the Czech Republic (PX), and Romania (BET)	the volatility found statistically significant with different coefficients. The volatility increased during the global crisis and depressed post-Brexit.

Source: Author's Own Study

Literature Review Related to Underlying Variables of Crisis

In this section a details analysis of descriptive papers is summarized in order to indentify various variables which are so far declared as causes of Euro-Zone crises. A summary of 25 descriptive papers is reported in Table 2.

According to Weber (2015) the Eurozone sovereign debt crisis is basically preceded by the US subprime crisis and extreme private debt. The problem with private debt is mainly lying in its allocation. The private debt was not used in productive avenues rather than it was mainly invested in real sector and consumption purposes. The study also elaborated breaches of the Maastricht criteria (public deficit criteria) in pre crisis period by Greece, Portugal and Germany. The study denied structure of Euroarea and public debt as reasons of the crisis. Similarly, Public debt criteria of Maastricht Treaty also breached by many Eurozone nations; such as Belgium, Italy, Greece, Germany and Austria in pre-crisis period. The researcher uttered Euro crisis as a grouping of current account, labour issues, public debt and a growth crisis.

As per Baldwin and Gros (2015) the Eurozone crisis is a balance of payments and a public debt crisis generated mainly due to unnoticed excessive imbalances.

McDonnell (2012) discussed the flaws in the design and implementation of European Monetary as main

cause of the crisis. Maladministration by Eurozone leaders enhanced severity of the crisis. Except Greece case the author expressed Euro crisis as a system crisis.

Visvizi (2012) has described Eurozone crisis as a banking crisis, a growth crisis, a political crisis and a sovereign debt crisis. The basic reason behind Eurozone crisis are internal economic problems of member countries, institutional weakness of EMU and the EU supported economic model lying with micro-level, mezzo level and macro level; respectively.

As per Akala (2017) the basic reasons behind Eurozone crisis is disparities between member states of the Euro-zone due to private and public excessive debt that resulted in high public deficit.

In order to assess reasons of the crisis Beker (2014) divided the whole zone into three parts. The first part consists of those countries whose sovereign debts have been mountedup before 2007. The second group of countries involves those member states whose sovereign debt mounted up after 2007 and the third group involves special cases like Spain. Finally Beker (2014) has concluded that there is no common explanation of crisis and the reasons of crisis are different for different groups made above. In first group of countries the reasons of crisis were debt accumulation, effect of euro on external competitiveness and increased imbalances within the Eurozone.

Orphanides (2014) mentioned the year 2009 as the year of starting the European debt crisis. The study describes incomplete design of Euroarea and Fiscal deficit as the basic reasons of the crisis.

As per Esposito (2014) the US subprime crisis has preceded the European crisis because of dynamics and local factors lying with the Eurozone. Scarcity of harmony into ECB's policy selection related to fiscal and political differences and lack of communication have made crisis more severe.

As per European Economy Series (2009) the main causes of Eurozone sovereign debt crisis were lying in the pre-crisis period. Those causes are low risk premium, excessive liquidity obtainability, ballooned asset prices, high leverage, credit boom and real sector bubble.

Mongelli (2013) tried to evaluate the impact of the Eurozone crisis and to present different dimensions of the crisis. The study found many flaws present with in the zone; which ignited the crisis. Those shortcomings are flaws in the governance and design of Euroarea, increasing current account imbalances, budget deficit, absence of crisis management framework and financial backstop, and weak productivity growth. The crisis was propagated in the entire zone because of credit flows, cross border trade, financial linkages and FDI flow.

According to Corsetti the European crisis expressed its strength in full swing with the widening of interest rate gap between Germany and crisis laden countries. The study elaborated lack of development of EMU in terms of financial, fiscal and monetary set up as root cause of the crisis. Absence of crisis management framework, lack of bail out clause, no prior arrangement for debt restructuring, lack of common fiscal policy, lack of institutional and political cohesion and lack of proper vision required for sustainability of the EMU are described as deficiencies in the development of EMU.

Grauwe (2015) elaborated starting of the Eurozone

crisis after 2010 and suggested formation of a political union as reliable solution to correct out the structural deficiencies of the Eurozone. The study refers Eurozone as not an optimal currency area.

Frankel (2015) stated late 2009 as the time of crisis eruption in Eurozone and elaborated some facts denying Eurozone to be an optimum currency area. The main causes of the Eurozone crisis was described as lack of option of devaluation or autonomous monetary policy, moral hazard and lack of banking supervision.

Gros(2015) described Eurozone crisis as a BOP crisis and a debt crisis. The study mentioned sovereign debt problem erupted in Greece in late 2009 and 2010 as the origin of the Eurozone crisis. The variables which enhanced the severity of the crisis were lack of lender of last resort for member states, lightly capitalized bank, lack of proper system to tackle banking failure and predominance of bank financing. In some countries like Spain and Ireland; domestic real sector boom funded by foreign lending was the root cause of the crisis.

Philip R. Lane(2015) explained the role of euro currency and deep cross border linkages between member countries of Eurozone in the eruption of crisis. Euro as a common currency has facilitated cross border flows and credit booms. The debt inflows were created real estate bubble in Spain and Ireland and on the other hand increased sovereign international liabilities in Greece and Portugal.

Mauro (2015) traced the causes of crisis continuation in the Eurozone and stated that the failure of institutional set up and excessive debt were the reasons of the crisis. The issue of institutional weakness was taken care of partly. The study explained that the crisis continued because of the high public debt is insufficiently handled. In sufficiently tackling the issue of excessive debt there were three main mistakes such as absence of mechanism to tackle sovereign insolvency, lack of mechanism to deal with excessive sovereign debt

and accumulation of debt. The sovereign debt-restructuring framework is completely missing.

Ullah and Ahmed (2014) stated starting of the Eurozone sovereign debt crisis in late 2008 and early 2009 due to triggering forces of the US subprime crisis 2007. The main reasons nurturing crisis variables were the US subprime crisis 2007-12, real estate boom, cross border trade imbalances, imprudent lending and borrowing and no bailout clause to shield Europe from effects of US subprime crisis.

Anand, Gupta and Dash (2012) affirmed that US subprime crisis 2007-08 triggered the Eurozone sovereign debt crisis. The Eurozone crisis transformed in a sovereign debt crisis by 2011 tackling with inability to pay back its cross border creditors. The study established the Eurozone crisis as a unique crisis because of its some unique characteristics like a monetary union without a fiscal union, Varying productivity & structural differences, imprudent cross border lending and complex decision making system in the Euro zone.

According to Nelson, Belkin and E. Mix (2011) investor's sentiments towards Greece ability to payback its debt started tumblingsince 2009 this made Greece at the center place of the upcoming Eurozone crisis. The study reports early 2010 as the starting the European debt crisis. The paper confirmed Greece as the very first EMU country that felt the pinch of market pressure and looked for the financial backing. The reasons behind Greek debt crisis triggered by US subprime crisis was described as overstated data, negligence of following of EU fiscal rules and easy availability of cross border capital due to common currency.

As per Herzog (2012) the reasons behind Eurozone crisis are the current account imbalances, high private deficit, declining competitiveness of countries, unsustainable fiscal policies of member countries, low interest rates (because of common currency euro)that caused private and public debt

accumulation, wage boom andunique institutional setup of the EMU.

In order to get the very basic cause of the Eurozone crisis John Weeks (2014) denied trade deficit, fiscal deficit, public debt and current account deficit as root causes of the crisis. As per the study Germany's export led growth policies commenced since 1990 found to be very basic root cause of the crisis that resulted in trade deficit & current account deficit in Eurozone member countries.

As per Overbeek (2012) the sovereign debt of Eurozone member countries become problematic not because of its excessive quantity but because of high risk premium demand from the investors in the financial markets; in case of lending peripheral nations. As per the paper the reasons of crisis are over accumulation of capital, capitalist nature of the Eurozone that crafted speculations and financialisation, degrading competitiveness, political burdens, influence of bail-out and financial aids, easy availability of fund in pre crisis period and sluggish export growth.

Peter A. Hall (2014) noticed the starting of European sovereign debt crisis in 2008 and elaborated it as crisis of monetary union. The author declared EMU as a political project rather than economic project. The European economic crisis has fuelled political crisis in many countries of the zone. The author elaborated specific causes related to different problematic countries in the zone. Overall, the causes of crisis described are extreme borrowing and lending, flaws with EMU architecture, partperformed by national varieties ofcapitalism and breakdown of the south to reform.

The common currency and its monetary policy were:

Chinn and Frieden (2012) analysed reasons and discussed three possible solutions of the crisis. The reasons of crisis are common currency euro and common monetary policy applied to diversified set of countriesand investors' perception of EMU as

unspoken guarantee of member states' sovereign debt. The discussed solutions of the crisis are collapse of EMU, continuation of austerity measures and transfer to southern European nations from northern European nations.

Hansen and Gordon (2014) described Eurozone crisis as simultaneous, self-reinforcing and overlapping crisis of demography, crisis of weak institutional setup, economic crisis. The authors did not blame

euro currency for the crisis eruption as it facilitates PIIGS nations to ignore underlying economic problems. The main reasons of the crisis are less developed regulatory framework within the zone and imbalances shaped by northern European countries; which resulted in the mounting current-account deficits in southern European nations. Southern European nations became uncompetitive because of credit boom and high wage rate.

Table 2 : Variables of Eurozone Sovereign Debt Crisis

S. No.	Researcher	Variables of Crisis
1.	Weber (2015)	US subprime crisis and extreme private debt
2.	Baldwin and Gros (2015)	Unnoticed excessive imbalances
3.	McDonnell (2012)	Flaws in design of EMU
4.	Visvizi (2012)	Internal economic problems of member countries, institutional weakness of EMU and the EU supported economic model
5.	Akala (2017)	Disparities between member states of the Euro-zone due to private and public excessive debt that resulted in high public deficit
6.	Beker (2014)	No common variables of crisis at the whole Eurozone level
7.	Orphanides (2014)	Incomplete design of Euroarea, Fiscal deficit
8.	Esposito (2014)	Systematic Imbalances as a result of lack of common fiscal and economic policy, Trade Imbalances, Lack of Determination to align economic competitiveness, Easy Access to low cost debt, Common currency Euro, Common Monetary Policy and Social and Human Variables (aging population, low birth rate, longer life time, typecasts for nationalized approaches and identities)
9.	European Economy Series (2009)	Low Risk Premium, Excessive Liquidity Obtainability, Ballooned Asset Prices, High Leverage, Credit Boom and Real Sector Bubble
10.	Mongelli (2013)	Flaws in the governance and design of Euroarea, increasing current account imbalances, budget deficit, absence of crisis management framework and financial backstop, and weak productivity growth
11.	Corsetti (2015)	Lack of development of EMU in terms of financial, fiscal and monetary set up

12.	Grauwe (2015)	Flaws in design of Eurozone, external imbalances, differences in competitiveness, nonexistence of lender of last resort for Eurozone states
13.	Frankel (2015)	Lack of option of devaluation or autonomous monetary policy, moral hazard and lack of banking supervision
14.	Gros (2015)	High public debt, balance of payment imbalances, real sector boom funded by foreign capital flows
15.	Lane (2015)	Euro currency and deep cross border linkages between member countries of Eurozone
16.	Mauro (2015)	Failure of institutional set up and excessive debt
17.	Ullah and Ahmed (2014)	US subprime crisis 2007-12, real estate boom, cross border trade imbalances, imprudent lending and borrowing and no bailout clause to shield Europe from effects of US subprime crisis
18.	Anand, Gupta and Dash (2012)	Monetary union without a fiscal union, Varying productivity & structural differences, imprudent cross border lending and complex decision making system in the Euro zone; all above factors made Eurozone crisis unique
19.	Nelson, Belkin and E. Mix (2011)	Variables responsible for crisis in Greece are overstated data, negligence of following of EU fiscal rules and easy availability of cross border capital due to common currency
20.	Prof. Herzog (2012)	Current account imbalances, Unsustainable Fiscal Policies, high private deficit, declining competitiveness of countries, low interest rates (because of common currency euro) that caused private and public debt accumulation, wage boom and unique institutional setup of the EMU
21.	Weeks (2014)	Germany's export based growth policies
22.	Overbeek (2012)	Overaccumulation of capital, capitalist nature of the Eurozone that crafted speculations and financialisation, degrading competitiveness, political burdens, influence of bail-out and financial aids, easy availability of fund in pre crisis period and sluggish export growth
23.	Hall (2014)	Extreme borrowing and lending, flaws with EMU architecture, part performed by national varieties of capitalism and breakdown of the southern European countries to reform
24.	Chinn and Frieden (2012)	Common currency euro and common monetary policy applied to diversified set of countries and investors' perception of EMU as unspoken guarantee of member states' sovereign debt
25.	Hansen and Gordon (2014)	Less developed regulatory framework within the zone and imbalances shaped by northern European countries

Source: Author's Own Study

CONCLUSION

The paper is an attempt to review the literature in the context of Euro Zone crises done so far. A total of sixty three papers were studied. There are various variables responsible for Euro zone crises and the same can be categorized as economic variables like gross fixed capital formation, financial variables like bond markets and rate bank rate, variables effecting banking sector bad loans, fiscal variables which are outcomes of budget and variables effecting the social structure of the economies like unemployment rate. Various methodologies like PCSE, EGLE, PPML, DGSE, FGLS, NBRM (references Table 1) were used to name a few in modeling the Euro Zone crises. Some studies identifies that US Sub Prime crises are also responsible for Euro zone crises different methodology has been employed to capture the contagion effects like multivariate GARCH model . Review of literature bring out the facts that there were no common variables of crisis at the whole Eurozone level, flaws in the governance and design of Euroarea, Lack of development of EMU in terms of financial, fiscal and monetary set up as a whole were the reasons of crises.

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