The effect of the financial crisis on macroeconomic variables in Iraq, Iran, and Turkey

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Article Info

Abstract

This study investigates the effect of financial crises on macroeconomic variables that include gross domestic product (GDP), export, inflation, and exchange rates, in some developing countries, namely Iraq, Iran, and Turkey, from 1980 to 2017. In doing so, it performed unit root and cointegration tests and employed generalized least square and panel dynamic least squares estimating methods. **Findings/Originality:** The empirical results show that the financial crises affect GDP, export, inflation, and exchange rates of the countries at different levels. While the Asian financial crisis shows a significant negative effect on GDP in Iran and Iraq, the global financial crisis exhibits a negative influence on export in all countries. Nevertheless, both Asian and global crises positively affect inflation because financial crises reduce expenditure at the family and government levels. Thus, governments worldwide attempt to minimize the inflation rate.

Introduction

Since the Great Depression in 1929, the world has faced many financial crises in developed and developing countries, such as the USA, Europe, and Asia. Financial crises largely influence international trade. During the 2008 crisis, banking, mortgage, and insurance sectors were greatly affected, followed by all economic sectors. According to data across 93 countries, the financial crisis resulted in a decrease in the registration of new firms and businesses (Klapper & Love, 2011). Griffith-Jones and Ocampo (2009) believed that the financial crisis that occurred in developed countries negatively affected developing countries.

Macroeconomies involve large sectors of the countries' economies, such as GDP, export, inflation, and exchange rates. Macroeconomic variables and finance were related to stock market returns during the financial crisis (Victor & Kuwornu, 2011). Some sectors are important for national economic growth (Shula, 2017). Export is one of these crucial sectors (Ramli, Nisa, Khan, & Ramli, 2011), while inflation refers to an increase in the price of goods and services, consequently decreasing the value of money (Reddy, 2012). Moreover, the exchange rate positively affects international trade.

During the pre-1990 era, Iraq featured a more advanced economy compared with its neighboring and Arab countries. However, Iraq's agricultural and industrial ability has deteriorated due to wars against Iran and subsequently against the US-led coalition and the

resulting economic sanctions. Currently, the most important sector on which Iraq heavily depends, for revenue, is oil export, since 94.7% of income is from oil exports. Iraq is the 43rd biggest exporter of oil in the world market. Currently, Iraq exports approximately 6.1 million barrels of oil per day. In 2017 Iraq's trade balance was surplus because export revenues exceeded import revenues (OEC, 2019). Inflation has increased from 1990 until 2007 but decreased by 0.18% in 2017. According to the World Bank (2019), the exchange rate of the Iraqi dinar to the US dollar was 0.31 from 1983 to 2002. However, it fluctuated in 2017 approximately by 1184, and the GDP has slightly increased continuously. According to Catalbas (2016), Turkey's exports had notably increased after 1980, which in turn balanced foreign trade. Exports during the period 2000-2002 decreased because of the "Local crisis in the Turkish economy." However, exports continued to increase until 2014. Inflation has fluctuated during (1980-2017), approximately 104% in 1994 and 5% in 2009. The year 2017 recorded the highest exchange rate. The GDP in Turkey has increased until 2013 and subsequently decreased.

Iran also heavily depends on oil for its revenues. Since the last sanction by the USA, oil exports and economic growth have declined rapidly, and the value of its currency decreased quickly (Katzman, 2018). According to Hadinejad, Mohammad, and Shearkhani (2010), the sanctions have negatively affected Iran's non-oil trade. Its GDP and export have also fluctuated. For example, while GDP grew by approximately 7.2% in 1992, export grew by about 30.33%in 2005. Inflation also fluctuated from 1980 to 2017. The highest inflation rate was approximately 49% in 1995, and the lowest was 4.5% in 1985. The exchange rate of IRR1752/US$ almost remained constant for the period 1995-2001. However, it increased in 2002 to nearly IRR7000/US$ and then slightly increased until 2017 (World Bank, 2019).

This study aimed to examine the effect of financial crises on macroeconomic variables, such as GDP, export, inflation, and exchange rate in the developing countries, namely Iraq, Iran, and Turkey. It departs from an observation that in an international context, financial crises have exerted different influences depending on the economic conditions of the country. Similarly, macroeconomic variables react differently during crises. The effect of financial instabilities on different macroeconomic variables has attracted considerable attentions among academics and economists. Therefore, numerous theoretical and empirical studies have investigated such factors in both developed and developing economies (Ari & Cergibozan, 2018; Cecchetti, Kohler, & Upper, 2009; Gilchrist, Schoenle, Sim, & Zakrajšek, 2017; Kamin, 1999). To the best of our knowledge, only a few studies have shown that financial crises bring advantages to a country. By contrast, numerous studies have highlighted their negative effects.

Rashid and Saedan (2014) have analyzed the effect of the 2008 financial crisis on the exchange rate in a PPP–UIP framework in emerging countries that include India, Thailand, Turkey, and Egypt. They collected monthly data from 1981 to 2012. Their findings suggest that the roles of exchange rate determinants were changed due to the crisis effects. The effects of international financial instability varied across countries with diverse economic and social environments. Mouna and Anis (2017) examined the nonfinancial sectors' sensitivity to equity market, interest rates, and the portion of exchange during the financial crisis. These factors were examined in the technology and industry sectors in Germany, Greece, the UK, France, Spain, Italy, the USA, and China from January 2006 to September 2009.

In most cases, equity return, exchange and interest rates showed powerful negative and positive effects during the crisis. Furthermore, "these empirical insights are in most cases of volatility spillovers occurring from market returns to sectoral returns in the industry sector in European economies, though there are also some instances of the interest rate and exchange rate spillovers, both in Europe and in the USA during the crises." Lee (2005) empirically investigated the behavior of asymmetrical price setting on the volatility of the exchange rate from international companies of Korea's remarkable trading patterns. The pass-over elasticity of the

exchange rate in both short and long-term to import prices during the pre-Asian crisis period was smaller than those during the post-crisis period.

Farzanegan and Markwardt (2009) evaluated the effects of oil price shocks on Iran's macroeconomic factors during the post-Iran–Iraq war period. They compared the main results with those from the pre-1989 period, the financial crisis of South East Asia (1998), the terrorist attacks on the USA (2001), and the Iraq war (2003). Positive oil price shocks enhanced the inflow of local currency and real exchange rate, which is one of the conditions of Dutch disease. While the import prices decreased, the export prices increased. Berkmen, Gelos, Rennhack, and Walsh (2012) methodologically analyzed differences in the crisis' effects across 40 emerging countries. The finding shows that the financial exposure, particularly the leverage and accumulation degree of credit development and exchange rate policy, clarify a considerable contributive difference in the changing growth predictions across those economies. For several developing economies, the trade channel appears to be affected. However, countries exporting food were less influenced than developed countries exporting and manufacturing goods. Trade relations played a crucial role in transmitting the crisis, especially to emerging markets.

Yurdakul (2014) determined the macroeconomic factors that might have caused the financial crisis in Turkey from January 1998 to July 2012. The international exchange rate, unemployment rate, interest rate, inflation rate, ISE index, and non-performing loan amount boost the probability of a crisis. Regardless of negative factors, increased money supply, economic growth, and a country's economic well-being lessen the chances of a crisis. However, throughout 2005–2015, Aghighi, Tilehnouei, and Isfahani (2016) examined the exchange rate changes and the inflation influences caused by international financial instability on the financial performance of banks listed on the Tehran Stock Exchange. The adjustment in the exchange rate and the effects of inflation considerably affected the financial performance of listed banks on the Tehran Stock Exchange during the financial crisis. Investors, stockholders, and groups intending to invest in such banks must concentrate on macroeconomic determinants, namely inflation and exchange rate, because of their important influence on banks' financial performance, specifically during financial crises.

Gilchrist et al. (2017) studied the inflation dynamics over the hypothesis of customer markets and the distribution with the assumption of financial markets' lack of friction during current financial crises. The findings indicate that, in response to unfavorable financial or demand shocks, companies are motivated to increase prices due to financial instabilities. Such a response reflects the decision of companies to defend interior liquidity and refine approaching external finance. These determinants strengthen the countercyclical behavior of raise and weaken the reaction of inflation to changes in output. Ari and Cergibozan (2018) investigated the main factors causing the Turkish currency crises during 1990–2014 by using multivariant logit and Markov models. The inflation rate, portfolio investment, and the proportion of foreign banks' deposits are the leading indicators of Turkish currency crises. Before 2001, crisis episodes have originated from local macroeconomic imbalances and frailties. By contrast, currency crises after 2001 were related to external exposures.

The influence of financial crises on economic growth has been extensively studied. Kamin (1999) analyzed the effects and scope of three developing markets' financial crises: the debt crisis of the 1980s, the Mexican financial crisis of 1994–1995, and the Asian financial crisis. The recent crisis is the most prevalent in the current emerging market crises, specifically if the involved countries' GDP, external debt, or trade are measured. The essential features of crisis, quick adaption in the current account, a sharp decrease in output, devaluating currencies, and in many cases, difficulties in banking sectors were extraordinarily similar in the three episodes. Goldstein and Xie (2009) analyzed how the global financial crisis has influenced emerging Asian countries and determined essential features that affect how the economies of these countries

become vulnerable to the crisis originating from developed countries. Asia's financial shocks from 1997–1998 notably contributed to the decline in emerging Asian countries' economic growth compared with the current financial crisis. Korea, Hong Kong, and Malaysia have experienced considerable growth decrease during the crisis. The economic development of India and China has also declined to approximately half their pre-crisis growth. Cecchetti et al. (2009) analyzed 40 frequent financial crises since 2008 and their output costs. GDP growth has been affected negatively and continuously due to several crises in some economies. This consequence results from an instantaneous decline in the actual level of output with a long-term decrease in the growth trend. Following the crisis, the growth trend increased, and the immediate decline was severe and lasted for years for the country to compensate for the decreased output. The recent financial crunch was dissimilar to other expanded range terms of economic determinants.

Another macroeconomic factor extensively affected by financial crises is export. For example, Seyed and Mehdi (2014) investigated a complete correlation between world oil price shocks and global financial instability on the export flows of seven selected East and West Asian countries during 1980–2008. The countries included China, Japan, Iran, Malaysia, Saudi Arabia, South Korea, and Turkey, which are oil-exporting and importing countries. Both financial crises and oil prices showed cross-effects on Asian trade flows in the short-term, whereas this effect could not occur in the long-term. Long-term movements in global oil prices considerably and negatively affect export flows in Iran, Japan, and Korea, but created no effect on the countries under consideration. Adamu (2009) also estimated the impact of the recent international crisis on the Nigerian economy. Given the integration of the Nigerian economy with that of the USA and the UK, such crisis causes a decline in the prices of goods, mainly crude oil, exports, FDI inflow, and a fall in the equity market.

Li, Willett, and Zhang (2012) provided a brief overview of the increasing importance of China in the global economy. They further discussed the spillover influences of international financial crises on the financial markets and macroeconomic determents of China. Contrary to popular belief, the global recession severely struck the Chinese economy. The Chinese economy experienced a large decline in its exports. Liang (2012) examined the causes of international imbalance and the current financial crisis. Both events are firmly correlated and may show prevalent causes. Financial globalization is suggested to contribute to universal imbalances by promoting export-led growth, barring adjustment in the real exchange rate and widening core country's financial deficiency. Moreover, financial globalization causes increasing international financial instability.

By employing multiple indicators–multiple causes, Rose and Spiegel (2012) found distinctive results when they studied the universal financial instability during 2008 on a cross-portion of 107 economies. The crisis occurrence model combines adjustment of 2008 in the exchange rate, country credit ratings, and the equity of the market, including a country's institutional and geographic characteristics. Almost none of the previous determinants appear to be mathematically important factors to the severity of a crisis. The paper could not link the crisis severity to its causes across countries. Aside from a few exceptions, countries that experienced a significant increase in share prices during 2003-2005 likely suffered from the 2008 crisis.

The rest of the paper is organized as follows. Section 2 summarises the literature, and Section 3 presents the methodology, results, and discussion. The last section offers a conclusion.

Methods

This study uses empirical analysis to evaluate financial crisis effects on macroeconomic variables, including GDP, export, exchange rate, and inflation, in Iraq, Iran, and Turkey for the period of 1980 to 2017. To model the relationship between variables, we express a functional form of the model as follows:

$$GDP = f(EP, EC, INF, D1, D2, D3) \tag{1}$$

$$GDP = f(D1, D2, D3) \tag{1.1}$$

$$EP = f(D1, D2, D3) \tag{1.2}$$

$$EC = f(D1, D2, D3) \tag{1.3}$$

$$INF = f(D1, D2, D3) \tag{1.4}$$

Equation (1) can be converted into an econometric model by introducing a drift parameter, the slope of each explanatory variable, and the stochastic error term, as shown in Equation (2).

$$LGDP_t = \beta_0 + \beta_1 LEP_t + \beta_2 LEC_t + \beta_3 LINF_t + D1, D2, D3 + U_t \tag{2}$$

where *LGDP* is the Gross domestic product or economic growth, *LEP* is export, *LEC* is exchange rates, *LINF* is Inflation, *D1* is the dummy variable that represents the Asian financial crisis in 1997-1998. While *D2* is the dummy variable that represents the global financial crisis in 2007-2008, *D3* is the dummy variable that represents the financial crisis that happened in each country, and *U* is a random error term.

Equation (1) can also be converted into an econometric panel model by introducing a cross-sectional unit with each having time series observations as shown in Equation (3):

$$LGDP_{it} = \beta_0 + \beta_1 LEP_{it} + \beta_2 LEC_{it} + \beta_3 LINF_{it} + \beta_4 D1 + \beta_5 D2 + \beta_6 D3 + U_{it} \tag{3}$$

where *i* stands for the cross-sectional unit, and *t* stands for the period.

Results and Discussion

This paper estimates two types of econometric models to examine the effect of financial crises on macroeconomic variables. First, it estimates a time series model using an OLS and an autoregressive distributed lag (ARDL) approaches for Iraq, Iran, and Turkey. Secondly, it estimates a panel estimation model using EGLS and DOLS techniques for Iraq, Iran, and Turkey together as a single group of countries. This study uses secondary annual data from 1970 to 2017. The data are taken from the Data Market, Word Development Indicator, Word Bank Database, Central Bank of Iraq and other scientific sources.

Stationary test (Augmented Dickey-Fuller (ADF))

A stationary series is a key term in a time series analysis. Even though the ARDL approach does not require the pre-testing of variables, the unit root test can indicate whether or not the ARDL model must be used. In this study, the ADF procedure is used to determine the degree of integration of each variable. The test result is reported in Table 1.

Table (1) indicates that all variables with log are stationary in the first difference (intercept and intercept with trend) at the 1%, 5%, and 10% significance levels for Iraq, Iran, and Turkey, respectively.

Co-integration analysis

Tables 2a, 2b, and 2c present the summary of the Johannsen Fisher Panel co-integration test. The trace tests in Table (2) indicate the presence of more than one co-integrating vector at the 5% level for the three countries. This result represents the presence of a co-integration relationship between the variables.

Table 1. Unit root test

Level	Iraq		Iran		Turkey	
Variables	Intercept	Trend	Intercept	Trend	Intercept	Trend
LGDP	0.9190	0.0003*	0.0007*	0.0034*	0.8714	0.2752
Lexport	0.7893	0.5594	0.0735***	0.9963	0.0003*	0.0005*
LExchange Rate	0.7869	0.4908	0.8736	0.3727	0.3122	0.9612
Linflation	0.0649***	0.0829***	0.0045*	0.9417	0.6016	0.6991
First Difference	Iraq		Iran		Turkey	
Variables	Intercept	Trend	Intercept	trend	Intercept	Trend
LGDP	0.0000*	0.0000*	0.0000*	0.0000*	0.0000*	0.0001*
Lexport	0.0000*	0.0001*	0.0007*	0.0005*	0.0000*	0.0001*
LExchange Rate	0.0000*	0.0001*	0.0001*	0.0006*	0.4571	0.1059
Linflation	0.0000*	0.0001*	0.0008*	0.0003*	0.0000*	0.0000*
	Panel Unit Root test): Iraq , Iran and Turkey					
Variables	Level		First Diff.		Level	First Diff.
	Intercept	Trend	Intercept	Trend	None	None
LGDP	0.1143	0.0003*	0.0000*	0.0000*	0.9905	0.0000*
LExport	0.0045*	0.0028*	0.0000*	0.0000*	0.9777	0.0000*
LExchange Rate	0.1553	0.7571	0.0000*	0.0000*	0.0000*	0.0000*
LInflation	0.0631***	0.1805	0.0000*	0.0000*	0.2502	0.0000*

Entries in *, **, *** denote Significant at 1%, 5% and 10% respectively. Diff stands for difference.

Table 2a. Unrestricted Co-integration Rank Test (Trace)

Country	Iraq		Iran		Turkey	
Variables	5% Critical value	Prob.	5% Critical value	Prob.	5% Critical value	Prob.
LGDP	63.876	0.000*	55.246	0.000*	47.856	0.000*
LExport	25.872	0.035**	18.398	0.004*	15.495	0.060***
LExchange	12.518	0.955	3.8415	0.008*	3.8415	0.043**
LInflation	42.915	0.001*	35.011	0.001*	29.797	0.002*

(*), (**), (***) denotes Significant at (1%, 5% and 10%) respectively

Table 2b. Unrestricted Cointegration Rank Test(Maximum Eigenvalue)

Country	Iraq		Iran		Turkey	
Variables	0.05 Critical value	Prob.	0.05 Critical value	Prob.	0.05 Critical value	Prob.
LGDP	32.118	0.000*	30.815	0.002*	27.584	0.014**
LExport	19.387	0.007*	17.148	0.120	14.265	0.160
LExchange Rate	12.518	0.955	3.842	0.010*	3.8415	0.043**
LInflation	25.823	0.009*	24.252	0.014**	21.132	0.013**

(*), (**), (***) denotes Significant at (1%, 5% and 10%) respectively

Table 2c. Johannsen Fisher Panel co-integration test

Variables	Fisher Stat. (From trace test)	Prob.	Fisher Stat. (From Max-Eigenvalue)	Prob.
LGDP	56.54	0.000*	264.8	0.000*
LExport	107.1	0.000*	33.58	0.000*
LExchange Rate	29.53	0.000*	29.53	0.000*
LInflation	95.41	0.000*	51.94	0.000*

(*), (**), (***) denotes Significant at (1%, 5% and 10%) respectively

Time Series Regression

The presence of unit root in the time-series data and confirmed co-integrating relationship among the variables, constitutes approval for the adoption of ARDL estimation. The ARDL approach is a dynamic econometric modeling technique that was developed by Pesaran and Shin (1999), based on OLS estimation and the inversion of the ECM. The method can be applied irrespective of whether the underlying regressors are purely integrated of degree one, $I(1)$, purely integrated of degree zero, $I(0)$, or a combination of both. However, this technique will crash in the presence of the integrated stochastic trend of $I(2)$. The ARDL approach involves considerable lags and may include dummy variables in the co-integration test process. The result is presented in Table 3.

Table 3. Estimation of Financial Impact on macro-economic variables using ARDL approach:

Regressors/ Countries	Iraq	Iran	Turkey
Constant	-7.001 (0.122)	0.751 (0.000)	-8.583 (0.0604)
GDP	0.658 (0.007)	0.215(0.344)	1.325(0.000)
Lexport	0.211 (0.034)	2.187 (0.051)	0.454 (0.021)
LExchange Rate	0.060 (0.088)	0.954 (0.029)	1.297 (0.000)
Linflation	-0.105 (0.059)	1.017(0.104)	- 0.221 (0.000)
Impact of AFC (D1) on GDP	- 0.883 (0.032)	- 7.727 0.0169)	- 0.295 (0.002)
Impact of AFC (D1) on Export	- 6.202 (0.003)	- 0.517 (0.038)	- 0.140 (0.053)
Impact of AFC (D1) on Exchange Rate	- 7.409 (0.000)	- 0.727(0.095)	- 0.270 (0.038)
Impact of AFC (D1) on Inflation	- 0.380 (0.037)	- 2.101 (0.024)	- 0.547 (0.033)
Impact of GFC (D2) on GDP	- 0.070 (0.079)	- 0.007 (0.994)	- 0.164 (0.011)
Impact of GFC (D2) on Export	- 0.560 (0.045)	- 1.315 (0.016)	- 0.071 (0.039)
Impact of GFC (D2) on Exchange Rate	- 0.067 (0.031)	- 0.195 (0.032)	- 0.206 (0.040)
Impact of GFC (D2) on Inflation	- 1.574 (0.000)	- 1.044 (0.037)	- 0.656 (0.011)
Impact of TFC (D3)on GDP	-	-	- 0.291 (0.056)
Impact of TFC (D3) on Export	-	-	0.153 (0.000)
Impact of TFC (D3)on Exchange Rate	-	-	- 0.089 (0.076)
Impact of TFC (D3) on Inflation	-	-	- 0.946 (0.005)
Impact of IFC (D3) on GDP	-	- 0.400 (0.216)	-
Impact of IFC (D3) on Export	-	- 0.293 (0.036)	-
Impact of IFC (D3) on Exchange Rate	-	- 0.114 (0.586)	-
Impact of IFC (D3) on Inflation	-	-1.162 (0.061)	-
Impact of IQFC (D3) on GDP	- 0.080 (0.000)	-	-
Impact of IQFC (D3) on Export	- 0.584 (0.000)	-	-
Impact of IQFC (D3) on Exchange Rate	- 0.465 (0.337)	-	-
Impact of IQFC (D3) on Inflation	- 3.196 (0.000)	-	-

Note: AFC is Asian Financial Crises; GFC is Global Financial Crisis; TFC is Turkey Financial Crises; IFC is Iran Financial Crises; IQFCis Iraq Financial Crises.

Most of the results in Table 3 are consistent with theory and literature. In econometric parlance, such results indicate that a 1% increase in export increases GDP by 2.187%, 0.453%, and 0.211 % for Iran, Turkey, and Iraq, respectively. Therefore, export shows a positive and statistically significant effect on economic growth in the sample countries. This result indicates a negative and statistically significant effect of inflation on GDP in Turkey and Iraq.

The second part of the table estimated the crisis influences (dummy variables) on the macroeconomic variables for the sample countries. This finding explains a negative direct relationship between the Asian and the global financial crisis with GDP, export, exchange rate, and inflation within the study period and with different levels of effect. Also, each countries' financial crisis has a negative impact on different levels. However, the Asian financial crisis was

the most effective dummy in the model and showed a considerable negative effect on the whole country's GDP; it decreased the economic growth of Iran, Iraq and Turkey by 7.73%, 0.882%, and 0.30%, respectively. Moreover, the global crisis had a considerable negative impact on all countries' export; it caused the export levels of Turkey, Iraq, and Iran to decrease by 0.16 %, 0.07% and 0.01%, respectively. All the crises negatively affect inflation in the three countries, representing a desired outcome because inflation is a key macroeconomic problem that all governments attempt to minimize it.

In brief, there is co-integration between macroeconomic variables of these countries, especially between exchange rate and export, as well as between the crisis and GDP as a measure for economic growth, particularly for Turkey and Iran. Moreover, the exchange rate has major impacts on the economy in general and the exports of these countries. Asian and global financial crises had a negative impact on economic growth for (Iraq, Iran, and Turkey), due to the strong relationship between economic conditions in these countries. The reason behind this might be the fact that in the 1980-2017 period, all these countries (with different levels and with the different condition) faced war, economic embargo, and financial crisis.

Panel Regression Model

Panel data are the type of data where each cross section observation has time series observations. The main reason for using panel estimation to analyze time series is to identify and measure the effects that are undetectable in pure cross-sectional or pure time-series data. It can be analyzed through several estimation methods. The current study uses EGLS and DOLS. The results of both are reported in Table 41 and 4b.

Table 4a. EGLS Pooled Estimation

Variables	Coefficient	Std. Error	t-Statistic	Prob.
LEP	0.0206	0.0078	2.6274	0.0099
LEC	-0.0214	0.0110	-1.9375	0.0554
LINF	-0.0297	0.0161	-1.8421	0.0683
R-squared = 0.927		Adjusted R-squared = 0.923		

Table 4b. DOLS Pooled Estimation

Variables	Coefficient	Std. Error	t-Statistic	Prob.
LEP	0.0982	0.0560	1.7528	0.0836
LEC	0.1080	0.0488	2.2132	0.0298
LINF	-0.0453	0.1411	-0.3213	0.7488
R-squared = 0.581		Adjusted R-squared = 0.456		

The findings represent that the coefficients of most independent variables were statistically significant in both models for Iraq, Iran, and Turkey. Nevertheless, the estimated regression provided different results in both estimations.

Table (4) reports a positive relationship between LEP and LGDP, where a 1% increase in export in Iraq, Iran, and Turkey increased GDP by 0.02% or 0.09%, while a 1% increase in inflation decreased GDP by 0.02% or 0.04%. However, the result for the exchange rate sugets different effects. The sign for the exchange rate was negative in EGLS, and positive in DOLS.

The findings show that while for the EGLS model all variables were statistically significant at the 5% and 10% levels, for the DOLS model only two variables were statistically significant at the 5% and 10% levels. Based on the value of R^2 and adjusted R^2, the goodness of fit of the EGLS model was better than that of the DOLS model.

Diagnostic Test and Statistical Indicators

To ensure that the models are not misspecified, a diagnostic test was conducted and the statistical indicators for all countries are reported in Table 5.

**Table 5:** Diagnostic test and Statistical Indicators for accurate models

	LM test	(Harvey) and (Breusch) test	Ramsey RESET test	Jarque-Bera	VIF	CUSUM & CUSUMQ
Countries	F-statistic	F-statistic	F-statistic	F-statistic	Centered VIF	5%
Iraq	0.3892	1.9273	0.3720	Not applicable		
	(0.9157)	(0.1450)	(0.9455)	(0.7252)	Less than 10	Stable
Iran	1.8829	2.1991	1.4508	Not applicable		
	(0.1064)	(0.1073)	(0.1569)	(0.0000)	Less than 10	Stable
Turkey	0.3752	1.2089	1.4386	Not applicable		
	(0.6930)	(0.3214)	(0.2389)	(0.3258)	Less than 10	Stable

Statistical Indicators					
Iraq	R-Squared	Adjusted R^2	S.E		F- Statistic
GDP Model	0.993	0.980	0.1297	72.0870	(0.0000)
Export Model	0.998	0.994	0.4032	238.9207	(0.0000)
Exchange Rate Model	0.969	0.888	1.4119	11.9772	(0.0013)
Inflation Model	0.812	0.610	1.1710	4.0331	(0.0064)
Iran	R-Squared	Adjusted R^2	S.E		F- Statistic
GDP Model	0.996	0.964	0.3078	31.2835	(0.0079)
Export Model	0.986	0.872	0.744	8.6411	(0.0499)
Exchange Rate Model	0.994	0.940	0.5060	18.4368	(0.0170)
Inflation Model	0.913	0.514	0.3347	2.2857	(0.1823)
Turkey	R-Squared	Adjusted R^2	S.E		F- Statistic
GDP Model	0.998	0.996	0.0585	502.9500	(0.0000)
Export Model	0.963	0.932	0.0529	30.9711	(0.0000)
Exchange Rate Model	0.999	0.999	0.0441	20619.31	(0.0000)
Inflation Model	0.976	0.971	0.1733	200.8605	(0.0000)

Table (5) shows that for all the tests used, namely, LM, ARCH, Ramsey RESET, Jarque-Bera, and variance inflation factor, the F-statistic is more than the critical value. However, the normality problem existed for Iran. The null hypothesis (H0; the econometrics model does not exist) was accepted across all models for all countries. Therefore, the OLS and ARDL models were correctly specified. It reports that the R^2 and adjusted R^2 were too high for all models for all countries. Furthermore, this finding indicates that the model fitted the data and showed the correct specification.

In sum, based on the econometric results, we can say export has a significant positive impact on economic growth, the likely reasons being these countries mainly depend on exports and the contribution of export to GDP is high, despite the fact that the level of effect and type of exports are different among these countries. Moreover, the exchange rate also has a significant effect on GDP, due to the strong relationship between export, GDP and exchange rate. Furthermore, despite having some special case, the location and economic contract between these countries, the impact of crises (Asian, Global, and Regional) on all macroeconomic variables went together and was similar, due to the existence of unstable economic and political conditions in these countries, especially as a result of the existence of a war against ISIS in Iraq and neighboring countries.Additionally, the study used (CUSUM and CUSUMQ) for checking the problem of structural change. The result shows the stability of the structural relationship

between variables. As the figure below shows the blue line (despite a little fluctuation of the data) is between two red lines, suggesting, in general, these models are stable at level (5%) and hence reliable for forecasting purposes.
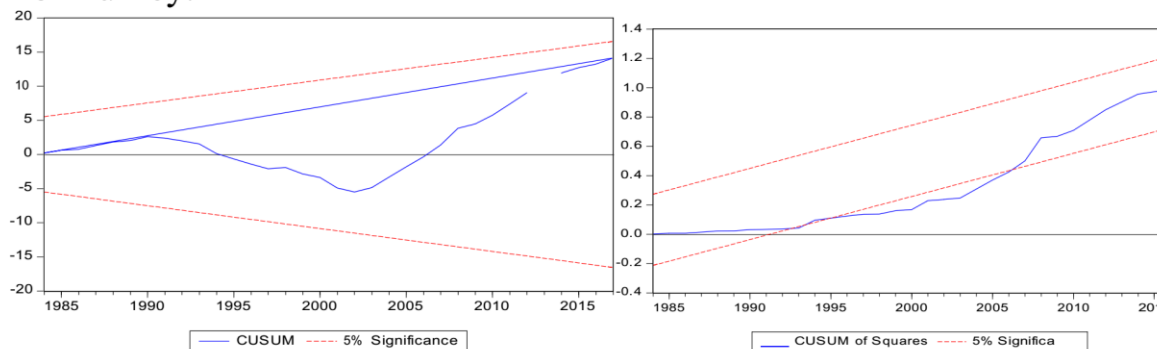
For Iraq:
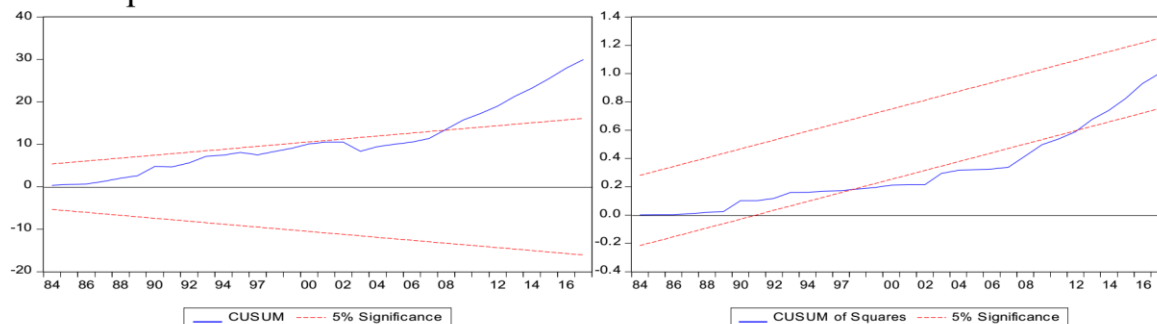
For Iran:
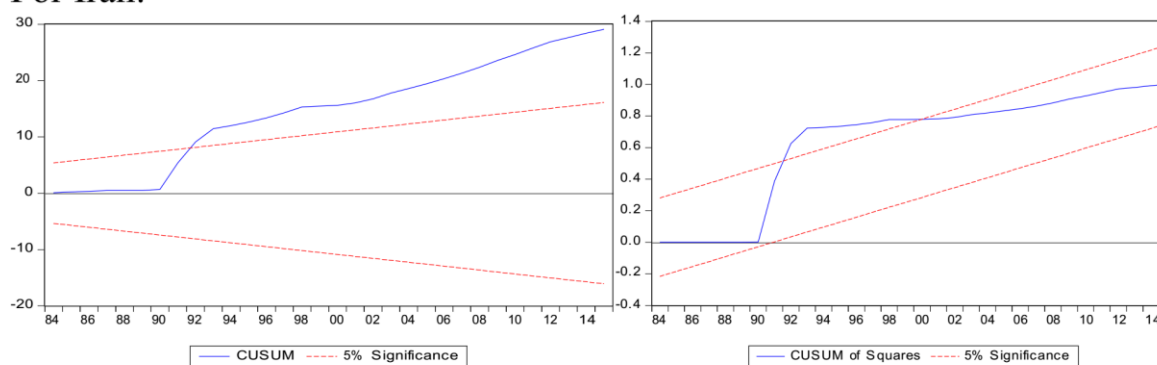
For Turkey:

Conclusion

The financial crisis is a major global event expected to have negative influences on national economies. However, the effects might vary according to each country's economic environment. Therefore, to contribute to the existing literature, this study attempted to empirically analyze the effects of financial crises on macroeconomic variables, namely, GDP growth, exports, exchange rate, and inflation, for three developing countries, that include Iraq, Iran, and Turkey. The study attempted to examine the respond of the variables for each country to the 1997–1998 Asian financial crisis, the 2007–2008 global financial crisis, and the corresponding financial crisis that occurred in each country. To obtain accurate results, we used two types of econometric methods: the time series estimation (OLS and ARDL) models for individual countries, and the panel regression (EGLS and DOLS) methods for all countries taken together as a group.

The results of this study show that the examined financial crises have negatively influenced GDP, exports, exchange rates, and inflation in Iraq, Iran, and Turkey. However, the effects were of different levels. The evidence from the time series models shows that the Asian financial crisis posed a significant negative effect on GDP, especially for Iran and Iraq. Likewise, the global financial crisis caused a considerable negative influence on export in all counties. Nevertheless, both crises negatively affect inflation, representing a desired outcome since inflation is a key macroeconomic problem that all governments attempt to minimize it.

As for the estimated panel regression models, the results from the EGLS and DOLS silightly differed. While, exchange rate exerts a negative effect on GDP in the former, it has a positive effect in the latter. However, in both models, export positively affected GDP, whereas inflation negatively incluenced GDP.

The study might suggest several policy implications. First, fiscal stimulation is an important approach to conducting local countercyclical policy efforts. In times of good economic conditions, hard fiscal policy generates defenses to use countercyclical position during crises. In addition, supervision and prudential regulation are necessary to prevent an increase in the types of vulnerabilities that are specifically correlated with credit booms. Nevertheless, with the expansion of data availability, additional studies are required to understand the reaction of policy effects and other institutional and structural factors during crisis periods in each country, as well as to determine the volume and speed of growth recovery.

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