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Differences in the Determinants of National Reserves across G7 and Rising Power Countries

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ABSTRACT

The paper investigates the macroeconomic factors influencing national reserves in G7 and rising power countries. Factors that have been demonstrated and theoretically explained by many empirical investigations were used in the study. Two distinct panel data analyses were used with a half-century-old data collection for this aim. The data set for both country groups spans the years from 1971 to 2020. For each nation group, four distinct specifications have been developed. Both the System-GMM method, which is one of the dynamic panel data methodologies, and the Fixed Effects method were used to estimate the generated specifications. Robustness was applied to the coefficients produced in terms of consistency by employing other variables such as external debt crisis, population, exchange rate regime, and exchange rate crisis. As a result, it is concluded that FDI and deposit interest rates have a negative influence on national reserves in G7 countries while having a beneficial effect for rising power countries.

Keywords: National Reserves, Foreign Exchange Reserves, Rising Power Countries, G7 Countries
JEL Classifications: F30, F43, O40

1. INTRODUCTİON

National reserves are official public assets that are made up of foreign assets that are held and regulated by monetary authorities. These assets are held for transactional as well as precautionary purposes. Reserves are typically utilized to cover a country's payment imbalances and to intervene in foreign exchange markets. The number of reserves held by a country is an essential indicator of that country's capacity to pay its debts and maintain monetary stability. However, the significance and necessity of reserves varies per country.

The factors influencing the reserve utilization area and reserve volume are not restricted to macroeconomic issues alone. National reserves are also employed when there are insufficient budget expenditures due to natural disasters, pandemics, or other societal factors in the country. Given these circumstances, it is extremely difficult to model the forces influencing these assets, which represent a state's "Monetary Prudence." The outcomes of statistical and econometric forecasts regarding the course of reserves, in particular, are not always consistent. For example, central bank reserves, which have been declining, are expected to rise as a result of a probable SWAP arrangement or foreign borrowing. On the contrary, in the event of a possible devaluation of the country's currency or a chronic depreciation of the national currency, reserves drop in response to an increase in foreign exchange demand. That is, national reserves tend to rise and fall in a variety of unforeseen conditions. In other words, it is extremely vulnerable to a wide range of macroeconomic events and external shocks in general.

The major reasons for central banks to keep liquid reserves in emerging countries are to provide a defense mechanism against a hypothetical speculative attack or changes in the trade balance. The fact that the central bank has reserves, and that this reserve volume is considerable, facilitates the effectiveness of the country's monetary policy. That is, foreign exchange reserves are critical for satisfying increased foreign exchange demand in the event of possible exchange rate shocks or financial crisis signals, when demand for foreign currency grows in the domestic market, or when import demand rises. However, the relevance of national reserves differs between developed and developing countries since developed countries have developed financial markets and a resilient financial framework against external shocks. The goal of our research is to give empirical evidence for these disparities based on macroeconomic conditions.

Rodrik (2006) stressed the need of accumulating reserves in order to meet emerging countries' short-term external loans. According to Kato et al. (2018), a currency crisis scenario can be avoided by allowing the central bank to assign a significant positive weight to the level of prudential foreign exchange reserves as one of its objectives, and that such a crisis is highly likely to occur when this weight is zero or sufficient. Aizenman and Lee (2007) emphasize the relevance of reserves for emerging countries, claiming that reserves serve as insurance against disasters. According to Reinhart and Rogoff (2008), financial crises significantly cut GDP per capita, whereas nations with large reserves are less affected. Dominguez et al. (2012), Blanchard et al. (2010), Rose and Spiegel (2012) all point out that countries with substantial reserves during the 2008 Financial Crisis fared better. Higher reserves provide a hedge against the country's risk of a financial crisis, but it is an expensive hedge. Because the government reduces country margins by using reserves to pay off debt (Bianchi et al., 2018).

One of the most frequently addressed concerns in the literature is the optimal size of foreign exchange reserves. Some observers claim that the social cost of reserves is excessively high, implying that more imports or investments could be made rather than collecting reserves. According to Caballero and Krishnamurthy (2009), Calvo et al. (2012), and Edwards (1984) studies, the fact that reserves are over the appropriate level raises the societal cost. According to Mohanty and Turner (2006), in addition to the social cost of retaining reserves, interventions in the market using reserves can generate inflation, overheating in asset and credit markets, and banking system disturbances. However, the general consensus is that reserves promote economic stability in a variety of ways. Studies by Berg and Pattillo (1999), Sachs et al. (1996) and Berg et al. (1999), Genberg et al. (2005), and Prasad and Wei (2009) highlight the need of appropriate foreign exchange reserves in preventing financial crises and economic vulnerabilities. Furthermore, studies by Sachs et al. (1996), Chang and Velasco (2000), and Jeanne et al. (2007) indicate that foreign exchange reserves should be retained in case of speculative attacks.

The distinction between reserve demand and reserve adequacy in general based on nation groupings began with Frenkel's (1974) study in the literature. The social cost of reserves, according to Frenkel, is the most important element influencing reserve demand in both emerging and established countries. With his study on the case of underdeveloped and developed country groups, Iyoha (1976) verified Frenkel's idea. Mendoza (2004) attributes the reasons for maintaining reserves to variances in nation groups, currency rate regimes, access to foreign money, and changes in foreign aid flows. Edwards (1984) concluded from empirical investigations with country differentiation on the subject that foreign trade openness and exchange rate regime are connected to reserve size. According to the findings, industrialized countries' reserves that are open to foreign trade and have free exchange rates are more stable. Lane and Burke's (2001) study was done during a period when countries were more open to foreign exchange and most of them shifted to floating exchange rates, and it was determined that the impacts of openness and financial growth on reserves differed across developed and developing countries. A half-century-old data set (1971–2020) was utilized to compensate for this deficit in our analysis, with the motivation that the literature dealing with the factors impacting national reserves on the basis of industrialized and developing countries is out of date.

In our study, the determinants influencing national reserves were evaluated using two alternative approaches based on four core requirements for both developed and developing countries. By categorizing the countries under study as developed or developing, a solution to the question of which factors are effective on national reserves on the basis of country groups has been sought. In other words, the study's research issue is a comparison of macroeconomic factors affecting national reserves in industrialized and developing countries. While it has been stated that national reserves are substantially affected by economic cyclical changes and are a sensitive macroeconomic component, it should be highlighted that empirical research on this issue involve significant econometric sensitivities. As a result, it is critical to examine the period, factor, and country groups that would induce structural changes in econometric models developed on this topic individually. In the empirical analysis, System-GMM, one of the dynamic panel data methods, and the Fixed Effects estimator were both used. Robustness was used to manage the stability of the acquired coefficients by developing additional requirements.

2. DATA SET AND EMPİRİCAL MODEL

Panel data analysis was used in the study to determine how macroeconomic parameters affecting national gross foreign exchange reserves differ between developed and developing countries. The data set for both country groups spans the years 1971–2020. The data set observed at the annual frequency contains 50 observations. In this perspective, G7 countries (Canada, France, Italy, Germany, Japan, the United Kingdom, and the United States) are treated as developed countries, while BRICS (Brazil, Russia, India, China, and South Africa) and MIKTA (Mexico, Indonesia) are discussed as developing countries. Fixed Effects and the System GMM estimator developed by Arellano and Bond (1991) were utilized for the two country groups.

Because there are several studies in the literature that investigate the effects of macroeconomic factors on national reserves, both on a country-by-country and country-group basis, the effect of specific indicators on national reserves is known both theoretically and experimentally. In terms of the study's uniqueness, this relationship indicates the distinction between developed and developing countries. As a result, the study provides precision in terms of the significance and sign of the coefficients. As a result, for both country groups in the study, four distinct models were built, each consisting of different combinations of the same variables. As a final appendix, Appendix A provides an explanation of the variables used in the study, while Appendix B provides descriptive statistics on the data set.

It was determined that national reserves were used as a dependent variable in our study. Even though IR/GDP has been viewed as a dependent variable, it is evaluated as a macroeconomic element and included in all four models as the independent variable, IR/GDP. It's a combination of factors that include macroeconomic, financial, political, and environmental factors. As a result, it is extremely difficult to analyze IR with variables other than macroeconomic variables because of the difficulties of gathering annual data and the considerable cyclical changes that occurred over the analysis period. Economic models are not sufficient to explain the country's IR because it is one of its most important economic indicators. According to theoretical and empirical studies, macroeconomic variables that affect IR are used in our study. Since there are so many variables that can affect IR, Equation 1 is the most extensive model in the analysis:

$$IR_{it}=\alpha+\beta IR/GDP_{it}\Upsilon IR_{it-1}+\mu LnFDI_{it}+\delta LnPE_{it}+\zeta LnEXP_{it}+\theta LnIMP_{it}+\xi CPI_{it}+\varsigma INRRt_{it}+\sigma LnED_{it}+\vartheta EFFCHG_{it}+\phi INTDIFF_{it}+\lambda LnDC_{it}+\phi M2RES_{it}+\varrho OP_{it}+\text{э} IMFCR_{it}+\text{м} SWAP_{it}+u_{it} \quad (1)$$

In addition to explaining the variables' positions in the extended equation 1 in the literature, this information will be important in determining the model's parameters. This topic has a significant body of literature and most empirical investigations have established a positive correlation between economic growth and national reserves. Economic growth may not always result from an increase in IR. When compared to other nations in the globe with huge natural resources, Japan's growth rate has been below 1% for the past 5 years. There are numerous studies in the literature, including Aizenman and Lee (2006); Cheung and Qian (2009); Benigno and Fornaro (2012); Cheng (2015); Blanchard et al. (2010); Dominguez et al. (2012); Rey (2015), Efremidze et al. (2011); A positive correlation between IR and GDP was established in Sula and Oguzoglu's (2021) study.

After 1985, we may say that both groups of countries have open economies and capital mobility. Aitken and Harrison (1999) and Helpman and Yeaple (2004) believe that investment in and out of the country has both a direct and an indirect impact on IR. FDIs have a substantial impact on foreign exchange activities and increase in favorable cyclical times in the economy, which in turn affects the International Reserves. Many important macroeconomic variables, such as national reserves, were found to be positively associated with FDI by Blonigen and Wang (2004). Matsumoto (2018) found that the medium-term growth in FDI/GDP value raises national reserves. National reserves are favourably impacted by foreign currency inflows in Asian countries, according to Jeane and Ranciere (2011). National reserves were found to be affected by capital mobility in the investigations of Wang (2009), Aizenman et al. (2015), Benigno and Forno (2012) and Wu and Lee (2018), as well.

For this year's budget, logarithmic values of the State's public spending are shown in the LnPE variable. As a measure of fiscal policy, changes in public expenditures are an important one. There are numerous ways to explain the relationship between PE and IR, which has a mutual causation relationship with a number of macroeconomic variables. With regard to fiscal policy, it is possible to see PE and IR's correlation as an indicator of fiscal policy's cohesion (Lim, 1983; Ram, 1986). Economic growth tends to lead to steady IR and proportionately rising PE when the economy is moving in the right direction (however the converse might be regarded) (Zhou, 2009). PEs are employed both in IR and as a fiscal policy instrument during the country's economic cyclical shifts, such as inflation occurring concurrently with the exchange rate crisis. According to Sula and Oguzoglu (2021), there is a positive and statistically significant correlation between governmental expenditures and national reserves.

In the model, the LnEXP and LnIMP variables are indices of international trade. Some studies use direct exports and imports as indicators of foreign trade, while others look at the current account balance or trade openness in the relevant literature. Changes in international trade indicators have been found to play a significant role in determining the country's foreign exchange reserves, according to empirical studies. In a panel data analysis including 120 nations, Sula and Oguzoglu (2021) found a substantial positive correlation between the increase in foreign trade and national reserves. Findings from Aizenman et al. (2020) show that developing countries' trade with the four major economies enhances their national reserves. Soto and García (2004), Aizenman (2007), Cheung and Ito (2009) and Bussière et al. (2015) reaffirmed the importance of foreign trade indicators on national reserves.

The consumer price ındex (CPI), a key economic indicator, is closely linked to a number of macroeconomic factors. A major purpose of many modern central banks is to combat inflation. A currency crisis can lead to both inflation and IR taking action simultaneously. Heller's work laid the theoretical and empirical groundwork for the link between inflation and national reserves (Heller, 1970). There is substantial empirical evidence for this association in the research of Khan (1979), Heller (1979), and Heller (1981). Inflation targeting statistics and reserves have been proved to be linked by Soto and García (2004), Aizenman et al. (2008), Rose (2007), Iacoviello and Navarro (2018), Nayak and Baig (2019) and Sula and Oguzoglu (2021). Stainer (2017) established a correlation between the inflation rate and the amount of national reserves held by the government. Increases in national reserves are shown to lower inflation, according to his research.

Internal capital mobility and foreign cash entering the country are influenced by the country's central bank's policy rate. National reserves can also be impacted directly by INTRT's impact on currency fluctuation. Under alternative assumptions, Pina (2015), Lacoviello and Navarro (2018 and Jung and Pyun (2018) found a correlation between interest rates and national reserves. The INTDIFF variable is another key interest rate variable in the model. According to Bitar and Boileau (2021), the interest rate differential is a convex function of the level of gross international reserves.

Particularly at low reserve levels, differential and gross reserves are inversely related, but positively correlated at higher reserve levels. National interest rates are compared to the Fed's interest rate. Flood and Marion (2001) and Aizenman and Marion (2004), Sula (2011), Dominguez et al. (2012) and Sula and Ozanoglu (2021) employed this variable in their studies and found it to be important in explaining national reserves.

To better understand the influence on national reserves and external debt, view national reserves as states' "monetary prudence" and as a guaranty for international debt repayments, which is what they are. In addition to the research by Chinn and Ito (2006), Cheung and Ito (2009), Aizenman et al. (2011), Jeanne and Panciere (2011), Lacaviello and Navarro (2018), Steiner (2017), Aizenman et al. (2020), (Laser and Weidner, 2020) and Law et al. (2021) substantial correlations between the extent of external debt and national reserves have been discovered.

Real exchange rate effects on national reserves have been studied extensively in both theoretical and empirical literature. Among these are Nowak, Hviding et al. (2004); Cady and Gonzalez-Garcia (2007); Aizenman and Lee (2007); Riera-Crichton (2007); Jeanne and Panciere (2011). Researchers have established a direct correlation between the effective exchange rate and national reserves. Aizenman et al. (2015), Alberola et al. (2016) and Steiner (2017) have empirically proved that net domestic credits affect national reserves, which are included in the model's LnDC variable. In addition, the theoretical foundations of m2's monetary size have an impact on the national reserves. NDC's Bussière et al. (2015), Sula (2011) research include empirical findings from Aizenman et al. (2015), Alberola et al. (2016), Steiner (2017), Laser and Weidner (2020) and Law et al. (2021).

There is a widespread practice in many nations of incorporating foreign currency received as part of SWAP agreements into their national reserves. SWAPs are projected to have a significant impact on international relations (IR) in particular for rising power countries. Evidence from Aizenman et al. (2015) and Aizenman et al. (2020) shows that SWAPs have a considerable impact on IR.

Loan data from the International Monetary Fund (IMF) are not accessible for G7 countries, hence the LnIMFCR variable cannot be calculated. SDRs allocated to member countries by the IMF are not included in this variable.

Equation 2 differs from Equation 1 in that it does not include the ratio of reserves to m2 monetary size or oil prices. By eliminating an important macrovariable, Res/m2, both a low-impact and a high-impact variable have been eliminated from the example: This specification was established.

$$IR_{it}=\alpha+\beta IR/GDP_{it}\Upsilon IR_{it-1}+\mu LnFDI_{it}+\delta LnPE_{it}+\zeta LnExp_{it}+\theta LnImp_{it}+\xi CPI_{it}+\varsigma \dot{I}ntRt_{it}+\sigma LnED_{it}+\vartheta Effchg_{it}++\phi INTDIFF_{it}+\lambda LnDC_{it}+\text{ɜ} IMFcr_{it}+\text{м} SWAP_{it}+u_{it} \quad (2)$$

Dummy variables that are not natural logarithmic and are expressed as percentages were deleted from the model in Model 3 and a more precise model specification was attempted.'

$$IR_{it}=\alpha+\beta IR/GDP_{it}\Upsilon IR_{it-1}+\mu LnFDI_{it}+\delta LnPE_{it}+\zeta LnExp_{it}+\theta LnImp_{it}+\varsigma \dot{I}ntRt_{it}+\sigma LnED_{it}+\lambda LnDC_{it}+u_{it} \quad (3)$$

Model 4 used a specification derived from the literature research that included the factors shown to be the most important in various studies:

$$IR_{it}=\alpha+\beta IR/GDP_{it}\Upsilon IR_{it-1}+\zeta LnExp_{it}+\theta LnImp_{it}+\xi CPI_{it}+\varsigma \dot{I}ntRt_{it}+\sigma LnED_{it}+u_{it} \quad (4)$$

For testing the significance of coefficients and whether their signs changed under varied parameters, robustness was employed. Control variables were included to the four models for both nation groups, and the periods and countries that were deemed to have a structural effect on the results were eliminated from the data set and re-estimation was conducted for the purpose of this study.

2.1. Methods of Estimation

It was employed in our work to model the lagged value of the dependent variable using System-GMM estimation method, which is one of the dynamic panel data estimation methods Because the lagged dependent variable is associated with the error term in lagged fixed effect and random effect models, estimations utilizing fixed and random effects models are inconsistent (Greene, 2000). Generalized moment method (GMM) is utilized in dynamic panel data models in a variety of ways, depending on assumptions. The difference-GMM estimating approach proposed by Arellano and Bond (1991) emphasizes that GMM management provides better results than other methods in scenarios with normal distribution, variable variance and measurement errors. Arellano and Bover (1995) and Blundell and Bond (1999) were the first to design the System-GMM approach (1998). Difference and level equations in the system-GMM technique are based on lagged instrumental variable values, as well as first differences in the difference equation. Compared to the "Difference GMM" method created by Arellano and Bond (1991), the System-GMM method proposed by Arellano and Bover (1995) and Blundell and Bond (1998) are better estimators (Roodman, 2006).

For the more advanced two-stage GMM estimator, residuals from the first stage are used to weight the first-stage moment conditions. Standard errors, on the other hand, can be skewed significantly downwards in finite samples. The Bond et al. So the analysis was done using the one-step approach.

First-order autocorrelation and second-order autocorrelation are tested in GMM estimations using AR(1) and AR(2) tests, respectively. No autocorrelation can be seen in data that has a higher than average accurate probability. No second-order autocorrelation is to be assumed in GMM calculations. The Hansen J test reveals that GMM calculations have over-identification restrictions (Bun and Windmeijer, 2010).

The system-GMM estimator's coefficients are also tested for consistency using an additional technique. Because the unit effect is associated with the independent variables, fixed and random affect models are very different. Because under a fixed effects model, one subtracts the effect. While the random effects model integrates the unit impact into its estimate procedure, it does not include the error term. Bell and Jones (2015, p. 163) The Hausman (1978) test result was used to determine whether or not the model is suitable for a random effects model or for a fixed effects model. There are various uses for the Hausman specification test. Panel data estimates are one of the options. Difference between variance covariance matrixes of fixed effects and random effects estimators for the Hausman test statistic is used to calculate the Hausman test statistic. If this difference is more than zero, the Hausman test is used to verify this (Baltagi et al., 2003).

3. RESULTS

Results of econometric estimation of the factors that affect national reserve volume were evaluated for both the G7 countries and the Rising Power countries in this section of the study. If the results of the analysis completed with the system GMM technique, which included the lagged value of dependent variable, changed when performed with a different method, all specifications were also estimated using the pooling least squares method. Table 1 shows that the probability values of Hansen-J statistics in model 1 and model 4 take the values of 0.003 and 0.030, which means that there is an over-identification error at 10% and 5% significance levels, respectively. A second-order autocorrelation problem was found in Model 2 when the Ar(2) statistic had a value of 0.075. Model 1 and Model 4 FE estimator results show second-order autocorrelation as well. Statistically and econometrically, Model 3 was found to be a better fit for the G7 countries in this scenario.

Each of the G7 countries' lag values of TotRest-1 is statistically significant and positive. In both approaches and all specifications, the IR/GDP variable was positive and significant. A 0.022 percentage point rise in IR/GDP, which was deemed to be statistically significant, was attributed to a one percent gain in GDP. Economic forecasts are also satisfied by this outcome. A natural logarithmic dependent variable can be used to estimate that the real economic effect is greater than the ratio of IR/GDP.

A negative sign is seen in both models for the natural logarithm of foreign direct investment (LnFDI). There is a statistically significant drop of 0.151 and 0.144, respectively, in the dependent variable as a result of model 1 and model 3. Aizenman et al. (2015), Benigno and Fornaro (2012), and Huang (2018) do not agree with the results of their investigations in terms of coefficient sign in terms of the G7 countries. LnPE and national reserves were found to have a positive and substantial correlation. We discovered that LnEXP was statistically associated with LnDEV, which is the dependent variable, in all specifications and two models. For the LnIMP variable, there was no statistically significant correlation with reserve levels. A coefficient of –0.065 was the only significant correlation between CPI and IR identified in model 4. According to Aizenman et al. (2008), Rose (2007), Lacaviello at al. (2018) and Sula et al. (2021) studies, the CPI findings are consistent.

It was a surprise to find out that the increase in deposit rates (INTRT) reduces national reserves under all specifications in the G7 analysis. A 0.14% loss in national reserves is caused by a 1% increase in deposit interest, according to Model (3). Pina (2015) and research, which used a larger data set, did not find these results to be consistent with the theoretical expectations of these studies. For national reserves, there is a positive correlation between LnED and CHNGRT variables. Natural logarithmic short-term foreign debt increases by 0.030 percent for every percent increase in short-term external debt, according to Model 3. This relationship's coefficients don't vary regardless of how it's defined. CHNGRT's influence on national reserves is consistent with both actual and theoretical predictions.

There was no significant correlation between INTDIFF and the dependent variable according to the system-GMM approach. The FE estimator shows that, despite the 10% significance level in model 1, the model has an issue with first and second order autocorrelation. It is found that national reserves are positively influenced by the LnDC and RESM2 variables in model 3. No significant changes were found between significance, coefficient sign, and values for all variables, regardless of how they were defined or how they were calculated.

There appears to be an over-identification error based on Table 2 diagnostic tests for the anticipated models, given the probability value of Hansen-J statistics in Models 1 and 4 takes 0.013 and 0.043 values, respectively. The AR(2) statistic for Model 3 has a probability value of 0.003, which indicates that the relevant model has an autocorrelation problem. Because of this, Model 2 was deemed the most stable specification for countries with rising power.

The lagged value of the dependent variable is statistically significant and positive for all four specifications, according to the estimates given in the case of Rising Power countries. As in the G7 countries, all specifications and techniques show a positive and substantial influence of GDP on the dependent variable. Though Res/GDP has a negative impact on national reserves of roughly 0.022 in G7 nations, this negative impact increases to 0.404 in emerging power countries according to Model 3 that meets the same specifications.

According to all models and methodologies used in G7 countries, the LnFDI variable is negative. However, when applied to Rising Power countries, the LnFDI variable is positive. In Model 2, which is statistically significant, there is a positive effect of 0.073 on the country's national reserves for every one percent rise. System-GMM estimates showed that LnFDI was statistically significant, whereas FE estimates showed that it was insignificant.

Natural logarithmic public expenditure (LnPE) on national reserves has been shown to be statistically significant by all models and methodologies. Model 3's effect on G7 countries was 0.627% against a 1% increase, while the effect on rising power countries was 0.730 percent. Natural logarithmic exports were found to have a favorable impact on national reserves, as well. The G7 countries had an effect size of 0.408, while the Rising Power countries had a size of 0.480. Despite the fact that the LnIMP variable is found to be statistically insignificant in G7 countries, it has a significant and negative sign in rising power countries according to model 1 and model 3. One percent increase in natural logarithmic imports reduces national reserves by one-hundredth

Table 1: International reserves and macro economic factors for G7 Countries

Variables	System GMM				Fixed Effects Estimation			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
TotREs (t-1)	0.386***	0.384***	0.342***	0.348***				
	(0.122)	(0.138)	(0.132)	(0.121)				
IR/GDP	0.025**	0.022**	0.022**	0.023**	0.362*	0.251	0.170*	0.203
	(0.048)	(0.037)	(0.030)	(0.034)	(0.124)	(0.188)	(0.087)	(0.084)
LnFDI	–0.151**	–0.148	–0.144**		–0.126**	–0.271**	–0.125*	
	(0.027)	(0.0260)	(0.021)		(0.049)	(0.024)	(0.021)	
LnPE	0.674*	0.643**	0.627*		1.485	0.705	1.110*	
	(0.212)	(0.191)	(0.170)		(0.973)	(0.252)	(0.645)	
LnExp	0.408**	0.407	0.408**	0.407***	0.303**	0.301***	0.307**	0.306
	(0.103)	(0.101)	(0.114)	(0.092)	(0.014)	(0.027)	(0.012)	(0.031)
LnImp	0.001	0.001	0.002	0.003	0.004	0.002	0.002	–00.001
	(0.00)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
CPI	–0.072	–0.044		–0.065*	–0.103	–0.251*		–0.156
	(0.050)	(0.010)		(0.023)	(0.047)	(0.073)		(0.056)
İntRt	–0.256***	–0.312**	–0.314***	–0.398**	–0.314***	–1.844***	–0.309***	–0.109**
	(0.194)	(0.211)	(0.223)	(0.073)	(0.189)	(0.257)	(0.187)	(0.012)
LnED	–0.511***	–0.431***	–0.438**	–0.402	–0.156**	–0.252**	–0.131***	–0.113**
	(0.122)	(0.182)	(0.185)	(0.105)	(0.103)	(0.063)	(0.000)	(0.875)
Effchg	–0.020***	–0.224**		–0.203*	–0.203***	0.308**		0.301
	(0.10)	(0.029)		(0.002)	(0.016)	(0.027)		(0.013)
INTDIFF	–0.011	–0.012			0.005*	0.022		
	(0.002)	(0.003)			(0.002)	(0.154)		
LnDC	0.014**	0.019**	0.093*		0.293***	0.252***	0.330*	
	(0.106)	(0.111)	(0.024)		(0.937)	(0.716)	(0.121)	
ResM2	0.005**		0.003**		0.121*		0.143*	
	(0.002)		(0.002)		(0.031)		(0.047)	
OP	0.031				0.02			
	(0.012)				(0.001)			
SWAP	0.016*	0.024			0.019*	0.011		
	(0.002)	(0.010)			(0.004)	(0.007)		
Constant					3.19	9.552*	5.377	4.901*
					(1.931)	(2.916)	(1.201)	(1.045)
Information about model outcomes								
Hausman test for fixed effects (P-value)					0.000	0.000	0.000	0.0002
R^2					0.80	0.63	0.74	0.56
Hansen-J (P-value)	0.003	0.128	0.124	0.030				
Diagnostic tests (P-value)								
Ar (1)	0.002	0.031	0.001	0.012				
Ar (2)	0.956	0.075	0.912	0.856				
Serial corr.First-Order					0.030	0.040	0.001	0.010
Serial corr Second-Order					0.051	0.210	0.160	0.040
Sargan	0.250	0.519	0.386	0.181				

For the GMM estimations, the Windmeijer (2005) small sample correction was also utilized along with robust standard errors. Parentheses denote errors that are resistant to standard deviation. There is statistical significance at the 1%, 5% and 10% levels using the ***, ** and * symbols respectively

of a percent. The theoretical and empirical expectations were not met by the results.

National reserves have a negative correlation with inflation. Even though all three models had negative signs and were statistically significant, the System-GMM estimator found no statistical significance in any of them. According to the actual and theoretical expectations, a 1% increase in CPI diminishes the national reserves by 0.151 percent.'

G7 countries have found that IntRt has a negative and considerable impact on national reserves. In the System-GMM estimator, only Model 1 and 2 specifications were found to be significant, but the FE estimator found it to be significant in all three models. System-GMM and FE estimations found that LnED had a statistically significant impact on the dependent variable in Model 1 and Model 2, respectively. As a result of the other components, a 1% rise in short-term external debt reduces national reserves by 0.154. Only in Model 3 was the link between the IR and the real effective exchange rate found to be significant. Real effective exchange rate increases by 1 percent have a 0.046 decrease in national reserves, according to the study. This variable was only statistically significant in model 2, although its effect on the dependent variable decreased by 0.04 percentage points for every percentage point rise in the dependent variable. According to both estimators and all specifications, there was no significant association between the SWAP variable and any of the other variables.

Table 2: International reserves and macro economic factors for rising power countries

Variables	System GMM				Fixed Effects Estimation			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
TotREs (t–1)	0.155***	0.181***	0.242***	0.438***				
	(0.032)	(0.031)	(0.029)	(0.045)				
IR/GDP	0.418**	0.494**	0.404**	0.441***	0.853***	0.400***	0.061***	0.267***
	(0.186)	(0.178)	(0.002)	(0.180)	(0.238)	(0.231)	(0.435)	(0.318)
LnFDI	0.663***	0.073**	0.102**		0.553	0.211	0.496	
	(0.326)	(0.032)	(0.019)		(0.305)	(0.313)	(0.552)	
LnPE	0.401**	0.327*	0.730**		0.546***	0.371**	0.821***	
	(0.058)	(0.054)	(0.048)		(0.121)	(0.120)	(0.187)	
LnExp	0.412***	0.480**	0.369**	0.583**	0.253**	0.216**	0.405**	0.498***
	(0.088)	(0.088)	(0.054)	(0.089)	(0.109)	(0.103)	(0.192)	(0.156)
LnImp	–0.151**	–0.128	–0.193**	–0.048	–0.040	–0.250*	–0.083	0.417**
	(0.086)	(0.086)	(0.060)	(0.104)	(0.109)	(0.096)	(0.188)	(0.143)
CPI	–0.157**	–0.151**		–0.136	–0.235**	–0.206		–0.185*
	(0.039)	(0.036)		(0.046)	(0.054)	(0.052)		(0.070)
İntRt	0.635***	0.543**	0.487**	0.023	0.323*	0.256*	0.313	0.245**
	(0.081)	(0.114)	(0.131)	(0.020)	(0.143)	(0.135)	(0.091)	(0.140)
LnED	–0.150*	–0.124*	–0.013		0.039**	–0.002	–0.091	–0.112***
	(0.044)	(0.042)	(0.027)		(0.048)	(0.046)	(0.079)	(0.066)
Effchg	–0.049	–0.089			–0.126	0.127		0.149**
	(0.095)	(0.097)			(0.133)	(0.133)		(0.128)
INTDIFF	–0.004**	–0.004			–0.004***	–0.004**		
	(0.000)	(0.000)			(0.000)	(0.000)		
LnDC	0.004	0.004*	0.008**		0.012**	0.013**	0.018*	
	(0.003)	(0.003)	(0.003)		(0.005)	(0.006)	(0.008)	
ResM2	–0.168		–0.373***		–0.189		–0.614***	
	(0.042)		(0.032)		(0.050)		(0.075)	
OP	0.0003***		0.0004**		–0.0001***		–0.0002	
	(0.000)		(0.000)		(0.000)		(0.0004)	
IMFcr	–0.013		–0.011		–0.033**		0.009	
	(0.012)		(0.010)		(0.012)		(0.022)	
SWAP	0.161	0.491			0.134	0.211		
	(0.829)	(0.019)			(0.085)	(0.031)		
Constant	2500				6.890**	2.785	6.237	–0.560
					(3.588)	(3.615)	(6.453)	(0.675)
Information about model outcomes								
Hausman test for Fixed Effects (P-value)					0.000	0.000	0.001	0.000
R^2					0.97	0.98	0.99	0.97
Hansen-J (P-value)	0.013	0.218	0.109	0.040				
Diagnostic tests (P-value)								
Ar (1)	0.010	0.002	0.010	0.103				
Ar (2)	0.451	0.582	0.003	0.651				
Serial corr.First-Order					0.001	0.000	0.002	0.010
Serial corr Second-Order					0.102	0.203	0.050	0.128
Sargan	0.174	0.185	0.124	0.246				
Diff-Sargan	0.903	0.506	0.519	0.567				

For the GMM estimations, the Windmeijer (2005) small sample correction was also utilized along with robust standard errors. Parentheses denote errors that are resistant to standard deviation. There is statistical significance at the 1%, 5% and 10% levels using the ***, ** and * symbols respectively

System-GMM estimates show no link between the natural logarithmic IMF loan volume variable and national reserves for G7 nations, while the FE estimates show a negative correlation of 0.033 between this variable and national reserves for emerging Power countries.

3.1. Robustness

The System-GMM estimator coefficients are subjected to sensitivity analyses in this section of the study to see if they vary under different specifications. Only the System-GMM estimator results were submitted to sensitivity analysis from this point onward. However, even though Model 2 for the G7 and Model 3 for the emerging power countries were regarded appropriate above, robustness was applied for all models to explore if the other models were not picked and the reasons why the other models were not preferred under different specifications. Each of the four models has additional variables added to it in order to improve its robustness. After that, the model was re-estimated by excluding specific times and nations that were deemed to have a negative impact on the results.

LnOilExp and Pop.Ghroth are given to model 1, whereas DumDC, LnOilExp, and Dum.Sov.Rg are given to model 2, and Pop.Ghroth and Dum.Sov.Rg are given to model 3. The Rg and Dum.CC variables were added to the models in order to re-estimate them. As shown in Table 3, the probability value of the Hansen-J test,

Table 3: International reserves and macro economic factors- alternative control variables

Variables	G7				Rising Power			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
TotREs (t-1)	0.126***	0.461***	0.389***	0.398***	0.021***	0.020***	0.014**	0.263***
	(0.029)	(0.046)	(0.046)	(0.037)	(0.006)	(0.006)	(0.005)	(0.050)
IR/GDP	0.033***	0.051***	0.054**	0.282***	0.218***	0.243***	0.239**	0.718**
	(0.063)	(0.018)	(0.041)	(0.043)	(0.034)	(0.032)	(0.030)	(0.029)
LnFDI	–0.021	–0.098	–0.132**		0.051***	0.053***	0.0618***	
	(0.033)	(0.061)	(0.059)		(0.018)	(0.018)	(0.018)	
LnPE	0.359***	0.480**	0.476**		0.015**	0.018**	0.018**	
	(0.066)	(0.118)	(0.115)		(0.012)	(0.012)	(0.011)	
LnExp	–0.016	0.343	0.120**	0.087	0.021	0.022*	0.023*	0.514**
	(0.095)	(0.160)	(0.158)	(0.135)	(0.013)	(0.013)	(0.012)	(0.099)
LnImp	0.445**	–0.438**	0.094	0.135	–0.027*	–0.028	–0.0222	–0.0008**
	(0.097)	(0.161)	(0.168)	(0.116)	(0.015)	(0.015)	(0.014)	(0.108)
CPI	–0.002*	0.051		–0.004*	–0.013	–0.007*		–0.105**
	(0.001)	(0.062)		(0.001)	(0.008)	(0.007)		(0.048)
İntRt	–0.454**	–0.350**	–0.245**	–0.154*	0.009*	0.008**	0.031**	–0.067*
	(0.052)	(0.175)	(0.017)	(0.056)	(0.004)	(0.004)	(0.002)	(0.021)
LnED	–0.029**	–0.154**	–0.029**	–0.001*	–0.004***	–0.007***	–0.007**	–0.009**
	(0.036)	(0.087)	(0.061)	(0.047)	(0.012)	(0.012)	(0.009)	(0.025)
Effchg	–0.427**	–0.038**			–0.021	–0.020		
	(0.095)	(0.014)			(0.015)	(0.016)		
INTDIFF	0.003	–0.003			0.022	0.019		
	(0.002)	(0.018)			(0.008)	(0.007)		
LnDC	0.143**	0.067	0.283**		0.011**	0.012**	0.011**	
	(0.047)	(0.014)	(0.083)		(0.001)	(0.001)	(0.001)	
ResM2	0.0003		0.005**		0.006*		0.007**	
	(0.005)		(0.009)		(0.001)		(0.001)	
OP	0.001**		0.001**		0.017**		0.007*	
	(0.001)		(0.002)		(0.007)		(0.006)	
Use Imf Cr					1.03*		0.0000**	
					(0.101)		(0.003)	
SWAP	–0.004*	0.006			0.630**	0.007		
	(0.001)	(0.018)			(0.111)	(0.001)		
Dum.DC	0.012				0.00007			
	(0.004)				(0.004)			
Ln.Oil.Exp	0.349**	0.204**			0.0334	0.017		
	(0.023)	(0.012)			(0.005)	(0.007)		
Pop.Growth		0.411*	0.024*			0.003**	0.221**	
		(0.035)	(0.008)			(0.001)	(0.051)	
Dum.Sov. Rg	0.310		–0.019	–0.317	0.101		0.162	–0.052**
	(0.029)		(0.003)	(0.008)	(0.022)**		(0.020)	(0.021)
Dum.CC				–0.334				–0.100
				(0.013)				(0.024)
Hansen-J (p-value)	0.045	0.215	0.259	0.247	0.457	0.389	0.074	0.278
Ar (1)	0.000	0.005	0.002	0.021	0.007	0.002	0.001	0.004
Ar (2)	0.430	0.057	0.512	0.489	0.041	0.276	0.210	0.079
Sargan	0.306	0.425	0.105	0.147	0.056	0.145	0.179	0.217
Diff-Sargan	0.195	0.253	0.176	0.170	0.450	0.489	0.357	0.312

Goes In All analyses employed robust standard errors and Windmeijer (2005)'s small sample adjustment was used to GMM estimates. Parentheses denote errors that are resistant to standard deviation. There is statistical significance at the 1%, 5% and 10% levels using the ***, ** and * symbols respectively

which is an over-identification statistic for G7 countries, is 0.045. This indicates that the relevant model is over-identified. There is a second-order autocorrelation issue in Model 2, as evidenced by the probability value of the Ar(2) statistic being 0.057. As a result of adding new variables to the model, the over-definition of Model 4 under the fundamental specifications has disappeared. It can be shown that in the example of rising power countries, second-order autocorrelation and meaningless instrument variables may be found in the Sargan statistics in Model 1 and Model 4, respectively. There is an over-identification problem with Model 3, on the other hand. G7 countries were chosen as an example, while rising power countries were chosen as an example.

Model 3 with additional variables added for the G7 countries is statistically significant when compared to the basic model. Model 3's Pop.Growth variables were found to have a significant and positive impact on the dependent variable. For all statistically significant variables, the coefficient signs did not change and the coefficient values did not differ significantly between the two specifications.

A comparison between Model 2 with additional variables and basic specification for emerging power countries showed that there was no change in terms of significance of the variables. There were no significant changes in the coefficient signs or coefficient values at

Table 4: International reserves and macro economic factors- subsamples

Variables	Exc.China and Japan		Exc 2006–2010		Exc. Brasil, Mexiko and Turkey . Hyperinflation
	G7	RP	G7	RP	RP
TotREs (t–1)	0.120*** (0.018)	0.104** (0.063)	0.426*** (0.072)	0.089** (0.070)	0.024*** (0.038)
IR/GDP	0.912** (0.324)	0.107** (0.355)	0.068*** (0.078)	0.943*** (0.045)	0.163** (0.139)
LnFDI	–0.025** (0.023)	0.085** (0.664)	–0.434*** (0.156)	0.812** (0.298)	0.138* (0.083)
LnPE	0.764*** (0.038)	0.458** (0.114)	0.328** (0.198)	0.455** (0.125)	0.906** (0.090)
LnExp	0.120 (0.063)	0.335** (0.134)	0.659** (0.204)	0.565** (0.144)	0.418** (0.111)
LnImp	0.020 (0.063)	0.245 (0.164)		0.003 (0.174)	0.570 (0.108)
CPI		–0.100** (0.074)		–0.275** (0.095)	–0.190** (0.063)
İntRt	0.171** (0.112)	–0.898** (0.671)	0.138** (0.104)	–0.237** (0.710)	–0.273** (0.215)
LnED	–0.013** (0.022)	–0.080** (0.049)	–0.103** (0.091)	–0.163** (0.059)	–0.050** (0.033)
Effchg		0.011 (0.019)		–0.031 (0.022)	0.012 (0.016)
INTDIFF		–0.193** (0.057)		–0.352** (0.066)	–0.186** (0.048)
LnDC	–0.020** (0.032)	0.023** (0.012)	–0.007** (0.001)	0.040 (0.013)	0.343*** (0.048)
ResM2	–0.0001 (0.0003)		–0.001 (0.0004)		
SWAP		0.047 (0.013)		0.191 (0.031)	
Hansen-J (p-value)	0.123	0.567	0.176	0.513	0.478
Diagnostic Tests (p-value)					
Ar (1)	0.000	0.005	0.031	0.002	0.004
Ar (2)	0.782	0.567	0.681	0.547	0.461
Sargan	0.249	0.518	0.315	0.627	0.594
Diff-Sargan	0.373	0.686	0.425	0.782	0.853

All analyses employed robust standard errors and Windmeijer (2005)'s small sample adjustment was used to GMM estimates. Parentheses denote errors that are resistant to standard deviation. There is statistical significance at the 1%, 5% and 10% levels using the ***, ** and * symbols respectively

the same time. Adding Pop.Growth to the model also has a positive and statistically significant impact on the dependent variable. For both G7 and Rising Power countries, results showed that the coefficients' signs and significance did not change when additional control variables were included to the findings.

Subtracting these two categories from the dependent variable yielded re-estimates of the results of Model 3 for G7 nations, as well as Model 2 for rising power countries, as shown in Table 4. used the same methodology as to recalculate the G7 and Rising Power models by eliminating Japan and China from their respective groups. In contrast to Model 3 under the basic specification, the estimation results show that the RESM2 variable has lost its statistical significance. Although the coefficient signs of the variables that were found to be significant under both specifications did not change, there was a difference in coefficient values because of the decreased sample size. There was no change in significance or sign of coefficients in relation to emerging power countries, however, between the new and basic specifications.

The 2008 global financial crisis had a direct and indirect impact on a number of macroeconomic indicators covered in the study. A new estimate was made by deleting the period before and after the 2008 global recession from the time series used for this model's calculations. In the G7 example, there was no modification in the basic specification other than that. The coefficients, on the other hand, remained unchanged in their sign. The LnDC variable was determined to be statistically negligible in the example of rising power countries.

It was decided to recalculate the model after taking into consideration the fact that Turkey, Mexico, and Brazil all suffered hyperneflation over the time period included by the data set. EfFcgh was the only variable in the sub-sample sample that was not statistically significant in the basic specification model.

Thus, it was found that the ResM2 and Effchg variables that had been significant in model 3 for G7 nations and for Rising power countries under different specifications were different. INTRT and LnFDI variables have different coefficient indications depending on nation group. No matter how many specs are changed, the scenario remains the same. Because deposit rates have a negative impact on national reserves, but a good one on emerging power countries, this was concluded in the example of G7 countries. G7 countries' increased foreign direct investment has a negative impact on the International Reserve whereas rising power countries benefit from it.

4. CONCLUSİONS

Many macroeconomic factors, including international trade indicators, have a direct correlation to the amount of national reserves. The general consensus in the research holds that countries' national reserves are affected both indirectly and directly by changes to their macroeconomic indicators and significant structural changes. Study results show that various macroeconomic factors and national reserves are causally linked in a direction from national reserves to relevant macroeconomic variables. Macroeconomic theory suggests that the volume of national reserves, especially in unstable countries, is influenced by changes in other macroeconomic indices. macroeconomic factors such as changes in the international trade balance, inflation and interest rates, changes in oil prices, foreign debt, and other macroeconomic indicators all have an impact on the volume of national reserves. When these indicators are disrupted, the central bank uses reserves to correct the imbalance. Otherwise, the central bank acts in accordance with the basic reserve policies. However, in industrialized and low-risk countries, the association between macroeconomic indicators and national reserves is weaker. Exchange rate or external debt crises occur less frequently in countries with stable macroeconomic structures, therefore Reserve Bank policies can be implemented without regard to macroeconomic conditions. Macroeconomic indicators and national reserves have a stronger correlation in emerging countries than in developed ones. More variables were statistically significant in the analysis of developing nations, with coefficient signs in line with theoretical assumptions, and R2 models had a greater value than developed countries, which further supports this claim. However, it cannot be ruled out that this is really a statistical fluke.

Even though we didn't look for a direct link between macroeconomic variables and national reserves in this study, we can infer that changes in other macroeconomic variables, such as those discussed above, induce changes in national reserve levels. However, it's not appropriate to keep up the defense of this position indefinitely. Additionally, it has been observed that certain central banks have a reserve policy that is independent of the economy. With regard to currency crisis and other economic issues, we might quote Russia's Central Bank, which does not use its reserves.

Net foreign investments decreased national reserves in G7 countries and increased in rising power countries as a consequence of the analysis. According to the findings of Wang (2009)'s study, FDI and national reserves have a favorable association based on the examination of both developed and developing countries. Furthermore, this conclusion conflicts with the findings of Benigno and Fornaro (2012), Matsumoto (2018), Benecká and Komarek (2018), Nayak and Baig (2019), Huang (2017), Law et al. (2021), which found a positive correlation between FDI and IR. According to the fact that G7 countries, who had optimal reserve levels, had an unexpected coefficient sign, this circumstance is characterized as a statistical coincidence. The economic validity of this conclusion has been questioned because of the inconsistency in reserves and foreign direct investment flows in any of the affected countries. A third factor that affects national reserves in diverse ways across countries is the interest rate on bank deposits. National reserves in G7 countries are negatively impacted, while those in Rising Power countries are positively impacted. This is, in fact, a predicted outcome from an economic standpoint. Deposit interest rates in many G7 countries have been extremely low for the past 15 years. Deposit rates have been static for a long time since the 2008 Global Crisis, when deposit rates fell significantly. According to the G7 countries' lack of non-temporary inflation or hyperinflation, rising deposit rates and diminishing reserves have not been recorded in the recent quarter century. That is, deposit interest rates are less volatile and reserve levels are more steady. On the contrary, over the time period included by the data set, emerging power countries faced numerous systemic and financial crises, raising concerns about macroeconomic instability. A number of countries developed monetary policies that were more restrictive and raised deposit rates in response to the economic turmoil. In this fragile macroeconomic conjuncture, national reserves were negative. In the end, this disparity between the two sets of countries is a logical result of their respective economies.

REFERENCES

Aitken, B.J., Harrison, A.E. (1999), Do domestic firms benefit from direct foreign investment? Evidence from Venezuela. American Economic Review, 89(3), 605-618.

Aizenman, J., Cheung, Y.W., Ito, H. (2015), International reserves before and after the global crisis: Is there no end to hoarding? Journal of International Money and Finance, 52, 102-126.

Aizenman, J., Cheung, Y.W., Qian, X. (2020), The currency composition of international reserves, demand for international reserves, and global safe assets. Journal of International Money and Finance, 102, 102120.

Aizenman, J., Chinn, M.D., Ito, H. (2008), Assessing the Emerging Global Financial Architecture: Measuring the Trilemma's Configurations Over Time (No. w14533). United States: National Bureau of Economic Research.

Aizenman, J., Hutchison, M., Noy, I. (2008), Inflation Targeting and Real Exchange Rates in Emerging Markets. NBER Working Paper 14561. United States: National Bureau of Economic Research.

Aizenman, J., Jinjarak, Y., Park, D. (2011), International reserves and swap lines: Substitutes or complements? International Review of Economics and Finance, 20(1), 5-18.

Aizenman, J., Lee, J. (2007), International reserves: Precautionary versus mercantilist views, theory and evidence. Open Economies Review, 18(2), 191-214.

Aizenman, J., Marion, N. (2004), International reserve holdings with sovereign risk and costly tax collection. The Economic Journal, 114(497), 569-591.

Alberola, E., Erce, A., Serena, J.M. (2016), International reserves and gross capital flows dynamics. Journal of International Money and Finance, 60, 151-171.

Arellano, M., Bond, S. (1991), Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. The Review of Economic Studies, 58(2), 277-297.

Arellano, M., Bover, O. (1995), Another look at the instrumental variable estimation of error-components models. Journal of Econometrics, 68(1), 29-51.

Baltagi, B.H., Song, S.H., Koh, W. (2003), Testing panel data regression models with spatial error correlation. Journal of Econometrics, 117(1), 123-150.

Bell, A., Jones, K. (2015), Explaining fixed effects: Random effects modeling of time-series cross-sectional and panel data. Political Science Research and Methods, 3(1), 133-153.

Benecká, S., Komarek, L. (2018), International reserves: Facing model uncertainty. Economic Systems, 42(3), 523-531.

Benigno, G., Fornaro, L. (2012), Reserve Accumulation, Growth and Financial Crises. England: London School of Economics and Political Science.

Berg, A., Pattillo, C. (1999), Are currency crises predictable? A test. IMF Staff Papers, 46(2), 107-138.

Berg, B., Milesi-Ferretti, G.M., Pattillo, C.A. (1999), Anticipating Balance of Payments Crises-The Role of Early Warning Systems. United States: IMF Occasional Paper. p186.

Bianchi, J., Hatchondo, J.C., Martinez, L. (2018), International reserves and rollover risk. American Economic Review, 108(9), 2629-2670.

Bitar, J., Boileau, M. (2021), Emerging markets ınterest rates, ınternational reserves and net foreign assets. Journal of Globalization and Development, 48,105-121.

Blanchard, O., Dell'Ariccia, G., Mauro, P. (2010), Rethinking macroeconomic policy. Journal of Money, Credit and Banking, 42, 199-215.

Blanchard, O.J., Faruqee, H., Das, M., Forbes, K.J., Tesar, L.L. (2010), The İnitial İmpact of the Crisis on Emerging Market Countries with

Comments and Discussion. Brookings Papers on Economic Activity. United States: International Monetary Fund. p263-323.

Blonigen, B., Wang, M. (2004), Inappropriate Pooling of Wealthy and Poor Countries in Empirical FDI Studies. United States: International Monetary Fund.

Blundell, R., Bond, S. (1998), Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics, 87(1), 115-143.

Bun, M.J., Windmeijer, F. (2010), The weak instrument problem of the system GMM estimator in dynamic panel data models. The Econometrics Journal, 13(1), 95-126.

Bussière, M., Cheng, G., Chinn, M.D., Lisack, N. (2015), For a few dollars more: Reserves and growth in times of crises. Journal of International Money and Finance, 52, 127-145.

Caballero, R.J., Krishnamurthy, A. (2009), Global imbalances and financial fragility. American Economic Review, 99(2), 584-88.

Cady, J., Gonzalez-Garcia, J. (2007), Exchange rate volatility and reserves transparency. IMF Staff Papers, 54(4), 741-754.

Calvo, G.A., Izquierdo, A., Loo-Kung, R. (2012), Optimal Holdings of İnternational Reserves: Self-insurance Against Sudden Stop (No. w18219). United States: National Bureau of Economic Research.

Chang, R., Velasco, A. (2000), Exchange-rate policy for developing countries. American Economic Review, 90(2), 71-75.

Cheng, G. (2015), Balance sheet effects, foreign reserves and public policies. Journal of International Money and Finance, 59, 146-165.

Cheung, Y.W., Ito, H. (2015), A cross-country empirical analysis of international reserves. International Economic Journal, 23(4), 447-481.

Cheung, Y.W., Qian, X. (2009), Empirics of China's outward direct investment. Pacific Economic Review, 14(3), 312-341.

Chinn, M.D., Ito, H. (2006), What matters for financial development? Capital controls, institutions, and interactions. Journal of Development Economics, 81(1), 163-192.

Dominguez, K.M., Hashimoto, Y., Ito, T. (2012), International reserves and the global financial crisis. Journal of International Economics, 88(2), 388-406.

Edwards, S. (1984), LDC's Foreign Borrowing and Default Risk: An Empirical İnvestigation (No. w1172). United States: National Bureau of Economic Research.

Edwards, S. (1984), The demand for international reserves and monetary equilibrium: Some evidence from developing countries. The Review of Economics and Statistics, 66, 495-500.

Efremidze, L., Schreyer, S.M., Sula, O. (2011), Sudden stops and currency crises. Journal of Financial Economic Policy, 3(4), 304-321.

Flood, R.P., Marion, N.P. (2001), A Model of the Joint Distribution of Banking and Exchange-rate Crises. United States: IMF Working Papers 01(213).

Frenkel, J. (1974), Dynamic Adjustment and the Demand for İnternational Reserves. United States: RePEc.

Genberg, H., McCauley, R.N., Park, Y.C., Persaud, A. (2005), Official Reserves and Currency Management in Asia: Myth, Reality and the Future. Geneva: International Center for Monetary and Banking Studies.

Greene, W.H. (2000), Econometric Analysis. 4th ed. International edition. New Jersey: Prentice Hall. p201-215.

Guimaraes, B. (2006), Debt and Default in a Growth Model. London: London School of Economics, Department of Economics.

Heller, H.R. (1970), Wealth and international reserves. The Review of Economics and Statistics, 52, 212-214.

Heller, H.R. (1979), Further evidence on the relationship between international reserves and world inflation. In: Economics and Human Welfare.United States: Academic Press. p233-248.

Heller, H.R. (1981), International reserves and world-wide inflation: Further analysis. Staff Papers (International Monetary Fund), 28(1), 230-233.

Helpman, E., Melitz, M.J., Yeaple, S.R. (2004), Export versus FDI with heterogeneous firms. American Economic Review, 94(1), 300-316.

Huang, Y. (2018), From the World's Factory to a World Creditor: China's External Wealth and Excess Returns, 1997-2016. Avaialble from: https://www.ssrn.com/abstract=3149301

Hviding, K., Nowak, M., Ricci, L.A. (2004), Can Higher Reserves Help Reduce Exchange Rate Volatility? United States: IMF Workıng Papers.

Iacoviello, M., Navarro, G. (2018), Foreign effects of higher US interest rates. Journal of International Money and Finance, 95, 232-250.

Iyoha, M.A. (1976), Demand for international reserves in less developed countries: A distributed lag specification. The Review of Economics and Statistics, 58, 351-355.

Jeanne, O., Ranciere, R. (2011), The optimal level of international reserves for emerging market countries: A new formula and some applications. The Economic Journal, 121(555), 905-930.

Jeanne, O., Wyplosz, C., Blanchard, O. (2007), 4. The International Lender of Last Resort: How Large Is Large Enough? Illinois: University of Chicago Press. p89-124.

Jung, K. M., & Pyun, J. H. (2018). Out-of-sample analysis of international reserves for emerging economies with a Dynamic Panel model. Available at SSRN 3108516.

Kato, M., Proaño, C.R., Semmler, W. (2018), Does international-reserves targeting decrease the vulnerability to capital flights? Research in International Business and Finance, 44, 64-75.

Khan, M.S. (1979), Inflation and international reserves: A time-series analysis. Staff Papers, 26(4), 699-724.

Lane, P.R., Burke, D. (2001), The empirics of foreign reserves. Open Economies Review, 12(4), 423-434.

Laser, F.H., Weidner, J. (2020), Currency Compositions of İnternational Reserves and the Euro Crisis (No. 238). Darmstadt: Darmstadt Discussion Papers in Economics.

Law, C.H., Soon, S.V., Ehigiamusoe, K.U. (2021), The nonlinear ımpact of ınstitutional quality on ınternational reserves: International evidence. Journal of International Commerce, Economics and Policy, 12(3), 2150014.

Lim, D. (1983), Instability of government revenue and expenditure in less developed countries. World Development, 11(5), 447.

Matsumoto, H. (2018), Reserve Accumulation, Foreign Direct İnvestment, and Economic Growth. In 2018 Meeting Papers (No. 237). Society for Economic Dynamics, 43, 241-262.

Mendoza, R.U. (2004), International reserve-holding in the developing world: Self insurance in a crisis-prone era? Emerging Markets Review, 5(1), 61-82.

Mohanty, M.S., Turner, P. (2006), Foreign Exchange Reserve Accumulation in Emerging Markets: What are the Domestic İmplications? India: BIS Quarterly Review.

Nayak, S., Baig, M.A. (2019), International reserves and domestic money market disequilibrium: Empirics for India and China. International Journal of Emerging Markets, 14, 536.

Pina, G. (2015), The recent growth of international reserves in developing economies: A monetary perspective. Journal of International Money and Finance, 58, 172-190.

Prasad, E., Wei, S.J. (2009), 9. The Chinese Approach to Capital Inflows: Patterns and Possible Explanations. Illinois: University of Chicago Press. p421-480.

Ram, R. (1986), Causality between income and government expenditure: A broad international perspective. Public Finance, Finances Publiques, 41(3), 393-414.

Reinhart, C.M., Rogoff, K.S. (2008), This Time is Different: A Panoramic View of Eight Centuries of Financial Crises (No. w13882). United States: National Bureau of Economic Research.

Rey, H. (2015), Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy İndependence (No. w21162). United States: National Bureau of Economic Research.

Rodrik, D. (2006), The social cost of foreign exchange reserves. International Economic Journal, 20(3), 253-266.

Roodman, D. (2006), How to do xtabond2: An İntroduction to "Difference"and "system. In GMM in STATA." United States: Center for Global Development Working Paper No. 103.

Rose, A.K. (2007), A stable international monetary system emerges: Inflation targeting is Bretton Woods, reversed. Journal of International Money and Finance, 26(5), 663-681.

Rose, A.K., Spiegel, M.M. (2012), Cross-country causes and consequences of the 2008 crisis: Early warning. Japan and the World Economy, 24(1), 1-16.

Sachs, J.D., Tornell, A., Velasco, A. (1996), Financial crises in emerging markets: The lessons from 1995. Brookings Papers on Economic Activity, 1996, 147-215.

Soto, C., García, P. (2004), Large hoardings of ınternational reserves: Are they worth ıt? Documentos de Trabajo (Banco Central de Chile), 299, 1.

Steiner, A. (2017), Does the accumulation of international reserves spur inflation? A reappraisal. *North American Journal of Economics and Finance, 41,* 112-132.

Sula, O. (2011), Demand for international reserves in developing nations: A quantile regression approach. Journal of International Money and Finance, 30(5), 764-777.

Sula, O., Oguzoglu, U. (2021), International reserves and economic growth. International Review of Economics and Finance, 72, 16-28.

Wang, M. (2019), Foreign Direct Investment and Foreign Reserve Accumulation. Working Paper. United States: IMES.

Windmeijer, F. (2005), A finite sample correction for the variance of linear efficient two-step GMM estimators. Journal of econometrics, 126(1), 25-51.

Wu, P.C., Lee, C.C. (2018), The non-linear impact of monetary policy on international reserves: Macroeconomic variables nexus. Empirica, 45(1), 165-185.

Zhou, Y. (2009), International reserves and fiscal policy in developing countries. Review of International Economics, 17(5), 942-960.

APPENDIX

Appendix A: Descriptive variables

Abbreviation in the article	Identifying information	Source
LnTotRes	Total reserves minus gold.USD	World Development Indicators
IR/GDP	The ratio of international reserves excluding gold to GDP. %	World Development Indicators
LnFDI	Foreign Direct İnvesment. USD	World Development Indicators
LnPE	Total public expenditure. USD	World Development Indicators
LnExp	Export. USD	World Development Indicators
LnIMP	İmport. USD	World Development Indicators
CPI	Consumer Price Index. %. Change	World Development Indicators
INTRT	İnterest Rate of Central Bank. %	World Development Indicators
LnED	External Debt (short time) . USD	World Development Indicators, FRED
EFFCHG	Effective Exchange Rate. %	World Development Indicators
INTDIFF	The difference between the national deposit rates and the Fed deposit rate. %. $Ln\left(\frac{1+i}{1+\acute{Y}_{us}}\right)*100$	Sula and Ozanoglu (2020)
LnDC	Net Domestic Credit. USD	World Development Indicators
M2Res	M2 Money Board/IR . %	World Development Indicators
LnOP	Oil Price. USD	World Development Indicators
LnIMFCR	Use of IMF Credit. USD	International Debt Statistics
Dum.SWAP	If the country has a swap agreement with any country; 1, if not 0	Ainzenman et al. (2019)
DumDC	External Debt Crisis. Dummy. İf External Debt/GDP>0.6, DumDC=1, otherwise=0	Guimaraes (2006)
LnOilExp	Monetary value of oil sold during the year. USD	World Development Indicators
Pop.Growth	Population growth rate. %	World Development Indicators
Dum.SovRg	Sovereign Regime. Dummy.If volatile exchange regime=1; fixed exchange rate=O	Calculate by author
Dum.CC	Currency Crisis. Dummy. If the national currency has depreciated 30% against the dollar within a year; 1, if not; 0	Calculate by author

Appendix B: Descriptive Statistics

Variables	N		Mean		Std.Error		Min		Max	
	G7	RP	G7	RP	G7	RP	G7	RP	G7	RP
TotRes	350	471	10.58193	10.31336	0.5549434	0.922509	9.115978	8.154219	12.12849	12.58649
IR/GDP	349	472	0.0366081	0.0924711	0.0442597	0.0860303	0.0018102	0.0031272	0.2749803	0.4735759
LnFDI	350	428	11.71691	11.50269	0.0594561	0.051473	11.51222	9.12042	11.8641	11.57209
LnPE	348	482	11.45739	10.64724	0.4667972	0.6235127	10.31155	8.937898	12.4764	12.37927
LnExp	321	482	11.42171	10.79534	0.4439753	0.6879109	10.18022	8.936908	12.22452	12.43509
LnImp	321	479	11.43416	10.72878	0.4653316	0.6601372	10.1707	9.042576	12.40777	12.32955
CPI	350	465	13.068703	11.041848	0.306598	0.9053919	–6.352837	–2.059311	24.20729	4.6059219
INTRT	350	435	1.0459103	2.0593938	0.053599	0.0205934	–4.1	–3.7	17.03568	33.059819
LnED	274	336	2.091084	10.20881	0.5474761	0.6565354	1.318668	8.502427	4.051021	12.09323
EFFCHG	290	222	2.012151	1.97583	0.0587976	0.1052311	1.841477	1.680807	2.176098	2.258528
INTDIFF	328	455	5.300696	5.0941839	3.255494	2.8058371	0.99583	–1.094381	16.22083	22.041948
LnDC	350	460	13.76632	11.73658	0.4824457	3.018805	13	–1.439333	15.21518	15.88164
M2Res	338	463	16.21435	0.7896338	19.41614	0.2860669	0.004194	0.0669042	90.94436	1.689793
LnOP	350	350	32.5988	32.5988	26.78824	26.78824	3.39	3.39	95.99	95.99
IMF CR	-	295	-	9.29662	-	0.6234347	-	7.363875	-	10.46015