

The Effect of Exchange Rates and World Crude Oil Prices on Inflation: Evidence from Emerging Economies

Reshma^{1,*}, Wahyu Widodo¹

Affiliations

1. Diponegoro University,
Indonesia

*Corresponding Author Email:
reshma.rasool012@gmail.com

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Abstract

This study examines the effect of exchange rates and crude oil prices on inflation in emerging economies using data from 2000 to 2018. The method used in this research is fixed effect least square dummy variable, by grouping the sample into four different country groups: Asia, Africa, America, and Europe. The findings of this study reveal a significant effect of the exchange rates and crude oil prices on inflation in emerging economies of different regions (Asia, Africa, Europe, and America), as the economies in these different regions heavily rely on imports throughout the period. Variations in exchange rates and volatility in crude oil prices wield considerable pressure on domestic inflation rates with varying effects on each region's emerging economies. The study sheds light on the role of interest rates and foreign direct investment in moderating inflationary pressures highlighting the importance of wide-ranging monetary policies in vindicating economic susceptibilities.

Keywords: *Inflation, Exchange Rates, World Crude Oil Prices, Emerging Economies, LSDV, Panel Data*

JEL Classification: F31, F41, Q43

1. Introduction

Inflation is the persistent growth in a country's overall price level, causing the purchasing power to decrease at a certain level. "Inflation is always a monetary phenomenon everywhere" (Friedman, 1989). According to the quantity theory of money, "the available quantity of money in an economy regulates the value of money, and growth in the quantity of money is the primary cause of inflation". Furthermore, many other economists have described inflation earlier such as (Easterly & Fischer, 2001) shown that inflation is an unfair tax that only hurts the poor compared to the richer ones. Inflation diminishes the buying supremacy of money, but inflation does not mean that entirely prices are increasing, even throughout periods of speedy inflation, prices may be comparatively endless and others may even decrease (Mcconnell et al., 2011.).

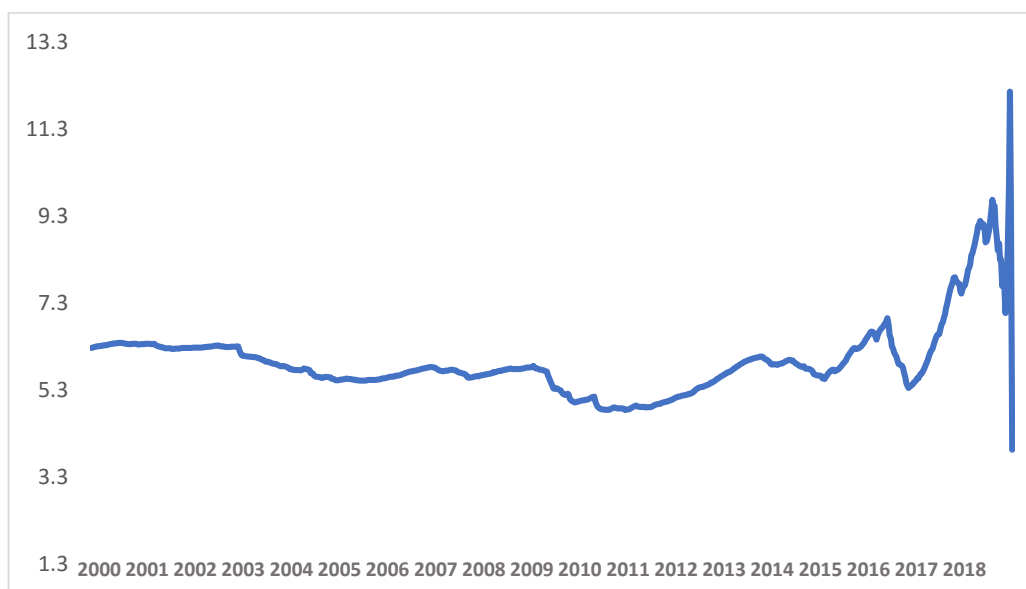
Exchange rates (EXR) are directly linked with the country's other macroeconomic variables such as Inflation (INF), Interest rates (IR), imports, exports, etc. A country's currency value is expressed through the exchange rate which is adjusted with the effect of inflation (Feng et al., 2022). A long-term association was detected among the price level, money, its amount of return, and the EXR (Asad et al., 2012.). Bano et al., (2021), studied the influence of exchange rates and World Crude Oil Prices (WCOP) on inflation in Pakistan, the study shows that both EXR and WCOP have a significant positive relationship with inflation in Pakistan by using the cointegration techniques. Mather & Carstensen, (2003) determined the impact of WCOP on INF using the Phillips Curve in the US, UK France, and Germany. An upsurge in petroleum prices causes an upsurge in consumer prices (Basnet & Upadhyaya, 2015). Al-Malkawi et al., (2012),

applied the VAR–VECM to examine the effects of WCOP shocks on inflation in Malaysia by using monthly data and decided that variations in WCOP cause a variation in the inflation percentage. EXR and the gross domestic product are positively related to inflation while the food items are undesirably linked to the INF (Bala & Alhassan, 2017).

Awan & Mukhtar, (2019), determined the influence of WCOP on EXR in Azerbaijan by applying the VECM model, the research suggests that WCOP and EXR have a positive and substantial consequence on inflation in the long run. An increase in the price of oil results in devaluation in the EXR (Rautava, 2004). Many of the previous studies exclusively focused on the pass-through consequence of WCOP on INF such as (Hooker, 2002), (Noord & André, 2007), (Stocks, 2016), (Blanchard & Gali, 2007), (Chen et al., 2009), (Clark & Terry, 2010), & (Fukac, 2011).

This remains the main reason and one of the goals of monetarists who always tried to stabilize prices and control inflation using monetary policy tools. Kelikume, (2017), studied the irregular properties of exchange rates and WCOP tremors' impact on inflation in Nigeria and concludes that the immediate consequence of EXR increases the worth level by up to 50% in 12 months. However, further study shows that a depreciation in exchange rates can increase the price level to 41% and an appreciation in currency can decrease the price to 14%. Thus, the previous studies focus more on the relationship between exchange rates and oil shocks. Still, our study emphasizes the nexus between the EXR and WCOP and the INF rates in the world's emerging economies. Previous studies examine the cross-country or the time series data but our study examines the panel data which mainly focuses on the cost-push inflation among the emerging economies of the world. As these countries are major oil importers in different regions and thus, they have more floating exchange rates and have had high inflation for decades.

Figure 1: Average Inflation Rate in World Emerging Economies 2000-2018 (%)



Source: World Bank (2023)

Figure 1 shows the average inflation rate in the world's emerging economies from 2000 to 2018. During the early period of 2000 inflation declined in the emerging economies because of the reforms adopted by different emerging economies. Inflation was 4.86% during 2000 but suddenly rose in 2008 to 6.36% due to the credit crisis. Again, there was a decline in the inflation rate in 2009. Emerging economies faced the challenges of adopting monetary policies as inflation rose again in 2015 up to 5%. The inflation rate in

Asian emerging economies increased continuously from 2000 to 2018 due to demand and supply shocks. Whereas, inflation remains low in the American emerging economies (Mumtaz & Surico, 2011).

Rising inflation is declining the investment confidence of many foreign investors in emerging economies which is declining savings and eroding unbalance in balance sheets (J. Ha et al., 2019). Moreover, high inflation can fall on the poor households, since these households rely more on the wage income and are unlikely to bear the interest-bearing accounts and have significant cash holdings. This is the main reason emerging economies are making reforms and monetary policies to lower the inflation rate which can significantly reduce poverty, and financial instability and improve economic growth (Iv, 2000). During 2017, inflation was within or below the central bank's aim points in sub-Saharan Africa. After the Bretton Woods static EXR period, inflation rates were stable and low in the emerging economies, however during the modern era it was notably challenging to maintain the inflation rate in emerging countries (Conti & Nobili, 2019).

Variations in domestic inflation occurred due to the oil price spike such as the WCOP shocks in 1973 and again in 2001, which increased the inflation rate to 40% in emerging countries. Nonetheless, domestic inflation much increased from the recession of 2008-2009 (Neely & Rapach, 2011). Emerging economies faced negative oil price shocks due to the OPEC decision to discover new oil production sources rapidly. This negative shock has increased the global inflation rate up to 60% in which emerging economies faced more challenges to recover. From 2001 to 2014 and 2016, the oil demand increased which automatically increased the global inflation rate (Borio & Filardo, 2011).

Interest rates have more movements in emerging economies as the monetary authorities practice IR as an important instrument to regulate the INF rate in these emerging countries followed by Taylor's first rule in 1993. According to Taylor's rule, IR is changing matching the deviation of the inflation rate and output slit. According to Taylor (2003), interest rates in emerging economies vary according to inflation expectations. It was examined that emerging markets are focusing more on the exchange rates and their central banks are making policies for stable exchange rates; however, empirical evidence suggests that interest rates are playing a crucial role in both the trade and inflation targeting policies (Borio & Filardo, 2011).

Mishkin, (2008), found that why emerging economies have sudden repeated exchange rate collapse and vulnerable shocks. To overcome the financial crisis emerging economies have weaker institutional credibility and because of that central banks should make inflation-targeting policies such as expansionary monetary policy (Gerlach & Gerlach-Kristen, 2005). According to Taylor, (2001) if exchange rates depreciate due to sudden collapse interest rates should remain unchanged, because these exchange rates movements do not have more effect on the expected inflation, due to which central banks will react directly to take action for these exchange rate movements.

To increase the output volatility central banks in emerging economies are attempting to reduce the exchange rate volatility (Ball, 1999). Vinh, (2011) examined that if exchange rates are due to financial shock and if foreign investors are withdrawing their investments from a particular country, it will be a better option for chief banks to upsurge the IR to stabilize both the inflation rate and output. One reason that is consistent with the theory is that currency depreciation in emerging economies from financial shocks usually causes high inflation. Exchange rate shocks are persistent in emerging economies. To maintain the currency rate chief banks, have to adopt the policy to increase the IR which can cause larger output losses (Goodhart, 1998). Emerging economies have followed the United States' neutral policy rates which were lower policy rates for two decades. Interest rates declined in emerging economies from 6% to 2.2% in 2019 (N. M. Ha & Ngoc, 2020). In emerging countries, interest rates fall from 1990 to 2000 from 7% to 2%.

Over the period, those countries aligned with geopolitical have continued to raise the FDI more than those with geographical locations. Emerging economies depend more on FDI than advanced economies as these countries rely more on flows from geopolitically distant countries. FDI has a substantial influence on the economic development of emerging economies as FDI boosts technology transfer, capacity building, and employment possibilities. Existing literature provides a brief knowledge that FDI increases economic growth by entering the international markets which provide exchange rates, capital investment, and share of income. FDI is riskier and steadier than other investments such as portfolio and debt flows. In 2020 FDI flows in emerging economies was (1.66 trillion \$) 76% more than in 2019 (92 billion \$) (Purwati et al., 2021).

2. Literature Review

2.1 Theory of Purchasing Power Parity (PPP) as the Basic Framework

According to the purchasing-power-parity (PPP) theory, EXR must ultimately alter such that they associate the buying influence of numerous currencies (McConnell et al., 2011). PPP is the measurement of the value of goods in various states and is cast off to the equivalence of the power of acquiring of the states. However, according to PPP INF and EXR vary from the marketplace EXR due to tariffs and additional business expenses. This concept explains that INF will lessen the actual supremacy of purchasing between the nations. Therefore, if a country has an INF rate of 10%, its money value will be less, and it will buy 10% fewer actual goods at the end of the year. The national price level (P) is anticipated to rise if the exchange rate (S) rises (domestic currency appreciates). According to PPP, this suggests that a weaker native currency causes higher inflation. It is anticipated that the domestic price level (P) will decline if the exchange rate (S) declines (domestic currency appreciates).

According to PPP, home currency strength reduces inflation. The PPP equation closely relates the foreign price level (P^*) and inflation in a foreign nation. Because oil is a key import for some countries, fluctuations in oil prices that impact international prices can also affect inflation rates in those nations. Purwati et al., (2021), studied the macroeconomic impacts of WCOP tremors in Asian economies. By using the VAR model, they identified the trio of basic shocks, oil supply shock, oil demand shock determined by financial bustle, and oil-specific demand tremor in four major Asian oil-consuming countries (Japan, Korea, India, and Indonesia). They further examined that the CPI of Indonesia and India remained the same during these shocks due to government subsidies and price regulations. Still, there was a persistent increase in Korean CPI during these shocks. The results of their findings advocate that monetary action and prices retort very inversely due to the WCOP tremors reliant on their activity. Their findings also suggest that the oil supply has limited shocks but the oil mandate has a positive and substantial influence on these four Asian economies.

Khan et al., (2020), investigated the effects of INF on the rate of economic development of Five Asian states; namely: Bangladesh, Iran, Indonesia, Malaysia, and Pakistan from 1973 to 2016. Using the Unit root test Ordinary Least Square and some other panel data methods, the outcomes revealed that INF has an adverse and statistically substantial influence on the economic progress of these sample states. The panel data correspondingly showed the undesirable impact of inflation and the momentous association between financial development and INF. The panel regression analysis shows the negative coefficient of inflation (-0.10 to -0.13) which shows the harmful effect of inflation among the five economies.

Astutie, (2018), estimated the effects of WCOP variations on INF in the US, UK, France, Germany, and Japan, via the Augmented Phillips Curve framework. The numerical estimations of the study suggest that WCOP has an uncertain impact on INF in the US, Japan, and Europe. An increase of 10% in oil prices tethered to 0.1 to -0.8 increases in the INF in the US and Europe. Furthermore, the study shows that INF

in Europe is increasing relative to the US due to the exchange rates and due to oil prices (Khan et al., 2023). Nusair & Olson, (2021), studied the irregular effects of WCOP changes on the internal production of Asian economies: Indonesia, Malaysia, Singapore, Philippines Korea, Japan, and Thailand. Using annual data between 1973 and 2018 the outcomes of the nonlinear ARDL suggest that WCOP variations do not affect the local output of Indonesia, Thailand, Korea, and Singapore.

The Bank of Japan (BOJ) raised a negative IR strategy to overcome deflation. With the negative interest rates, domestic citizens will withdraw their money from the banks and start spending which can increase domestic demand and raise production (Stocks, 2016). Golub et al., (2003), investigated that increased oil prices may appreciate the EXR of the oil-exporting states. Kiel et al., (2023), studied that after the Bretton wood system, oil prices were the key drivers of the EXR variations in the US dollar. Abul et al., (2011), examined that EXR in emerging countries is depreciated by the rising of oil prices.

Wati et al., (2022), examined the impact of WCOP on Indonesia's EXR. The study shows the results as the long-run cointegration relation among the WCOP and EXR is complex to the EXR regime in Indonesia. Since the US dollar is a player in international trade, lower prices of oil will decrease the dollar value and the exporter of the oil currencies, (Zhang, 2008). A 1% increase in the oil prices cause the interest rates dropped by 0.26% in the long run in Indonesia (Murjani, 2019). Babajide Fowowe, (2011) found that there is no positive association between the WCOP and the INF. The first concept of the association between WCOP and INF was brought by (Hooker, 2002), who found that WCOP had a substantial influence on INF in previous periods rather than in future periods.

2.2 Hypothesis

Based on the literature review and theoretical background of our study following hypothesis has been formulated:

H1: Exchange rates have a positive and significant effect on the inflation rate in the emerging economies of the world.

H2: Oil prices have a positive and significant effect on the inflation rate in emerging economies of the world.

H3: Interest rates have a positive and significant effect on the inflation rate in the selected countries.

H4: Foreign direct investment positively and significantly affects inflation in the selected countries.

3. Theoretical Framework and Models

3.1 Types and Sources of Data Collection

To examine the effect of EXR and oil prices on inflation in the world's emerging economies, we have obtained panel data from 2000 to 2018. This study contains the annual secondary data. The exchange rates, inflation, interest rates, and FDI data are selected from the World Development Indicators (WDI) and the World Bank. However, the data for the WCOP are taken from OPEC, OECD, and the International Monetary Fund (IMF).

3.2 Empirical Model

Following Hussain et al., (2022), the current study will use the Least Square Dummy Variable model (LSDV) to examine the consequence of EXR and oil prices on inflation (evidence from emerging economies of the world) to evaluate the influence of the independent variables on the dependent variables and to check the accuracy in our model our study will use the multicollinearity, autocorrelation, and heteroscedasticity to check whether the independent variables are correlated each other or not. Along with these, we will also use the Robust Standard error to get an unbiased standard error. We have used exchange

rates, oil prices, interest rates, and foreign direct investment (FDI) as the explanatory variables and inflation as the dependent variable. The following model has been created for the estimation:

$$INF_{it} = \beta_0 + \beta_1 EXR_{it} + \beta_2 WCOP_{it} + \beta_3 IR_{it} + \beta_4 FDI_{it} + \alpha_i + \varepsilon_{it} \quad (3.1)$$

Where:

INF = Inflation rate

EXR= Exchange rate

WCOP= World Crude Oil Prices

IR = Interest rate

FDI = Foreign Direct Investment

i = Country

t = Time (periods)

α_i = specific fixed effect for country i

ε = error term

4. Results and Discussions

4.1 Description of the Variables

Table 1: Description of the Variables

Variables	Symbol	Measure	Source
Inflation	INF	%	World Bank
Exchange Rates	EXR	\$	World Bank
World Crude Oil Prices	WCOP	\$	OPEC/OECD
Interest Rates	IR	%	World Bank
Foreign Direct Investment	FDI	\$	World Bank

4.2 Results of the LSDV Model

Table 2: Empirical Results of the LSDV Model

Variables	Coefficient	T statistics	P value
EXR	36.152***	4.19	0.000
WCOP	0.078***	3.94	0.000
IR	0.063	0.61	0.543
FDI	8.621	1.03	0.305
R	0.9		

ADJ R 0.8

Note: * shows significance level at * 1%, ** 5%, *** 10%

Table 2 presents the summary of the variables. The above table illustrates the outcomes of the data analysis for the different emerging economies of the regions by using the Least Square Dummy Variable model (LSDV) through the econometric software Stata. Table 2 demonstrates the results of the full sample that shows the results of all 44 emerging economies of the world. The coefficient value of the EXR illustrates that when EXR increases by a single unit it leads to an upsurge in the INF rate by 36 units this could be due to higher imports. However, the coefficient of EXR is larger than other variables which indicates a higher and stronger impact on the inflation rate among the world's emerging economies, (Ahmad et al., 2017).

The probability of the EXR is 0.000 which is less than 0.05, and from this value, the findings of our study show that there is a positive and momentous influence of EXR on the INF rate in emerging economies. The findings of our study are more related to the results of (Majeed & Malik, 2016), and (Sek, 2017). Furthermore, the coefficient value of the WCOP shows that an increase of one unit in WCOP prices leads to an increase in the INF rate by 0.07 units, as the oil is the prime source in manufacturing most of the products and items which is also explained by the findings of (Sek & Lim, 2016). The probability of the WCOP is 0.000 which is less than 0.05 and it illustrates that there is a positive and substantial impact of the WCOP on the INF rate in emerging economies of the world. Whereas the coefficient value of the IR indicates that an increase of one unit in interest rates decreases the INF rate by 0.06 units, according to the famous economist Irving Fisher, there is a direct association between the IR and the inflation rates which indicates that when IR fall there will be a rise in the inflation rate.

This impact can be seen from the probability of the IR which is 0.3 and is larger than 0.05 which illustrates that there is a positive and insignificant association between the interest rates and the inflation rate. These results are matched with the findings of the (Carbó et al., 2009). The coefficient value of the foreign direct investment (FDI) shows that when FDI increases by a one-unit inflation increase by 8.6 units in the emerging economies of the world, this is due to the technological transfer and the creation of employment which will increase the living standards and the consumption power of the people. The probability value of the FDI is 0.3 which is larger than 0.05 and shows an immaterial value for the FDI variable. The value of the R square is 0.9 which illustrates that 90% of the variation in the inflation is explained by the exchange rates and world crude oil prices in our regression model. However, the value of the adjusted R square is 0.8 which shows that our model is 80% fits with the data accuracy.

From the above discussion, we can conclude that EXR and WCOP have a strong and substantial consequence on the Inflation rate within the emerging economies of the world that are included in our sample. In contrast, the Interest rates (IR) and FDI have positive but a weak influence on inflation as both variables are statistically not significant in our LSDV model.

4.3 Wooldridge Test for Autocorrelation

Table 3: Wooldridge Test for Autocorrelation

World	Asia	Europe	Africa	America
0.000***	0.6265	0.7054	0.0077**	0.0035**

Note: * shows significance at 1%, ** 5%, *** 10%

Table 3 illustrates the findings of the Autocorrelation test. Autocorrelation states the association of the variable and its values from the past in the time series examination, it is necessary to check the autocorrelation to check whether the values of a variable are correlated at a point or not. There are several methods to check the autocorrelation, however, our study has used the Wooldridge test for autocorrelation which is more appropriate for the panel data set. The results of Table 3 indicates that there is no autocorrelation in the variables since the values are less than 1 it shows that our model does not contain autocorrelation. Table 3 demonstrates the results for the different emerging economies from different regions.

4.4 Multicollinearity

Table 4: Test for Multicollinearity

Variables	World	Asia	Europe	Africa	America
EXR	0.0224**	1.0000	1.00000	1.0000	1.0000
WCOP	0.0602	0.0080**	0.0595**	0.0113**	0.0078**
IR	0.0677	0.2273	0.0391**	0.2506	0.3901
FDI	0.0274**	0.1369	0.0184**	0.3800	0.2357

Note: * shows significance at 1%, ** 5%, *** 10%

Table 4 shows the results of the Multicollinearity test. Multicollinearity is the statistical phenomenon of checking whether the independent variables are correlated to each other or not. To check the multicollinearity of our regression model (LSDV), there are various methods to check the existence of multicollinearity. However, our study has used the Variance Inflation Factor (VIF), a value higher than 10 indicates significant multicollinearity. The results for multicollinearity are presented in Table 4, which shows that no multicollinearity exists between the variables. Table 4 shows the separate results for each independent variable for different group of countries in world emerging economies.

Table 4.5 shows the results of the robust standard error which is the final estimation for our LSDV model. In panel data, robust standard error is used to address the heteroscedasticity and the correlation across the entities. In our study, we used the robust standard errors to reduce the variance in the independent variables across the time to detect heteroscedasticity. Table 5 shows the results of the Robust Standard error for the whole sample in our model for the emerging economies of the world.

The coefficient value of the EXR shows that when EXR rises by a single unit it will surge the INF rate by 36.15 units in the emerging economies of the world, the probability (0.000) value shows that there is a positive and substantial consequence of the EXR on the INF rate in the emerging countries of the world throughout the analysis. Similarly, the coefficient value of the WCOP indicates that when the WCOP surges by a single unit it will raise the INF rate by 0.775 units, whereas the probability (0.000) shows that there is a positive and substantial effect of the WCOP on the INF rate in the world emerging countries. Furthermore, the coefficient of the IR demonstrated that when IR increases by one unit it will raise the

INF rate by 0.063 units, this happens due to an increase in the cost of borrowing which reduces consumer spending, however, the probability (0.543) value shows that there is a positive but irrelevant or weaker consequence of the IR on the INF rate in the emerging economies in our study.

4.5 Final Estimation of the Empirical Model

Table 5: Final estimation of the LSDV model (Dependent Variable is Inflation)

Variable	World EME		Asian EME		European EME		African EME		American EME	
	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value
EXR	36.15	13.03	- 4.08	-2.45	- 0.50	-0.54	3.50	2.88	8.99	7.06
WCOP	0.07	5.10	0.22	2.88	-0.57	-3.91	0.01	0.99	0.06	0.51
IR	0.06	1.02	0.13	1.48	-0.21	-1.10	-0.52	-4.16	0.21	1.04
FDI	8.62	0.90	10.88	2.60	12.28	1.70	2.21	1.04	11.43	3.06
Adj R	0.8		0.4		0.3		0.5		0.7	
No of Samples (N*T)	836		323		171		228		114	

The coefficient of the FDI indicates that when FDI rises from a single unit to another it will increase the INF rate by 8.621 units which is a greater value than the IR and WCOP, whereas the probability (0.305) value shows that there is an insignificant effect of the FDI over the INF rate throughout the study. Lastly, the value of the R square illustrates that the variation in the INF rate is 90% enlightened by the explanatory variables in our LSDV model and the remaining 10% is unexplained which can be from other variables that are outside of our model. Also, the R square illustrates the best fit of the model (LSDV) for the panel data estimation.

So far, we have discussed the empirical results of our LSDV model for the all-emerging economies in our sample, now we will discuss the results of the emerging economies of different regions which are Asia, Europe, Africa, and America. The results from Table 5 for different emerging economies from different regions of the world are as follows:

Column no 3 of Table 5 shows the empirical results of the emerging economies from Asia. The coefficient value of the EXR demonstrated that when EXR decreases by a single unit it will raise the INF rate by - 4.086 units, due to expensive imports the prices of the imported products will be higher when the currency depreciates in the Asian emerging economies, (Qazi Masood Ahmed & Mohammad Sabihuddin Butt, 2001). The probability of the EXR is 0.000 which indicates that EXR has a strong positive and substantial influence on the INF rate. Similarly, the coefficient value of the WCOP indicates that when WCOP rises

by a single unit it will raise the INF rate by 0.225 units, and the value of the probability also shows that WCOP has a substantial impact on the INF rate in the Asian emerging economies, (Bonato, 2007).

Furthermore, the coefficient of the IR shows that when IR is increasing by a single unit it will decrease the INF rate by 0.130 units, and the value of probability (0.001) shows that the variable has a substantial impact on the INF rate. The coefficient of the FDI indicates that when FDI is increasing by one unit it will increase the INF by 10.880 units. In contrast, the probability value is 0.000 which shows that FDI has a positive and meaningful consequence on the inflation rate in Asian emerging economies. The value of R square shows that the variation in INF is 40% explained by the EXR, WCOP, IR, and FDI in our regression model.

Column no 4 of Table 5 illustrates the LSDV model results for the European region's emerging economies. The coefficient of the EXR shows that when EXR is decreasing by one unit there will be an upsurge in the INF rate by -0.504 units. The probability value is 0.552 which is larger than 0.05 indicating that EXR has a negative and irrelevant influence on the INF rate in the European emerging economies (Lewis, 2014). Similarly, the coefficient of the WCOP shows that when WCOP is increasing by one unit will raise the inflation rate by 0.057 units. The probability value is 0.000, indicating that WCOP has a positive and substantial impact on the INF rate in the European emerging economies (Miller & Ratti, 2009), (Narayan et al., 2008).

The coefficient value of the IR shows that when IR are decreasing for a unit it will increase the INF rate by 0.217 units. The probability of the IR is 0.033 which is less than 0.05 and it shows that IR has a negative and substantial effect on the INF rate among the European emerging economies from 2000 to 2018. Furthermore, the coefficient value of the FDI shows that when there is an upsurge in the assets inflow (FDI) in the European emerging economies by one unit, it increases the inflation rate by 12.286 units which is higher than the other coefficient values. The value of probability (0.010) shows that FDI has a positive and momentous effect on the INF rate in the emerging economies in the European region, (Farrell et al., 2003). The R square shows the inclusive appropriate of the model with the data and also it shows that 40% variations in the INF rate are explained by the EXR, WCOP, IR, and FDI, in the European emerging economies.

Column no 5 of Table 5 reveals the results of the LSDV model for the African emerging economies from 2000 to 2018. The coefficient value of the EXR indicates that an EXR increase by a single unit will raise the INF rate by 3.503 units. Whereas, the probability (0.001) value expressed that there is a positive and substantial influence of EXR on the INF rate in emerging African economies, (Ayadi, 2005). The coefficient value of the WCOP shows that when the WCOP rises by one unit it will raise the INF rate by 0.010 units, and the probability (0.285) value indicates that there is a positive and trivial outcome of the WCOP on the INF rate which is weaker effect than the EXR among the African emerging economies, (Akbulut, 2014).

The coefficient value of IR shows that when IR is decreasing through a single unit it will increase the INF rate by 0.525 units, whereas, the probability (0.000) value indicates that there is a negative and substantial outcome of the IR on the INF rate among the African emerging countries. However, the coefficient value of the FDI indicates that when FDI is increasing by one unit in the African emerging economies it will raise the INF rate by 2.213 units, and the probability (0.329) value shows that there is a weaker and

insignificant effect of FDI on the INF rate in the African emerging economies, (Coady et al., 2017). The value of R square exposes the overall fit of our LSDV model for the panel data, it indicates that 50% variation in the INF rate is described by the explanatory variables in our LSDV model and the 50% is unexplained by the other variables that are outside of the model.

Column no 6 of Table 5 demonstrated the outcomes of the LSDV model for the American emerging economies. The coefficient value of the EXR shows that when there is an increase in the EXR of one unit there will be an increase of 8.994 units in the INF rate, similarly, the probability (0.000) value shows that there is a positive and substantial consequence of the EXR on the INF rate among the American emerging countries from the period of 2000 to 2018 (Carrière-Swallow et al., 2021). The coefficient value of the WCOP shows that if there is an increase in the WCOP of one unit it will raise the INF rate by 0.066 units. However, the probability (0.591) value shows that there is a progressive but weaker or trivial effect of the WCOP on the INF rate among the American emerging economies, (Flammer & Ioannou, 2015).

Similarly, the coefficient value of the IR expressed that when IR rises by one unit, INF decreases by 0.214 units, and the probability (0.367) value shows that IR has a positive but weaker influence on the INF proportion among the emerging economies of the American region, (Kilian et al., 2009). The coefficient of the FDI illustrated that when FDI rises by a single unit it will upsurge the INF rate by 11.436 units, and the probability (0.004) value shows that there is a positive and momentous outcome of the FDI on the INF rate in the American emerging economies and so on, (Jordà et al., 2011). Lastly, the value of the R square shows that 70% variation in the INF rate is explained by the EXR, WCOP, IR, and FDI within our LSDV model for the panel data.

5. Summary and Conclusion

This study aims to examine the effect of EXR and WCOP on inflation (evidence from world emerging economies). The study has been conducted to check the consequence of the EXR variations and the explosiveness in the WCOP in the major emerging economies from different regions of the world. Our study has used the panel data for the 44 emerging economies from the different regions (America, Africa, Europe, and Asia), from 2000 to 2018. We used the annual data for the assessment, whereas, the statistics were poised from the World Bank, IMF, and OPEC/OECD for the variables that are Inflation, Exchange rates, World Crude Oil prices, Interest Rates, and Foreign Direct Investment. To estimate the panel data and to check the individual effect of the variables the study has used the Least Square Dummy Variable model (LSDV). To get the unbiased standard error we applied the Robust Standard Error, Multicollinearity, autocorrelation, and heteroscedasticity.

Our findings shows that exchange rates have highly significant effects on the inflation rate in emerging economies, as the coefficient value has a positive sign and the number is larger than other independent variables. Whenever exchange rates are increasing (the USD) emerging economies are facing higher inflation due to expensive imports, because the national money purchases less of the external goods as well as services. Our empirical results also shows that world crude oil prices have a substantial consequence over the INF rate, as emerging economies depend more on imports, and because the crude oil exporting economies export the crude oil in dollars it becomes more expensive for the emerging economies.

Emerging Economies are depressing their economic growth due to crude oil imports, as the capital flows shift from oil-importing to oil-exporting economies which determines the income distribution. Our study

has proved the major reasons that are affecting emerging economies which can be observed from the LSDV model estimated results. Furthermore, our results illustrated that IR has a positive consequence on emerging economies, as the State banks might target the INF rate by increasing interest rates. When the cost of borrowing increases people will lend more money to the banks and the financial institutions. Whereas, it will also decrease the money supply in emerging economies. However, FDI also has a significant consequence on the inflation proportion, with the capital inflow and the foreign investment in the emerging economies there will be a growth in the currency stream from technology transfer.

Findings from our study also revealed the cross-region comparison of the world's emerging countries, the observed outcomes of our study illustrated that there is a different effect of the EXR as well as the WCOP on the emerging economies of the world. Exchange rates hurt the inflation percentage in both Asian and European emerging economies which reflects that exchange rates have more variations in both regions. Similarly, exchange rates have a positive impact on the African and American emerging economies. Due to different economic situations in every region, the variables have different effects on the inflation rate in emerging economies.

5.1 Practical Implication and Limitation of the Study

The findings of our study can be used by policymakers to make better monetary policies that can control the inflation rate and maintain the EXR inside the economy. Moreover, the results of this research can be better used by the monetary authorities to control the IR to boost FDI. Investment makers both domestic and foreign can make better decisions by looking at the connection among WCOP, INF, and EXR to get satisfactory returns on the investment. The business community in emerging countries can take advantage of the findings of our study to plan for inflationary pressures and adopt risk-mitigating strategies to respond to the variations in exchange rates and commodity prices. Worldwide institutions such as the IMF, and the World Bank may leverage the findings of our study to target the policy ideas in emerging countries both monetary and fiscal policies.

Central Banks in each emerging country can take ideas from the empirical findings of our study to make better policies to target macroeconomic indicators such as inflation, IR, and EXR by using effective monetary policy tools. This research has allegations for the energy sector and the management to introduce energy planning policies such as in emerging countries government can boost domestic energy production to promote sustainability. Furthermore, the study can provide better ideas for international trade in emerging economies to address the challenges in the trade sector to maintain the exchange rates, and inflation to promote sustainable economic growth. Lastly, emerging countries can take advantage of the findings of this study to make better decisions and policies for each sector of the economy to take action against every economic shock both internal and external.

This study has used the Least Square Dummy Variable model (LSDV) which has limitations in capturing the complex relationship between the variables that are examined for the analysis. However, future research can use other econometric models to check the relationship between, WCOP, EXR, IR, and INF rates in emerging countries. Our empirical research has not included all the relevant variables that can be included by future research, such as the money supply being an important aspect of the monetary authority and an important factor in mitigating the consumer prices (INF) and cost of borrowing (IR) in the economies.

This study has not focused on the geopolitical situations or global shocks that are affecting the exchange rates, oil prices, and inflation rates in emerging countries, future research can include and examine these economic situations in emerging countries. Emerging countries are widely different regarding economic conditions, policies, environmental structure, and institutional context, so the study might not capture the

diversity across each emerging country. Further research may focus on this multifariousness between emerging economies.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Disclosure statement

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References

- Al-Malkawi, H.-A. N., Marashdeh, H. A., & Abdullah, N. (2012). Financial development and economic growth in the UAE: Empirical assessment using ARDL approach to co-integration. *International Journal of Economics and Finance*, 4(5), 105–115.
- Asad, I., Ahmad, N., & Hussain, Z. (n.d.). Impact of real effective exchange rate on inflation in Pakistan. *Asian Economic and Financial Review*, 2(8), 983–990.
- Awan, A. G., & Mukhtar, S. (2019). Causes of trade deficit and its impact on Pakistan's economic growth. *Global Journal of Management, Social Sciences and Humanities*, 5(3), 480–498.
- Abul, S., Abul Basher, S., Haug, A. A., & Sadorsky, P. (2011). Oil prices, exchange rates and emerging stock markets. *Munich Personal RePEc Archive*. <https://mpra.ub.uni-muenchen.de/30140/>
- Ahmad, D., Afzal, M., & Ghani Khan, U. (2017). Impact of exports on economic growth: Empirical evidence of Pakistan. *International Journal of Applied Economic Studies*, 5(2). <http://sijournals.com/IJAE/>
- Ahmed, Q. M., Butt, M. S., Alam, S., & Kazmi, A. A. (2000). Economic growth, export, and external debt causality: The case of Asian countries [with comments]. *The Pakistan development review*, 591–608.
- Ayadi, O. F. (2005). Oil price fluctuations and the Nigerian economy. *OPEC Review*, 29(3), 199–217.
- Bank for International Settlements. (2001). *BIS papers: Modelling aspects of the inflation process and the monetary transmission mechanism in emerging market countries* (Issue 8).
- Borio, C. E. V., & Filardo, A. J. (2011). Globalisation and inflation: New cross-country evidence on the global determinants of domestic inflation. *SSRN Electronic Journal*, 227.
- Ball, L. (1999). Policy rules for open economies. In *Monetary Policy Rules: Vol. I* (Issue January). <http://www.nber.org/chapters/c7415>
- Baltaci, N., Akbulut, G., & Civelek, G. (2014). The Relationship between Foreign Banking and Credit Access: Panel Analysis Method. *Journal of Economics and Political Economy*, 1(1), 39–48.
- Babajide, F. (2011). Financial sector reforms and private investment in Sub-Saharan African countries. *Journal of Economic Development*, 36(3), 79–97.
- Bonato, L. (2007). Money and inflation in the Islamic Republic of Iran. *IMF Working Papers*, 07(119), 1.
- Bala, S. A., & Alhassan, A. (2017). Structural effect of oil price shocks and food importation on economic growth in Nigeria using SVAR model. *International Business and Accounting Research Journal*, 2(1), 34–46.
- Bano, S., Alam, M., Khan, A., & Liu, L. (2021). The nexus of tourism, renewable energy, income, and environmental quality: An empirical analysis of Pakistan. *Environment, Development and Sustainability*, 23(10), 14854–14877. <https://doi.org/10.1007/s10668-021-01275-6>
- Blanchard, O. J., & Gali, J. (2007). The macroeconomic effects of oil shocks: Why are the 2000s so different from the 1970s? National Bureau of Economic Research, No. 15467, Cambridge, USA.

- Basnet, H. C., & Upadhyaya, K. P. (2015). Impact of oil price shocks on output, inflation and the real exchange rate: evidence from selected ASEAN countries. *Applied Economics*, 47(29), 3078-3091.
- Countries, O. o. t. P. E. (2022). OPEC Basket Price Retrieved 14, 2023, from https://www.opec.org/opec_web/en/data_graphs/40.htm
- Carbó, S., Humphrey, D., Maudos, J., & Molyneux, P. (2009). Cross-country comparisons of competition and pricing power in European banking. *Journal of International Money and Finance*, 28(1), 115–134.
- Chen, N., Imbs, J., & Scott, A. (2009). The dynamics of trade and competition. *Journal of International Economics*, 77(1), 50–62.
- Carrière-Swallow, Y., David, A. C., & Leigh, D. (2021). Macroeconomic effects of fiscal consolidation in emerging economies: New narrative evidence from Latin America and the Caribbean. *Journal of Money, Credit and Banking*, 53(6), 1313–1335.
- Clark, T. E., & Terry, S. J. (2010). Time variation in the inflation passthrough of energy prices. *Journal of Money, Credit and Banking*, 42(7), 1419–1433.
- Coady, D., Parry, I., Sears, L., & Shang, B. (2017). How large are global fossil fuel subsidies? *World Development*, 91, 11–27.
- Crises, E. (2009). African Economic Conference 2009: Fostering development in an era of financial and economic crises confronting the global financial crisis: Bank efficiency, profitability and banking system in Africa. November.
- Easterly, W., & Fischer, S. (2001). Inflation and the poor. *Journal of Money, Credit and Banking*, 33(2), 160–178.
- Fund, I. M. (2022). IMF Primary Commodity Prices Retrieved 14, 2023, from <https://www.imf.org/en/Research/commodity-prices>
- Feng, Y., et al. (2022). The impact of exchange rate changes on China's economy. *Atlantis Press*, 32, 166–179. <https://www.atlantis-press.com/article/125973957.pdf>
- Farrell, S., Manning, W. G., & Finch, M. D. (2003). Alcohol dependence and the price of alcoholic beverages. *Journal of Health Economics*, 22(1), 117–147.
- Friedman, D. (1989). Law and economics: What and why. *Economic Affairs*, 9(3), 25–28.
- Fukac, M. (2011). Have rising oil prices become a greater threat to price stability? *Federal Reserve Bank of Kansas City Economic Review*, 96(4), 27–53.
- Gerlach, S., & Gerlach-Kristen, P. (2005). Estimates of real economic activity in Switzerland, 1886-1930. *Empirical Economics*, 30(3), 763–781.
- Golub, S. S., Hajkova, D., Mirza, D., Nicoletti, G., & Yoo, K.-Y. (2003). The influence of policies on trade and foreign direct investment. *OECD Economic Studies*, 2003(1), 7–83.
- Goodhart, C. A. E. (1998). The two concepts of money: Implications for the analysis of optimal currency areas. *European Journal of Political Economy*, 14(3), 407–432.
- Ha, J., Kose, M. A., & Ohnsorge, F. (2019). Understanding inflation in emerging and developing economies. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3348138>
- Ha, N. M., & Ngoc, B. H. (2020). Revisiting the relationship between energy consumption and economic growth nexus in Vietnam: New evidence by asymmetric ARDL cointegration. *Applied Economics Letters*, 1–7. <https://doi.org/10.1080/13504851.2020.1789543>
- Hooker, M. A. (2002). Are oil shocks inflationary? Asymmetric and nonlinear specifications versus changes in regime. *Journal of Money, Credit and Banking*, 34(2), 540–561.
- Iv, C. (2000). Chapter IV: The decline of inflation in emerging markets: Can it be maintained? October 1996, 116–144.
- Jordà, Ò., Schularick, M., & Taylor, A. M. (2011). Financial crises, credit booms, and external imbalances: 140 years of lessons. *IMF Economic Review*, 59(2), 340–378.
- Kelikume, I. (2017). Do exchange rate and oil price shocks have asymmetric effect on inflation? Some evidence from Nigeria. *The Journal of Developing Areas*, 51(4), 271–283.
- Khan, M. S., Senhadji, A. S., & Smith, B. D. (2006). Inflation and financial depth. *Macroeconomic Dynamics*, 10(2), 165-182.

- Khan, M. K., Khan, M. I., & Rehan, M. (2020). The relationship between energy consumption, economic growth and carbon dioxide emissions in Pakistan. *Financial Innovation*, 6(1), 1–13.
- Kiel, S., Amano, K., & Goedert, J. L. (2023). New taxa, records, and data for vesicomid bivalves from Cenozoic strata of the North Pacific region. *Acta Palaeontologica Polonica*, 68(2), 297–320.
- Kilian, L., Rebucci, A., & Spatafora, N. (2009). Oil shocks and external balances. *Journal of International Economics*, 77(2), 181–194.
- Khan, A., Khan, A., & Ullah, I. (2023). Exploring Macroeconomic Determinants of Inflation in Pakistan; Fresh Insights from Vector Autoregressive Analysis. *Journal of Economic Sciences*, 2(2), 127–138.
- Lewis, B. W. (2014). The price of praise in the market for virtue: A paradox of rating and recognizing responsibility. SSRN. <https://doi.org/10.2139/ssrn.2390074>
- Mumtaz, H., & Surico, P. (2011). Evolving international inflation dynamics: Evidence from a time-varying dynamic factor model. *SSRN Electronic Journal*, 341.
- Mumtaz, H., & Surico, P. (2012). Evolving international inflation dynamics: World and country-specific factors. *Journal of the European Economic Association*, 10(4), 716–734.
- Majeed, M. T., & Malik, A. (2016). E-government, financial development and economic growth. *Pakistan Journal of Applied Economics*, 26(2), 107–128.
- Miller, J. I., & Ratti, R. A. (2009). Crude oil and stock markets: Stability, instability, and bubbles. *Energy Economics*, 31(4), 559–568.
- Mishkin, F. S. (2013). Can inflation targeting work in emerging market countries? *Money, Crises, and Transition*, 71–94.
- Murjani, A. (2019). Short-run and long-run impact of inflation, unemployment, and economic growth towards poverty in Indonesia: ARDL approach. *Jurnal Dinamika Ekonomi Pembangunan*, 2(1), 15–29.
- Mather, M., & Carstensen, L. L. (2003). UC Santa Cruz postprints. Society.
- McConnell, C., Brue, S., Flynn, S., Series, M. M., Pdf, E., Macroeconomics, D., Economics, M. S., Series, M. M., & McConnell, C. (n.d.). *Series economics: Description*.
- Neely, C. J., & Rapach, D. E. (2011). International comovements in inflation rates and country characteristics. *Journal of International Money and Finance*, 30(7), 1471–1490.
- Nusair, S. A., & Olson, D. (2021). Asymmetric oil price and Asian economies: A nonlinear ARDL approach. *Energy*, 219, 119594.
- Narayan, P. K., Narayan, S., & Smyth, R. (2008). Are oil shocks permanent or temporary? Panel data evidence from crude oil and NGL production in 60 countries. *Energy Economics*, 30(3), 919–936.
- Noord, P. Van Den, & André, C. (2007). Why has core inflation remained so muted in the face of the oil shock? *Organization for Economic Co-Operation and Development*, 551.
- OECDiLibrary. (2022). IEA World Energy Statistics and Balances (International Energy Agency) Retrieved 14, 2023, from https://www.oecd-ilibrary.org/energy/data/iea-world-energy-statistics-and-balances_enestats-data-en
- Purwati, T., Rafidah, R., Chollisni, A., Soeswoyo, D. M., & Sari, A. R. (2021). Service management concepts and the role of banks' creative economic in Indonesia during the COVID-19 pandemic era. *Linguistics and Culture Review*, 6(August 2021), 277–287.
- Rautava, J. (2004). The role of oil prices and the real exchange rate in Russia's economy: A cointegration approach. *Journal of Comparative Economics*, 32(2), 315–327.
- Sek, S. K. (2017). The impact of energy consumption on economic growth: The case of China. *Applied Ecology and Environmental Research*, 15(3), 1243–1254.
- Sek, S. K., & Lim, H. S. M. (2016). An investigation on the impacts of oil price shocks on domestic inflation: A SVAR approach. *AIP Conference Proceedings*, 1750.
- Taylor, B. (2003). Staying the course. *Recycling Today*, 41(10).
- Taylor, B. J. B. (2016). The role of the exchange rate in monetary-policy rules. *The American Economic Review*, 91(2), 263–267.
- Vinh, N. T. T. (2011). *The impact of oil prices, real effective exchange rate and inflation on economic activity: Novel evidence for Vietnam* (No. DP2011-09).

- World Bank. (2023). World Development Indicators. Data Bank. Retrieved June 12, 2024, from <https://databank.worldbank.org/source/world-development-indicators>
- Wati, E. F., Pujiati, A., & Wahyudin, A. (2022). The role of the human development index in moderating the effect of household consumption expenditure, government, and general population consumption expenditure on economic growth. *Journal of Economics and Development*, 11(2), 342–351.
- Zhang, D. (2008). Oil shock and economic growth in Japan: A nonlinear approach. *Energy Economics*, 30(5), 2374–2390.