

## Money supply and inflation in the United Kingdom

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### Abstract

*This study examines the influence of money supply, financial progress, trade, GDP, and the interaction effect of money growth and financial progress on inflation in the United Kingdom, using the ARDL method from 1980 to 2019. The outcome of the cointegration test reveals a long-run link among the model's variables. Short-run estimates illustrate that money supply, financial performance, and the interaction of money supply and financial progress increase the rate of inflation. The long-run analysis also reveals that money supply, financial progress, GDP, and the interaction of money supply and financial progress accelerates the level of inflation. However, trade has no effect on inflation in the United Kingdom. Hence, the study suggests that since in the presence of financial progress, the supply of money increases the inflation rate policymakers should design policies aimed at overseeing the supply of money through Central Bank initiatives, efficiency, and control. Also, the financial institution should consider the public sector in the event of an increase in the money supply.*

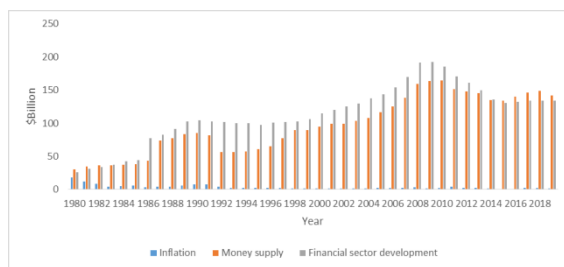
**Keywords:** Inflation, money growth, financial progress, United Kingdom, ARDL

### 1. INTRODUCTION

The growth of the inflation rate has become a global issue during the world's financial crisis period (IMF, 2019). It is argued that inflation has reached 6.4 percent and adversely affects the nation's economic progress (World Bank, 2013). Economic instability, unemployment, financial markets crisis were at the stage of needful concern,

especially in developing economies. However, in 2019 inflation rate was estimated to about 3.56 percent in the developed nations which is better than what was obtained in the emerging countries (World Bank, 2019). In this regard, a theory from the monetarist perspective has cautioned on the excessive supply of money into the circulation that may endanger a nation's economy and accelerating the inflation rate (Gamber, Liebner & Smith 2016).

In the United Kingdom, the inflation capacity is not severe and maintained stability in the macro-economic settings (WDI, 2019). Nonetheless, the growth of the money supply in the nation may induce higher and persistent inflation. For instance, figure 1.1 illustrate the trends in inflation, money supply, and financial sector development in the United Kingdom (WDI, 2019). It indicates a positive movement of these indicators in the economy and the level at which supply of money and the financial progress increases might influence a higher inflation rate in the future.



**Figure 1.1 Trends in inflation, money supply, and financial sector development in the United Kingdom (1980 – 2018)**

Source (WDI, 2019)

It is noted that several studies have examined the influence of money supply on inflation in the literature (Cukierman, 2017; Udo, Ben, & Okoh, 2019). Nevertheless, this study intends to investigate the interaction effect of money supply and financial sector development on inflation in the United Kingdom. This evidence serves as what makes the study differ from the earlier studies as none examine the interaction effect of money growth and financial progress.

## **2. LITERATURE REVIEW**

Association among money supply, financial progress, and inflation have been discussed in the economic literature. For instance, Jiang, Chang, and Li (2015) studied the influence of the growth of money supply on inflation in China. The study's outcome reveals that the money supply accelerates the level of inflation. Cukierman (2016) argued that money growth induces a positive increase in the inflation rate in Germany. Similarly, a study by Makin, Robson, and Ratnasiri (2017) analyze the performance of money supply on inflation in Australia from 1970 to 2015. The findings illustrate that money supply has a positive influence on inflation. Lu et al. (2017) examine the influence of money supply performance and financial progress on inflation in China using a VAR approach. They find that money growth and financial progress increase the inflation rate. Ofori, Danquah, and Zhang (2017) investigate the effect of money supply on inflation in Ghana using the OLS technique from 1967 to 2015. The outcome reveals that the money supply accelerates the inflation level. Sean, Pastpipatkul, and Boonyakunakorn (2019) used the VAR method to analyze the influence of money supply on inflation in Cambodia. The findings indicate that money growth influences inflation positively. However, Udo, Ben, and Okoh (2019) use the VECM technique to assess the effect of money supply on inflation in Nigeria. The result indicates that money supply does not explain inflation. In another development, Obradovic, Sapic, Furtula, and Lojanica (2017) stressed that GDP increases the level of inflation in Serbia. Sahu and Sharma (2018) studied the influence of trade on inflation in India by employing ARDL technique. The outcome reveals that trade influence rate of inflation. It is indicated that from the reviewed literature linkage among money supply, financial progress, GDP, trade and inflation exists. However, the interaction effect of money supply and financial progress has not been examined. Hence, this study examine the influence of the interaction of money supply and financial progress in United Kingdom.

### 3. METHODOLOGY

#### 3.1 Data

Yearly data is used in this study from 1980 –2019 on the variables inflation (rate of inflation), money growth (broad money supply \$billion) domestic credit % of GDP (financial progress), Trade (sum of exports and imports), and economic performance GDP (current USD). The data was accessed from WDI. It is revealed from the statistical description of the data in table 1 that GDP obtained the highest minimum and the mean values at 9.00 with 10.1 respectively. However, inflation has the lowest minimum and mean values at 0.99 as well as 1.03.

**Table 1. The statistical description of the data**

Variables	Min	Max	Mean	SD
LINF	0.99	2.88	1.03	0.72
LMG	3.42	5.10	4.45	0.50
LFDP	3.26	5.26	4.62	0.51
LGDP	9.00	10.8	10.1	0.57
LTO	3.80	4.16	3.97	0.09

#### 3.2 Specification of the model

The study used a revised model of Jiang, Chang, and Li (2015) for the connection among inflation and other independent variables as shown in the following equation:

$$INF_t = \alpha + \beta_1 MG_t + \beta_2 FD_t + \beta_3 TO_t + \beta_4 GDP_t + \beta_5 MG * FD_t + \varepsilon_t \quad (1)$$

INF, MS, FD, TO, GDP, MS\*FD indicates inflation, money growth, financial progress, trade and trade, economic performance, and the interaction effect of money supply and financial progress,  $\alpha$  and  $\beta$  shows the parameter,  $t$  represent time and  $\varepsilon$  is the error term. The apriori expectation ( $\beta_1 \beta_2 \beta_3 \beta_4 > 0$ ) that is the expected sign of the coefficient is positive. This study applies the ARDL technique to examine the interaction effect of money growth and financial progress on inflation and it is illustrated in equation 2.

$$\begin{aligned} \Delta LINF = & \beta_0 + \sum_{j=1}^n \beta_1 LINF_{t-j} + \sum_{j=0}^n \beta_2 MS_{t-j} + \sum_{j=0}^n \beta_3 FD_{t-j} + \sum_{j=0}^n \beta_4 TO_{t-j} + \sum_{j=0}^n \beta_5 GDP_{t-j} \\ & + \sum_{j=0}^n \beta_6 MG * FD_{t-j} + \alpha_1 LINF + \alpha_2 MG_t + \alpha_3 FD_t + \alpha_4 TO_t + \alpha_5 GDP_t \\ & + \alpha_6 MG * FD_t + \varepsilon_t \end{aligned} \tag{2}$$

In equation 2  $\varepsilon$  denotes the disturbance error,  $t$  designates the time and  $\Delta$  denotes the first change operator. The decision on the long-run connection is based on the F statistic.

#### 4. RESULT

This part discusses the stationarity outcome and the model estimation result. Table 2 illustrates that the variables in the model obtained mix stationarity level in both ADF and PP tests.

**Table 2. The outcome of stationarity tests**

Variable	ADF		PP		ADF		PP	
	LEVEL		LEVEL		First Diff		First Diff	
LINF	-2.93745**	(0.0502)	-2.91536**	(0.0527)	-	-	-	-
LMS	-2.73654	(0.0784)	-1.86450	(0.3450)	-	-	-4.53254*	(0.0008)
LFD	-3.16556	(0.0301)	-0.66782	(0.9686)	-	-	-5.54755*	(0.0003)
LGDP	-0.66782	(0.9686)	-0.66782	(0.9686)	-5.86620*	(0.0002)	-3.89626*	(0.0219)
LTO	-2.41273	(0.3677)	-2.20574	(0.4733)	-6.08424*	(0.0001)	-9.58015*	(0.0000)

Notes: \* Illustrates significance at one percent level.

Table 3 shows that the variables in the model are cointegrated since the value of F-statistics is greater than the critical value.

**Table 3. Bound test outcome**

F-statistics	1%		5%	
	I(0)	I(1)	I(0)	I(1)
4.98	3.41	4.68	2.26	3.79

The estimated result in table 4 shows that short-run estimates illustrate that money supply, financial performance, and the interaction of money supply and financial progress increase the rate of inflation. This means that a percent increase in these variable cause inflation rate to rise by 0.17, 1.76 and 1.52 respectively. Similarly, a negative value of the ECT confirms that the variables converge to a long-run position. Furthermore, the estimated long-run analysis illustrates that the money supply accelerates the level of the inflation rate. It implies that a percent rise in money supply leads to a 2.6

percent upsurge in inflation level. This finding indicated that a 2.6 percent rise in the inflation rate was caused by an increase in money supply annually and leads to instability in the economic progress in the nation. Therefore, policymakers should design appropriate policies about financial institutions for economic stability. The outcome also reveals that a percent increase in financial performance causes the inflation level to rise by 0.16 percent. A percent upsurge in GDP results in a 4.4 percent increase in the inflation rate. Similarly, the interaction of money supply and financial progress has a positive influence on the inflation rate. This shows that a percent increase in the interaction of money supply and financial progress leads to inflation level to rise by 0.05 percent. The finding illustrates that in the presence of money supply, financial progress accelerates the inflation rate in the United Kingdom. Hence, policymakers should design policies aimed at overseeing the supply of money through Central Bank initiatives, efficiency, and control. Besides, the financial institution should consider the public sector in the event of an increase in the money supply. However, trade does not influence the inflation rate in the nation. This outcome corresponds with the result obtained by earlier studies (Ofori et al., 2017). Nevertheless, the outcome contradicts with findings of a study by (Udo, Ben & Okoh, 2019).

**Table 4. Model's estimated outcome**

ARDL estimation	Coefficients	SD Errors	t-Statistics	Prob
<b>Short run estimates</b>				
$\Delta$ LMS	0.178556***	1.040560	-0.171596	0.0655
$\Delta$ LFD	1.765961**	0.819810	-2.154110	0.0436
$\Delta$ LGDP	1.529191***	0.832813	1.836176	0.0812
$\Delta$ LTO	2.024654	1.544374	1.310986	0.2047
$\Delta$ LMS*FD	0.010263	0.000050	2.053705	0.0533
ECT(-1)	-0.582189*	0.150727	-3.862544	0.0010
<b>Long run estimates</b>				
LMS	2.616329**	1.368419	1.911936	0.0703
LFD	0.165125**	1.011389	0.163266	0.0719
LGDP	4.443729*	1.183190	-3.755720	0.0012
LTO	0.040277	2.584028	-0.015587	0.9877
LMS*FD	0.058251*	0.000042	1.381580	0.0423
C	32.82314*	12.29232	2.670215	0.0147

Notes: \*\*\*, \*\* and \* represents statistically significant at 1, 5, and 10 percent levels

Table 5 indicates the outcome of the post estimation tests. It indicates that the model is efficient and can be reliable for policymaking as

there are no econometric problems such as heteroscedasticity, serial correlation, and the non-normality in the error term distribution.

**Table 5. Diagnostic tests**

Test Type	F-statistics	Probability	Result
Breusch-Pagan Test.	1.011796	0.4832	No Heteroskedasticity
Breusch-Godfrey Test	4.522597	0.1025	No Serial Correlation
Jarque-Bera	9.268772	0.5541	Normally Distributed

## 5. CONCLUSION

The study investigates the influence of money supply, financial progress, trade, GDP, and the interaction effect of money growth and financial progress on inflation in the United Kingdom, using the ARDL technique from 1980 to 2019. The outcome of the cointegration test reveals a long-run link among the model's variables. Short-run estimates illustrate that money supply, financial performance, and the interaction of money supply and financial progress increase the rate of inflation. The long-run analysis also reveals that money supply, financial progress, GDP, and the interaction of money supply and financial progress accelerates the level of inflation. However, trade has no effect on inflation in the United Kingdom. Hence, the study suggests that since in the presence of financial progress, the supply of money increases the inflation rate policymakers should design policies aimed at overseeing the supply of money through Central Bank initiatives, efficiency, and control. Also, the financial institution should consider the public sector in the event of an increase in the money supply. The study is limited to the fact other macro-economic factors have not been incorporated in the study's model such as exchange rate and oil price. Therefore futures studies should consider these variables to elaborate the policy implication.

## REFERENCES

1. Cukierman, A. (2017). Money growth and inflation: Policy lessons from a comparison of the US since 2008 with hyperinflation Germany in the 1920s. *Economics Letters*, 154, 109–112. <https://doi.org/10.1016/j.econlet.2017.02.036>
2. Gamber, E. N., Liebner, J. P., & Smith, J. K. (2016). Inflation persistence: revisited. *International Journal of Monetary Economics and Finance*, 9(1), 25–44.

3. Group World Bank. (2019). *Global economic prospects*.
4. IMF. (2019). *Global economic outlook*.
5. Jiang, C., Chang, T., & Li, X. (2015). Money Growth and Inflation in China: New Evidence from a Wavelet Analysis. *International Review of Economics and Finance*, 35(1), 249–261. <https://doi.org/10.1016/j.iref.2014.10.005>
6. Lu, X., Guo, K., Dong, Z., & Wang, X. (2017). Financial development and relationship evolution among money supply , economic growth and inflation : a comparative study from the U . S . and China. *Applied Economics*, 49(10), 1032–1045. <https://doi.org/10.1080/00036846.2016.1210776>
7. Makin, A. J., Robson, A., & Ratnasiri, S. (2017). Missing money found causing Australia’s in fl ation. *Economic Modelling*, 66, 156–162. <https://doi.org/10.1016/j.econmod.2017.06.009>
8. Obradovic, S., Sapic, S., Furtula, S., & Lojanica, N. (2017). Linkages between Inflation and Economic Growth in Serbia : an ARDL Bounds Testing Approach. *Inzinerine Ekonomika-Engineering Economics*, 28(4), 401–410.
9. Ofori, C. F., Danquah, B. A., & Zhang, X. (2017). The Impact of Money Supply on Inflation, A Case of Ghana. *Imperial Journal of Interdisciplinary Research*, 3(1), 2312–2318.
10. Sahu, P., & Sharma, N. K. (2018). Impact of Trade Openness on Inflation in India : An Autoregressive Distributed Lag ( ARDL ) Approach. *The Empirical Economics Letters*, 17(1), 22–32.
11. Sean, M., Pastpipatkul, P., & Boonyakunakorn, P. (2019). Money supply , Inflation and Exchange rate movement : The case of Cambodia by BAYESIAN VAR approach. *Journal of Management, Economics, and Industrial Organization*, 3(1), 63–81.
12. Udo, E. S., Ben, E., & Okoh, J. (2019). Money Supply and Inflation Rate in Nigeria : The Missing Link. *Humanities and Social Sciences Letters*, 7(8), 156–166. <https://doi.org/10.18488/journal.73.2019.73.156.166>
13. WDI. World Development Indicators (2019).
14. World Bank Group. (2013). *Global economic prospects, january 2013*.