

THE RELATIONSHIP BETWEEN INFLATION AND FINANCIAL DEVELOPMENT IN SAUDI ARABIA

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ABSTRACT

This paper employed the ARDL bounds testing approach to investigate the relationship between inflation and financial sector development in Saudi Arabia for the period of 1982-2013. The credit to the private sector as percentage of GDP was used as a proxy of financial development and inflation rate measured by the consumer price index. The study also included two more control variables: trade openness and real gross domestic product. Empirical results showed that there was a long run relationship between inflation and financial development in Saudi Arabia. The results also indicated that there was a negative statistically significant relationship between inflation and financial development in long-and-short run.

JEL Classification: D14, E31, G21.

Keywords: Inflation, Financial Development, ARDL Approach, Cointegration, Saudi Arabia.

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INTRODUCTION

In general, macroeconomic theory suggests that the combination of low inflation with financial sector development plays a crucial and fundamental role in achieving sustained economic growth. The improved performance of the financial sector through its process of financial intermediation between savers and investors and between lenders and borrowers as well as the guidance of the funds that are available to the optimal investments lead to achieve the desired economic growth. Generally, the financial development has a positive effect on economic growth (Jung, 1986; Roubini and Sala, 1992; King and Levine, 1993a, b; Pagano, 1993; Levine and Zervos, 1996, 1998). On the other hand, inflation is one of the main obstacles that affect financial sector and economic growth negatively (Huybens and Smith, 1998, 1999; Haslag and Koo, 1999; Rousseau and Wachtel, 2002).

The aim of this study is to investigate the impact of inflation on financial sector development in Saudi Arabia using time series data covering the period from 1982-2013. According to our knowledge, only a few studies have been conducted in the case of Saudi Arabia to discuss the sources of inflation or the determinants of inflation. This study tries to fill the gap in the literature of the impact of inflation on financial sector performance in Saudi Arabia. The rest of the paper is organized as follows. Section 2 summarizes the main findings from the research on the impact of inflation on financial development and review related literature. Section 3 addresses data and the methodology of the study. Section 4 presents the empirical results and section 5 suggest conclusions.

LITERATURE REVIEW

The link between inflation, financial development, and economic growth has received great attention in both theoretical and empirical studies in recent decades. This is motivated by the different empirical findings reported. From an empirical point of view, studies that examined the impact of inflation on financial sector development (based on cross - sectional data, panel data and time series analysis) showed that there was a strong statistically significant negative relationship (correlation) between the variables. In this section a number of empirical works relating to the relationship between inflation, the performance of the financial sector and economic growth will be introduced.

Huybens and Smith (1998, 1999) presented a monetary growth model in which banks and secondary capital markets play a crucial allocative function. Their findings suggest that real activity, the volume of bank lending activity, and the volume of trading in equity markets are strongly correlated. At the same time, inflation and financial market activities are strongly negatively correlated (in the long-run). The same can be said about inflation and the real rate of return on equity. They also found that inflation and real activity are negatively correlated in the long-run, particularly for economies with relatively high rates of inflation.

English (1999) used cross-sectional data to examine the impact of inflation rate on the financial sector's size. He provided empirical evidence that inflation has positive effect on financial sector development. According to English, a higher rate of inflation leads households to substitute purchased transactions services for money balances, thereby boosting the size of the financial services sector. More specifically; the size of a nation's financial sector is strongly affected by its inflation rate.

Boyd et al. (2001) tried to assess empirically the impact of sustained inflation rate on financial sector performance. They found that there was a significant negative relationship between inflation and financial development. Moreover, they found that the empirical relationship between inflation and financial sector activity was highly nonlinear. For example, in low-inflation countries, the data show that more inflation is not matched by greater nominal equity return. In high-inflation countries, nominal stock returns move essentially one-for-one with marginal increases in inflation rates. Rousseau and Wachtel (2002) used a rolling regression technique to examine the interactions between financial development and inflation that affect economic growth for 84 countries. They found that financial depth has a significant positive effect on growth only when inflation falls below a threshold of about (6%) to (8%). The results also showed that inflation had a negative effect on financial depth when the five –year average inflation rate was below about (15%) to (20%). Lee and Wong (2005) applied a threshold regression model to investigate the existence of inflation threshold effects in the relationship between financial development and economic growth for Taiwan and Japan. Their results suggest that financial development may promote economic growth when inflation rate is low and moderate. Khan et al. (2001) used a large cross-country sample to assess the impact of various variables such as GDP per capita, the share of public consumption in GDP, the degree of openness and inflation rate on financial activity. They found support for the existence of threshold level of inflation which lies in the range 3-6% a year depending on the specific measure of financial depth utilized. They also found that an increase in inflation had a weak positive effect when initial rate of inflation is low and a negative effect at initially high inflation rate.

Naceur and Ghazouani (2005) used time series data from 11 MENA region countries and applied GMM methodology to examine the impacts of inflation rate on the financial sector performance. Their results indicated that inflation had a negative and significant impact on the financial sector development; but there was no evidence of thresholds. They showed that a marginal increase of inflation was harmless to stock market performance and banking sector development regardless the rate of inflation. Haslag and Koo (1999) have found that a positive relationship between inflation and financial repression and financial system becomes less developed as inflation rate increases.

Boyd and Champ (2003) used cross-country tests to investigate the relationship between inflation and financial market performance. They provided an empirical result that inflation was negatively associated with banking industry size, real returns on financial assets, and bank profitability. They also indicated that there was positive relationships between assets return volatility and inflation. Finally, they suggested that inflation hurt economic growth through declining financial development.

Kim et al. (2010) applied Pooled Mean Group estimator method developed by Pesaran and Shin (1998) to investigate short-and long-run impact of inflation on financial development for 87 countries covering the period 1965-2005. Their results confirmed that inflation has a positive impact on financial development in short-run but a negative impact on long-run.

Keho (2009) used Bound testing approach developed by Pesaran et al. (2001) and Granger causality test introduced by Toda and Yamamoto (1995) to analyze the long-run and causal relationship between inflation and the financial sector performance in seven countries of the West African Economic and Monetary Union (UEMOA). He found no evidence of long run relationship between inflation and financial development for six countries but in one country. He also found that financial development caused inflation in five countries with the reverse causality detected in only two countries.

In a related single country study which examined inflation and financial development relation, Bittencourt (2011) initially used time series data and then panel time series data to examine the impact of inflation on financial development in Brazil covering the period 1985-2004. The results confirmed that inflation had detrimental effects on financial development. Furthermore, Wahid et al. (2011), Odhiambo (2012) and Ozturk and Karagoz (2012) used the ARDL bounds testing approach and Error Correction Model (ECM) to examine the impact of inflation on financial development. Their results indicated that the relationship between inflation and financial development was negative in the short-and long-run, confirming that inflation reduced the efficiency of financial sector performance.

THE EMPIRICAL FRAMEWORK

The Data

This study utilized the annual data on financial development proxied by credit to the private sector as percentage of GDP (FD); inflation rate was measured by consumer price index (CPI). Two control variables were added to the model: Real gross domestic product (GDP) which measure real activity in the economy. Total trade as percentage of GDP (OPEN) calculated as (total exports + total imports) divided by GDP which measures openness degree of economy. All variables were transformed to logarithms to eliminate the problem of heteroskedasticity. Data included in this study were obtained from Saudi Arabian Monetary Agency (SAMA). The data covers the period 1982-2013. Descriptive Statistics were reported in table (1)..

TABLE 1. DESCRIPTIVE STATISTICS

Variables	Δ LFD	Δ LCPI	Δ LGDP	Δ LOPEN
Observations	31	31	31	31
Mean	0.046	0.013	0.031	-0.002
Median	0.081	0.007	0.038	0.019
Maximum	0.303	0.094	0.088	0.156
Minimum	-0.304	-0.032	-0.081	-0.206
Std. Dev.	0.135	0.028	0.044	0.097
Skewness	-0.495	0.751	-0.685	-0.520
Kurtosis	3.305	3.449	2.790	2.408
Jarque-Bera	1.389	3.179	2.486	1.852
Probability	0.499	0.203	0.288	0.396

Methodology

This paper used the autoregressive distributed lag (ARDL) bound testing approach suggested by Perasan et al. (2001) to examine the existence of the long-run relationship between the inflation rate and financial development in Saudi Arabia. The advantage of the bounds testing approach is in its applicability irrespective of whether the underlying variables are purely I (0), purely I (1) or mutually co-integrated. The ARDL bounds model can be written as follows

$$\Delta \ln FD_t = \alpha_1 + \alpha_2 \ln FD_{t-1} + \alpha_3 \ln CPI_{t-1} + \alpha_4 \ln GDP_{t-1} + \alpha_5 \ln OPEN_{t-1} + \sum_{i=0}^n \beta \Delta \ln FD_{t-i} + \sum_{i=0}^n \gamma \Delta \ln CPI_{t-i} + \sum_{i=0}^n \delta \Delta \ln GDP_{t-i} + \sum_{i=0}^n \rho \Delta \ln OPEN_{t-i} + \mu_t \quad (1)$$

Where, Δ is first difference operator, $\ln FD$ is natural log of financial development (credit to the private sector as percentage of GDP), $\ln CPI$ is natural log of consumer price index, $\ln GDP$ is real gross domestic product, $\ln OPEN$ is natural log of total volume of trade as percentage of GDP, and μ_t is white noise error term.

The test of no cointegration using ARDL approach involves performing the F-test on the null hypothesis ($H_0: \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 0$) against the alternative hypothesis of cointegration ($H_1: \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq 0$). Based on the value of computed F-statistic it can be determined if there is cointegration among the variables. When the computed F-statistic value is more than upper critical bounds value, then hypothesis of cointegration is accepted. When the computed F-statistic value is less than the lower critical bounds value, then hypotheses of no cointegration cannot be rejected. When the computed F-statistic value comes between lower and upper critical value, then the decision about cointegration becomes inconclusive.

For the short-run relationship between inflation and financial development, we use unrestricted error correction version of ARDL model by estimating the following equation:

$$\Delta \ln FD_t = \alpha_1 + \sum_{i=0}^n \beta \Delta \ln FD_{t-i} + \sum_{i=0}^n \gamma \Delta \ln CPI_{t-i} + \sum_{i=0}^n \delta \ln GDP_{t-i} + \sum_{i=0}^n \rho \ln OPEN_{t-i} + ECM_{t-1} + \mu_t \quad (2)$$

Where, ECM_{t-1} is the error correction term and measuring the deviation of FD from its long-run value.

EMPIRICAL RESULTS

Stationarity Test

The augmented Dickey-Fuller (ADF; see Dickey and Fuller (1970)) and Phillips-Perron (PP; see Philips and Perron (1988)) unit roots tests for stationarity were conducted and reported in tables (2 & 3). Based on the results of both tests it was found that natural logarithm of consumer price index (LCPI), natural logarithm of real gross domestic product (LGDP) and natural logarithm of trade openness (LOPEN) did not seem to be stationary at their level but they were at first difference. Accordingly, they were integrated of order one I (1). On the other side, both tests results of natural logarithm financial development (LFD) seemed to be stationary at its level. Accordingly, it was integrated of order zero I (0).

TABLE 2. AUGMENTED DICKEY – FULLUR UNIT ROOT TEST

		Null Hypothesis: Variable is not- Stationary ADF				
Variables		Level with constant (C)	Level With C and trend (T)	First differences (C)	First differences (C &T)	Variable type
LFD		-2.69***	-4.27**	-5.42*	-5.53*	I(0)
LCPI		0.29	-1.79	-2.70***	-3.43***	I(1)
LGDP		2.42	-2.66	-4.51*	-5.13*	I(1)
LOPEN		-1.84	-2.73	-4.73*	-4.26**	I(1)
		Critical Values				
Significance level	1%	-3.66	-4.37	-3.72	-4.37	
	5%	-2.96	-3.60	-2.98	-3.60	
	10%	-2.62	-3.23	-2.63	-3.23	

*Note: *, **, and *** represent significance at the 1%, 5% and 10% levels, respectively.*

TABLE 3. PHILLIPS – PERRON (PP) UNIT ROOT TEST

		Null Hypothesis: Variable is not-stationary PP Test				
Variables		Level (C)	Level (C&T)	First differences (C)	First differences (C &T)	Variable type
LFD		-2.77***	-7.52*	-8.36*	-10.32*	I(0)
LCPI		1.62	-0.66	-2.82***	-3.36***	I(1)
LGDP		2.25	-2.59	-4.51*	-5.13*	I(1)
LOPEN		-2.03	-2.61	-4.83*	-4.76*	I(1)
		Critical Values				
Significance level	1%	-3.66	-4.28	-3.67	-4.29	
	5%	-2.96	-3.56	-2.96	-3.56	
	10%	-2.62	-3.21	-2.62	-3.21	

*Note: *, **, and *** represent significance at the 1%, 5% and 10% levels, respectively.*

Cointegration Test

The next procedure to find out whether there is a long – run relationship between inflation and financial development or not. Since all variables in this study are not integrated of the same order, they are I(1) and I(0), we cannot apply the traditional cointegration approaches that were provided by Engle and Granger (1987), Johansen and Juselius (1990) and Johansen (1992), since they should be integrated of the same order I(1). Therefore in this situation the best approach to apply for cointegration test is autoregressive distributive lag

model (ARDL) which was developed by Pesaran et al. (2001). The ARDL bound testing approach is considered more suitable and it provides better results for small sample size (Haug, 2002). In order to proceed with the ARDL bounds testing approach, optimal lag length needs to be determined.

TABLE 4. LAG LENGTH SELECTION CRITERIA

lag	LR	FPE	AIC	SC
0	NA	2.01e-08	-6.37	-6.18
1	184.10*	2.86e-11*	-12.94*	-11.99*
2	15.63	4.24e-11	-12.61	-10.92
3	13.76	6.53e-11	-12.37	-9.92

Table (4) implies that the optimal lag order is 1. The results of the ARDL bounds testing approach are presented in table (5) indicating that the computed F-statistic (5.66) exceeds upper critical bound (5.61) at 1% level of significance. This finding supports that cointegrating relationship exists and confirms the stable long-run relationship between the variables. Examining the marginal impacts of inflation, economic growth and trade openness on financial development comes next. Therefore, the long-and short-run relations were estimated based on Schwarz Bayesian Criterion (SBC) and thus the ARDL (1, 0, 0, 1) model has been adopted.

TABLE 5. ARDL BOUNDS TEST FOR THE EXISTENCE OF COINTEGRATION

F-Statistic	1% Critical value		5% Critical value		10% Critical value	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F (LFD LCPI, LGDP, LOPEN) = 5.66	3.81	5.12	2.85	4.05	2.42	3.57

Notes: Computed F-statistic (Wald test) = 5.66. The critical values are obtained from Pesaran et al. (2001), Table CI (III), p. 300.

Long-and short-run analyses

As mentioned above, the long-and short-run relations were estimated based on Schwarz Bayesian Criterion (SBC). Table (6) shows the results of long-run relationship between financial development (LFD) and its explanatory variables. Results show that there was a statistically significant long-run negative relationship at 1% level between inflation and financial development in Saudi Arabia. The results also indicated that economic growth has statistical significant positive impact on the financial development at 1% level. Finally, there was a statistically significant negative impact of trade openness and financial development.

TABLE 6. ESTIMATES OF THE LONG-RUN COEFFICIENTS BASED ON ARDL MODEL BY SBC-FINANCIAL DEVELOPMENT EQUATION

Variables	Coefficients	t-ratio	P-value
LCPI	-2.65	-4.04*	[.000]
LGDP	2.16	7.26*	[.000]
LOPEN	-.769	-2.51**	[.019]
Constant	-10.90	-8.18*	[.000]

*Note: Dependent variable is LFD. * Significant at 1%, ** significant at 5% *** Significant at 10%.*

**TABLE 7. ERROR CORRECTION REPRESENTATION FOR THE SELECTED ARDL MODEL –
SELECTED BASED ON SBC (1, 0, 0, 1)**

Variable	Coefficients	t-ratio	P- value
Constant	-5.82	-3.53*	[.002]
DLFI(-1)	0.46	3.46*	[.002]
DLCPI	-1.41	-3.55*	[.001]
DLGDP	1.15	3.77*	[.001]
DLOPEN	-0.98	-4.30*	[.000]
DLOPEN(-1)	0.57	2.77**	[.010]
ECM(-1)	-0.53	-3.96*	[.001]
R-square	0.94		
DW	1.88		
Serial Correlation	0.166		[.683]
Functional Form	0.056		[.812]
Normality	1.57		[.455]
Heteroscedasticity	1.53		[.216]

Note: * Significant at 1%, ** significant at 5%. *** Significant at 10%.

Table (7) shows the short-run results. Including the lag of financial development ((DLF (-1)) which measures the impact of previous financial sector's policies on financial development. As seen in table (7) there is statistically significant positive impact at 1% level of previous financial sector's policies on financial development. This confirms that improved financial sector policies in previous period will help to develop financial sector in current period in Saudi Arabia. There was a statistically significant negative short-run impact of inflation on financial development at 1% level. There was also statistically significant positive impact of economic growth on financial development at 1% level. The effect of trade openness on financial development was statistically significant negative at 1% level. Finally, the error correction (ECM(-1)) coefficient estimated at (-.53375) is highly significant at 1% level and has the correct sign indicating a high speed of convergence to equilibrium. The results show that any change in the short-run towards long-run is corrected by 53% per year in the development of financial sector. Finally, Diagnostic tests for this model are provided in table (7)..

CONCLUSIONS

This paper has examined the relationship between inflation and financial sector performance in Saudi Arabia in the short-and long-run for the period of 1982-2013. Since all variables in this study were not integrated of the same order I (1) or I (0), the traditional cointegration approaches cannot be applied. Therefore, the best approach to apply for cointegration test was autoregressive distributive lag model (ARDL) which was developed by Pesaran et al. (2001). Long- and short-run results show that inflation has significant negative effect on the financial sector development in Saudi Arabia. On the contrary, previous financial sector's policies and economic growth have played major roles in improving the performance of financial sector development.

References

- Bittencourt, M 2011, 'Inflation and financial development: Evidence from Brazil', *Economic Modeling*, vol. 28, no.1-2, pp. 91-99.
- Boyd, J & Champ, B 2003, 'Inflation and financial market performance: what have we learned in the last ten years', *Federal Reserve Bank of Cleveland*.
- Boyd J, Levine, R, and Smith, B 2001, 'the impact of inflation on financial market performance', *Journal of Monetary Economics*, vol. 47, no. 2, pp. 221-228.
- Dickey, D & Fuller, W 1979, 'Distribution of the estimators for autoregressive time series with a unit root', *Journal of the American Statistical Association*, vol. 74, no. 366, pp. 427-431.
- Engle, RF & Granger, CJ 1987, 'Cointegration and error-correction: representation, estimation and testing', *Econometrica*, vol. 55, no. 2, pp. 251-276.
- English, WB 1999, 'Inflation and financial sector size', *Journal of Monetary Economics*, vol. 44, pp. 379-400.
- Hasllag, JH & Koo, J 1999, 'financial repression, financial development and economic growth', *Federal Reserve Bank of Dallas*.

- Haug, A. A., 2002, 'Temporal aggregation and the power of cointegration tests: A Monte Carlo study. *Oxford Bulletin of Economics and Statistics*, vol. 64, no. 4, pp. 399-412.
- Huybens, E & Smith, B 1998, 'Financial market frictions, monetary policy, and capital accumulation in a small open economy', *Journal of Economic Theory*, vol. 81, no. 2, pp. 353-400.
- Huybens, E & Smith, B 1999, 'Inflation, financial market, and long-run real activity', *Journal of Monetary Economics*, vol. 43, no.2, pp. 283-315.
- Johansen, S 1992, 'Cointegration in partial systems and the efficiency of single-equation analysis', *Journal of Econometrics*, 52, no. 3, pp. 389-402.
- Johansen, S & Juselius, K. 1990, 'Maximum likelihood estimation and inference on cointegration with applications to the demand for money', *Oxford Bulletin of Economics and Statistics*, vol. 52, no.2, pp. 169-210.
- Jung, WS 1986, 'Financial development and economic growth: international evidence', *Economic Development and Cultural Change*, vol. 34, no. 2, pp. 333-346.
- Khan, MS., Senhadji, AS and Smith, B.D 2001, 'Inflation and financial depth', 1 st Edn., *International Monetary Fund*, pp. 30.
- Keho, Y 2009, 'Inflation and financial development: Cointegration and causality analysis for the UEMOA countries', *International Research Journal of Finance and Economics*, vol. 27, no. 10, pp. 117-123.
- Kim, DH, Lin, SC, and Suen, YB 2010, 'Dynamic relationship between inflation and financial development', *Macroeconomics Dynamics*, vol. 14, pp. 343-364.
- King, R & Levine, R 1993a, 'Finance and growth: Schumpeter might be right', *Quarterly Journal of Economics*, vol. 108, no. 3, pp. 717-737.
- King, R & Levine, R 1993b, 'Finance, entrepreneurship and growth: theory and evidence', *Journal of Monetary Economics*, vol. 32, no.3, pp. 513-542.
- Lee, C & Wong, S Y 2005, 'Inflation thresholds effects in the relationship between financial development and economics growth: Evidence from Taiwan and Japan', *Journal of Economic Development*, vol.30, no.1, pp. 49-68.
- Levine, R & Zervos, S 1996, 'Stock market development and long-run growth. *World Bank Review*, vol.10, no.2, pp. 323-339.
- Levine, R & Zervos, S 1998, 'Stock markets, banks and growth', *American Economic Review*', vol. 88, no.3, pp. 537-558.
- Naceur, SB & Ghazouani, S 2005, 'Does inflation impact on financial performance in the MENA Region?', *Journal of Middle East Economics and Finance*, vol. 3, no.3, pp. 219-229.
- Odhiambo, M N 2012, 'The impact of inflation on financial sector development: Experience from Zambia', *The Journal of Applied Business Research*, vol. 28, no. 6, pp. 1497-1508.
- Ozturk, N & Karagoz, K 2012, 'Relationship between inflation and financial development: Evidence from Turkey', *International Journal of Alanya Faculty of Business*, vol. 4, no. 2, pp. 81-87.
- Pagano, M. 1993 'Financial markets and growth: An overview', *European Economic Review*, vol. 37, no.2-3, pp. 613-622.
- Pesaran, MH & Shin, Y 1998 'An Autoregressive distributed lag modeling approach to cointegration analysis', in: *Econometrics and Economic Theory in the 20th Century*, Storm, S. (Ed.), Cambridge University Press.
- Pesaran, MH, Shin, Y, and Smith, RP 2001, 'Bounds testing approaches to the analysis of level relationships', *Journal of Applied Econometrics*, vol. 16, no.3, pp. 289-326.
- Phillips, P & Perron 1988, 'Testing for a unit root, *Econometrica*', vol. 75, no. 2, pp. 1361-1401.
- Roubini, N & Sala-I-Martin, X 1992, 'Financial repression and economic growth', *Journal of Development Economics*, vol. 39, no.1, pp. 5-30.
- Rousseau, P & Wachtel, P 2002, 'Inflation thresholds and the finance –growth nexus', *Journal of International Money and Finance*, vol. 21, no.6, pp. 777-93.
- Wahid ANM, Shahbaz, M, and Azim, P 2011, 'Inflation and financial sector correlation: The case of Bangladesh', *International Journal of Economics and Financial Issues*, vol. 1, no. 4, pp. 145-152.