Impact of devaluation on Saudi oil exports: The J-Curve analysis

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10 July 2017

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Abstract

This research probes the impact of Exchange Rate (ER) and oil prices on oil-exports of leading OPEC country, Saudi Arabia by using Shin's et al. (2014) non-linear ARDL. We find that world income is helping in increasing Saudi oil-exports and the insignificant impact of ER on oil-exports in linear ARDL is found. Alternatively, a positive ER variable is negatively impacting to oil-exports and an appreciation is result in decrease in oil-exports. Further, in long a devaluation, negative ER, could not help in increasing oil-exports. But, short run analysis expose the existence of W-curve instead of J-curve with devaluation in the non-linear ARDL model and J-curve has been found in the linear ARDL model. Positive Oil prices' movement is also helping in raising oil-exports and negative movement has no impact. Lastly, the impacts of both ER and oil-prices have the asymmetrical impacts.

Acknowledgement: This project was supported by Deanship of Scientific Research at Prince Sattam bin Abdulaziz University under the project No. 2016/01/6266.

1. Introduction

Exchange rate (ER) have important role to play in economic analysis and its effect on real activity is one of the most debated issue among numerous economists. It has been argued that depreciation may stimulate economic growth by boosting trade. Few economists have debated that depreciation may be counterproductive, particularly in semi-industrialized countries due to the fact that imports and exports are usually insensitive to changes in exchange rate and price. Looking into supply side, Schmid (1982) highlighted that the external position and growth performance may be badly affected by devaluation in many developing and industrialized countries, in short to medium term at least, due to oil-dependence and imported raw material. As far as demand side is concerned, Alexander (1952) revealed that likelihood devaluation could lead to lower consumption component. Since marginal propensity to consume of workers are higher than the producers, therefore the total consumption falls because of the currency devaluation.

Hamilton (2011) discuss that during the decade of 2000s, the world has experienced a massive surge in oil prices as a result of impressive global economic growth with prices hitting the record levels of US 140$/barrel in 2008. Oil prices and its impact on macroeconomic level has usually been studied from the perspective of importing countries whereas the condition of exporters and producers has been given less attention. In recent years, the most important country to highlight with respect to oil is Saudi Arabia. Because, oil-price crises may be affecting this country in larger amount due to over dependence on oil for exports' revenue. The kingdom has been the world's prominent supplier during the decades of 1980's and 1990's and has the power to increase production whenever required. Saudi Arabia's field production of oil is consisted of 13% of worldwide field production in year 2005. Many researchers and analysts have presumed that the kingdom's role would remain significant to increase production in order to accommodate rising demand globally in the decade of 2000. However, it has been observed later on that the production of Saudi Arabia stood around 850,000 barrels/day in 2007 which was lower than what it had been in 2005.

KSA is considered as major oil-exporter and is highly vulnerable to the lower oil prices. The effects of recent plunge in the crude prices have started to reflect in Saudi economy. According to the Guardian report, the kingdom incurred a 15% deficit of GDP and recently, they have announced a big cut in their budget spending. Saudi Arabia faced almost $98 billion fiscal deficit in 2015 owing to the lower oil prices. IMF has already warned Saudi Arabia with the projection of bankruptcy in the upcoming years and suggested to kingdom a shift in its economic policy.

Looking at the exchange rate of Saudi Arabia, it has been fixed to the US dollar since 1986 i.e., SAR 3.75 per USD. Al-Hamidy and Banafe (2013) argue that the kingdom biggest source of foreign exchange earnings come from oil-exports. Being an oil based economy, Saudi Arabia is heavily dependent on oil revenue to meet its budget spending as well. During 2003-2011, revenue earned from oil averaged 87%. While, Other sectors represents around 49% of the real income or about 25.5% of the nominal income. It has been due to strong oil-market since 2003 which drove this noticeable portion of nominal oil GDP. Real GDP growth of Saudi Arabia was averaged around 4.5% annually during 2003-2011. Moreover, during the same time, budget-surplus reached to 13% of GDP on average whereas the debt to GDP ratio significantly declined to under 4% in 2012-13 from the peak of around 103.5% which was last seen in 1999. Balance of payments surplus to GDP averaged around 20.6% during 2003-11. These all positive developments occurred mainly because of the cumulative budget surpluses appeared in the aforementioned years and that has been a blessing of oil-revenue.

According to the view of textbook, depreciation in the currency of a nation experiencing a deficit as compared to a currency of trading partner increases the import's cost and reduce price of export as well. Both these effects may together deteriorate Balance of Payment / Trade (BOP/BOT) in short run. Because, quantities of imports and exports react slightly in short run. Resultantly, imports' expenditure increase and exports' revenue fall and BOT is further getting worse instead of any improvement. These effects are also dominated due to inelastic behaviour of trade in short run. But, this situation gets well in the long run as response of trade increases with depreciation in long run with higher proportional change in both exports and imports with a lower change in ER. Therefore, in long run exports' revenues increase and imports' expenditures decrease and have a pleasant / desirable impact of devaluation on BOT. This phenomena is referred to J-curve hypothesis. It is simply explaining that devaluation policy is creating even bad impact on BOT in short run due to low elasticities and it has favourable impact in long run due to comparably high elasticities.

Yousefi and Wirjanto (2003) conduct a study to analyze the influence of ER on BOT for Saudi Arabia, Venezuela and Iran. They find that these countries increase their primary export price (i.e., crude oil) due to the dollar depreciation. As far as Saudi Arabia is concerned, the kingdom long term pricing approach has been witnessed to secure a higher share in oil exports in comparison of Venezuela and Iran. As Saudi Arabia's economy heavily rely on oil-exports only, it is important to find out how devaluation could impact the kingdom's oil-exports. This relationship has not been investigated before in the published literature. Therefore, this study is investigating the impact of devaluation on oil-exports of Saudi Arabia by applying the latest NARDL approach proposed by Shin et al. (2014).

2. Review of Literature

Extensive literature has been produced to investigate the relationship between depreciation (or devaluation) and exports, however a series of J-curve findings give us ambiguous evidence regarding its application and existence. Many researchers have supported the evidence of J-curve in their findings. For example, Bahmani-Oskooee (1985) test J-curve for Greece, Korea, India, and Thailand and find the J-curve effect in these countries except for Thailand. Notwithstanding, many researchers including Bahmani-Oskooee have also rejected evidence of J-curve for some countries (see i.e. Hassan et al., 2013). On the other hand, we can find hardly few studies on exploring J-curve for oil-exports particularly.

The literature has highlighted the effects of ER on exports on non-oil producing countries. However, this relationship has been given less attention in the case of oil-producing countries, particularly members of OPEC. Bahmani-Oskooee and Kandil (2007) argue that it is usually assumed that oil leads the world supply of output but the international coordination and capacity constraints might rule the choices of oil-exports. Oil prices are determined in USD and many oil-exporting economies are caring fixed pegged system in handling the stability of exchange rate and in order to soothe oil-exports as well. They discuss that decisions regarding production and exports of oil are not expected to vary with devaluation. But the supply may fall due to surge in cost associated with the imported-inputs on account of the depreciation in domestic currency.

The large price fluctuations in the international oil prices are the matter of concern for most of the oil exporting countries because of their high dependency on oil. Hardly any study analysed the impact of devaluation on the oil exports, especially in KSA which is the prominent oil producer and exporter worldwide. In the earlier paper, Bahmani-Oskooee (1996) studies the case of Iran for the sample period 1959-1990. In which, he proves empirically that depreciation could be contractionary in an oil-producing country despite the fact of dominant oil-exports. According to Al-Hamidy and Banafe (2013), oil exports are the biggest source of foreign exchange earnings for Saudi Arabia and to meet the budget spending of the country as the kingdom greatly relies on oil revenue. The authors report that on average 87% of total revenue generated from oil standalone during 2003-2011.

Recent developments in the world oil market i.e., a steep decline in the crude oil prices has raised the alarming situation for the oil exporting countries, especially Saudi Arabia whose oil exports have a major share in GDP. According to Kitous et al. (2016), the crude oil exports of Saudi Arabia accounts 35% of their GDP which depicts that the 60% decline in oil prices will reduce the kingdom's GDP by 14.3%. Similarly, Mahboub and Ahmad (2016) argue that lower prices of oil will lead to lower oil export revenues in the case of Saudi Arabia. Subsequently, it is important to analyze the relationship between devaluation and oil exports. Therefore, this study takes the issue and is aimed at finding influence of devaluation and oil prices on oil exports in Saudi Arabia. As literature is very limited related to devaluation and its impact on oil exports and hardly any study exists that has targeted this issue. So, our study may have a significant support in the existing growing reaserch and will open many dimensions for the students, researchers, institutions and policy makers in this regard.

3. Data and Methodology

3.1 Data

For testing the effect of devaluation on oil-exports, study uses the annual time series of a period 1970-2015. The sample of this time period is selected on the basis of maximum availability of data. Oil-exports and exchange rates are taken in real values. This study also checks influence of OP on oil-exports as oil export prices affect volume of oil exports. Saudi Arabia is heavily depending on oil exports i.e. about 90% exports' revenue comes from oil exports. Therefore, oil prices can have a significant impact on oil exports. All data is collected from SAMA. Further, the world GDP proxy for world demand for Saudi oil and Consumer Price Index (CPI) of Saudi Arabia and US are taken from World Development Indicators (WDI).

3.2 Methodology

To estimate the effects of exchange rate or oil price, we are assuming a symmetrical model at first. Further, we are using world GDP proxy for world income or world demand for Saudi oil exports. The model is as follow:

$$OX_t = \alpha + \beta Y_t + \gamma X_t + \varepsilon_t \qquad (1)$$

Here, OX_t denotes to the oil-exports of Saudi Arabia. Y_t denotes to world GDP and X_t may assume real Exchange Rate (ER_t) or Oil Prices (OP_t). The ER and OP are not used in a same model due to possibility of multicollinearity between two. Oil prices are affecting the Saudi economy in a large amount due to its heavy dependence and oil prices may have impact on exchange rates of Saudi Arabia. Further, all variables are assumed in logarithm form to make our model log-linear as most of trade or exports models are assumed to be log-linear. The coefficient of world income might be positive as rising world income may increase the oil demand and Saudi-oil exports as well. The exchange rate is defined as one Saudi Riyal equal to number of US dollars and fall in ER is representing devaluation of Riyal under fixed ER system followed by Saudi government. Further, it is converted into real exchange rate by multiplying it with CPI of Saudi Arabia and dividing by CPI of US. The coefficient of ER_t is expected as negative in long run if devaluation has a favourable outcome Saudi exports. OP_t might have positive influence as oil is assumed as necessity in the oil importing countries and rising oil prices may have positive impact on oil-exports' revenues.

This study uses the ARDL suggested by Pesaran et al. (2001) due to the superiority and efficiency of this technique even in detection of I(0) and I(1). This technique can be termed as linear ARDL and further this study is also wanted to differentiate the results of linear ARDL with non-linear ARDL proposed by Shin et al. (2014). At first, we incubate a linear ARDL model:

$$\begin{aligned}\Delta OX_t &= \alpha + \varphi OX_{t-1} + \beta Y_{t-1} + \gamma X_{t-1} + \sum\nolimits_{i=1}^{p} \kappa_i \Delta OX_{t-i} \\ &+ \sum\nolimits_{i=0}^{q} \lambda_i \Delta Y_{t-i} + \sum\nolimits_{i=0}^{r} \nu_i \Delta X_{t-i} + \psi_t\end{aligned} \qquad (2)$$

We estimate the equation (2) at first and then apply the bound test on (H_0: $\varphi = \beta = \gamma = 0$). The rejection of H_0 could claim the cointegrating relation in model. After a confirmation of cointegration, the long run effects can be captured through finding the normalized coefficients of our independent variables normalize on coefficient of OX_{t-1}. Here, X_t may assume the ER_t or OP_t separately in the estimations of the models. After estimation of long run results, the short run results may also be calculated from the ECM of ARDL by incorporating the lag of residual from the long run relationship. This is all about the linear-ARDL. The estimation procedure will be the same for non-linear ARDL and only change is developing the positive and negative series of ER (PER and NER) and OP (POP and NOP). It is done by partial summations as suggested by Shin et al. (2014) and then we accommodate these variables (PER & NER and POP & NOP) in the ARDL framework instead of single variable of ER or OP to analyse the possible presence of asymmetry.

4. Data Analyses

Usually, macroeconomic series are found non-stationary, which needs to be tested for stationarity level . But, in case of ARDL, it does not need to inquire this issue because ARDL is efficient in case of mix order of integration of order 1 and 0. We have tested and found that all of our selected series are stationary at either order of 1 or 0 and we can proceed for further analysis. Table 1 shows the bound test results based on selected four ARDL models. Model 1 and 2 are the linear or symmetrical ARDL models of ER and OP respectively. Model 3 and 4 are the non-linear or asymmetrical ARDL models. The calculated F-values in model 3 and 4 are large enough and we can conclude the existence of cointegration in model 3 and 4. F-values do not carries sufficiently high value to reject H_0 in model 1& 2, but alternatively the coefficients of ECT in table 3 are negative and significant for these models and this is an alternative way to find long and short relationship argued by Pesaran et al. (2001). Therefore, we can carry forward our analyses for all the four models. Further, diagnostic tests are also performed on four models and F-values of each test are sufficiently low and their p-values are greater than 0.1. Therefore, all of our models have no econometric problem of heteroscedasticity, serial correlation, non-normality of error term and any issue with functional form. Furthermore, CUSUM and CUSUM square tests are showing that the estimated parameters of all models are stable and reliable to interpret.

Table 1: Bound Test and Diagnostics

Tests	**Linear ARDL**		**Non-Linear ARDL**	
	Model 1	**Model 2**	**Model 3**	**Model 4**
F-value (Bound Test)	3.3791	3.3664	5.9481	5.1746
Serial Correlation Tests	0.3434 (0.7122)	0.5360 (0.5908)	2.3829 (0.1090)	0.1489 (0.8623)
Heteroscedasticity Test	1.3393 (0.2577)	1.3646 (0.2198)	1.2659 (0.2871)	1.0107 (0.4607)
Normality Test	0.2711 (0.8733)	0.0756 (0.9629)	2.8104 (0.2453)	0.5593 (0.7560)
Ramsey RESET Test	0.2656 (0.7924)	0.0155 (0.9018)	1.5980 (0.1199)	1.7186 (0.1868)
CUSUM	S	S	S	S
CUSUMsq	S	S	S	S

Note: Upper bond critical values are 3.2, 4.08 and 4.66 at 10%, 5% and 1% respectively. Brackets keep p-values of respective tests. S is showing stability of estimated parameters through CUSUM and CUSUM square tests.

Table 2: Long Run Results

Variables	**Linear ARDL**		**Non-Linear ARDL**	
	Model 1	**Model 2**	**Model 3**	**Model 4**
ER_t	0.2046 (0.8048)			
PER_t			-5.1333	

			(0.0001)	
NER_t			-0.2716 (0.8629)	
OP_t		0.7807 (0.0005)		
POP_t				1.2834 (0.0015)
NOP_t				-0.3120 (0.7349)
Y_t	1.9195 (0.0585)	0.8779 (0.0440)	7.0631 (0.0000)	4.0342 (0.0277)
Intercept	-22.4079 (0.0661)	-7.6569 (0.1675)	-88.5040 (0.0000)	57.2048 (0.02443)

Note: Brackets keep p-values based on t-test

Table 2 shows the long run results of four estimated models. First two models are estimated with linear ARDL and first model shows, ER has insignificant influence on oil-exports. Asymmetrical analysis in model 3 suggests that positive ER has a negative and significant influence on oil-exports. A negative ER has insignificant impact. It shows that an appreciation has adverse impact on oil exports in term of a decline in value of oil-exports but devaluation has not favourable impact on the oil-exports. It is also showing that ER has asymmetrical effect on oil exports as positive and negative movement in exchange rates have not same kinds of effects. That is further tested by Wald test and we find the same evidence. Further, in model 1, the effect of exchange rate is observed insignificant which is found significant at least in case of positive exchange rate movement and it is showing the importance of non-linear ARDL in our case of estimation. In the model 2, the OP has a positive influence for value of oil-exports. That is showing a compulsory demand of oil for oil-importing countries and a rising oil price has favourable impact for Saudi oil-exports value. In the model 4, positive movement of oil price again has favourable effects on oil-exports but the negative movement in oil price do not affect the value of oil-exports. Further, asymmetrical effects of oil price are also observed like in case of ER.

Table 3: Short Run Results

Variables	**Linear ARDL**		**Non-Linear ARDL**	
	Model 1	**Model 2**	**Model 3**	**Model 4**
ΔOX_{t-1}		0.0843 (0.5095)	0.2864 (0.0310)	0.1666 (0.1698)
ΔOX_{t-2}		0.3330 (0.0109)		0.1023 (0.0368)
ΔER_t	0.3827 (0.1452)			
ΔER_{t-1}	-0.6518 (0.0043)			
ΔPER_t			-1.5561 (0.2426)	

ΔNER_t			3.4769 (0.0112)	
ΔNER_{t-1}			-4.3897 (0.0108)	
ΔNER_{t-2}			4.0805 (0.0015)	
ΔOP_t		1.1728 (0.0000)		
ΔOP_{t-1}		0.0574 (0.7115)		
ΔOP_{t-2}		-0.3235 (0.0422)		
ΔPOP_t				1.3802 (0.0000)
ΔPOP_{t-1}				-0.2713 (0.1283)
ΔNOP_t				0.6877 (0.0000)
ΔNOP_{t-1}				0.3926 (0.0157)
ΔY_t	3.6088 (0.0947)	2.0233 (0.0126)	2.4144 (0.1303)	1.7395 (0.0181)
ΔY_{t-1}	6.0179 (0.0047)	-1.8555 (0.0364)		
ΔY_{t-2}	2.4021 (0.2451)			
ΔY_{t-3}	3.9163 (0.0675)			
ECT_{t-1}	-0.1404 (0.0006)	-0.2851 (0.0006)	-0.5059 (0.0000)	-0.2271 (0.0000)

Note: Brackets keep p-values based on t-test

Table 3 displays short run estimations. The coefficients of ECT are negative and significant and are showing the short run relationship in all models. In model 1, real exchange rate has insignificant effect at zero lag but a negative impact with first lag. It is showing a J-curve effect as at first exchange rate has no effect but after sometime it contributes in increase in oil exports' revenues due to devaluation. In model 3, impact of a positive change has been insignificant. The negative real exchange rate variable shows the W-curve effect as oil-exports decrease in zero lag with a devaluation in exchange rate, then it improves at first lag and later decreases at second lag. In model 2, oil price shows positive and significant impact on oil exports and negative and significant at second lag. In model 4, positive and negative changes in oil prices are showing the positive and significant impact on oil-exports. It means that arising oil-price may help in raising oil-exports' revenue even in short run. In the both models of 3 and 4, real exchange rate and oil price are showing asymmetrical effects.

5. Conclusion

From the above discussion, study concludes that existence J-curve in first model. The second model clearly indicates that in short run OP has positive and significant impact on oil exports and significant negative effects are seen at second lag. Third model confirms short run insignificant impact and negative ER indicates W-curve because at zero lag devaluation decreases exports, at first lag increases exports and later at third lag decreases exports again. Model 4 also confirms asymmetrical effects in the short run. To observe long run relationship study first applies linear ARDL models and then uses non-linear ARDL models. All these models confirm long run relationship as their F-calculated values cross upper bonds values. World income has favourable influence on oil-exports. First two models were symmetrical models while third and fourth models were asymmetrical models to capture positive and negative changes in exchange rate, in oil prices and their impact on exports. Model 3 confirms that an appreciation has adverse impact on oil exports and value of oil exports declines but devaluation has not favourable impact on the oil exports in the long run. This is also an indication of asymmetrical effects. According to model 2, rise in oil prices are beneficial for exports' value to increase for Saudi Arabia. Model 4 partially confirms this situation as only positive changes in oil prices confirms rise in oil exports.

References

Alexander, S.S. (1952). Effects of a Devaluation on a Trade Balance. Staff Papers-International Monetary Fund, 2(2), 263-278.

Al-Hamidy, A., and Banafe, A. (2013). Foreign exchange intervention in Saudi Arabia. BIS Paper, (73v).

Bahmani-Oskooee, M. (1996). Source of stagflation in an oil-producing country: evidence from Iran. Journal of Post Keynesian Economics, 18(4), 609-620.

Bahmani-Oskooee, M., and Kandil, M. (2007). Exchange rate fluctuations and output in oil-producing countries: the case of Iran. IMF Working Papers, 1-32.

Bahmani-Oskooee, M. (1985). Devaluation and the J-Curve: Some Evidence from LDCs. The Review of Economics and Statistics, 67(3), 500-504.

Hamilton, J.D. (2011). Historical oil shocks (No. w16790). National Bureau of Economic Research.

Hassan, M.U., Hassan, M.S. and Mahmood, H. (2013). An Empirical Inquisition of the Impact of Exchange Rate and Economic Growth on Export Performance of Pakistan. Middle-East Journal of Scientific Research, 14(2), 288-299.

Kitous, A., Saveyn, B., Keramidas, K., Vandyck, T., Los Santos, L.R. and Wojtowicz, K. (2016). Impact of low oil prices on oil exporting countries (Working Paper # JRC101562). Institute for Prospective Technological Studies, Joint Research Centre.

Mahboub, A.A., and Ahmad, H.E. (2016). The Effect of Oil Price Shocks on the Saudi Manufacturing Sector. Paper presented at "Topics in Middle Eastern and African Economies" held by Middle East Economic Association.

Pesaran, M.H., Shin, Y. and Smith, R. (2001). Bounds Testing Approaches to the Analysis of Level Relationships. Journal of Applied Econometrics, 16(3), 289-326.

Schmid, M. (1982). Stagflationary Effects of a Devaluation in a Monetary Model with Imported Intermediate Goods. Jouranl of Economics and Statistics, 197, 107-129.

Shin, Y., Yu, B. and Greenwood-Nimmo, M. (2014). Modelling asymmetric cointegration and dynamic multiplier in an ARDL framework. In: Horrace, W.C. and Sickles, R.C. (Eds) Festschrift in honor of Peter Schmidt. Springer Science and Business Media, New York.

Yousefi, A. and Wirjanto, T.S. (2003). The Empirical Role of the Exchange Rate on the Crude-Oil Price Formation. Energy Economics, 26, 783-799.

Ahmad, K. & Mahmood, H. (2013). Macroeconomic Determinants of National Savings Revisited: A Small Open Economy of Pakistan. World Applied Sciences Journal, 21(1), 49-57.

Ahmad, K., & Mahmood, H., (2013). Openness-Inflation Puzzle: Evidence from Pakistan. The Bangladesh Development Studies, 69-78.

Ahmad, N., Iqbal, A. and Mahmood, H. (2013). CO2 Emission, Population and Industrial Growth linkages in Selected South Asian Countries: A Co-integration Analysis. World Applied Sciences Journal, 21(4), 615-622.

Alkhateeb, T.T.Y, Mahmood, H. & Sultan, Z.A. (2016). The Relationship between Exports and Economic Growth in Saudi Arabia. Asian Social Science. 12(4), 117-124.

Alkhateeb, T.T.Y., Alkahtani, NS, Mahmood, H., (2017). Assessing the Role of Foreign Labour on Saudi Labour Unemployment in Saudi Arabia. International Journal of Applied Business and Economic Research 15, 22.

Alkhateeb, T.T.Y., Mahmood, H., Sultan, ZA & Ahmad, N. (2017). Trade Openness and Employment Nexus in Saudi Arabia. International Journal of Economic Research, 14 (14), 56-66.

Alkhateeb, T.T.Y., Mahmood, H., Sultan, ZA, & Ahmad, N. (2017). Financial market development and employment nexus in Saudi Arabia. International Journal of Applied Business and Economic Research 15 (21), 165-174.

Alkhateeb, TT, Ajina, AS, George, S, & Mahmood, H., (2017). Egyptian intra agriculture trade with GAFTA members: Reilly's law of retail gravitation and marketing effects. International Journal of Economic Research 14 (9), 137-147.

Habib, A., Rehman, V, Zafar, T., Mahmood, H., (2016). Does sustainability hypothesis hold in developed countries? A panel co-integration analysis. Quality & Quantity, 50 (1), 1-25.

Hassan, M.U., Mahmood, H. & Hassan, M.S. (2013). Consequences of Worker's Remittances on Human Capital: An In-Depth Investigation for a Case of Pakistan. Middle-East Journal of Scientific Research, 14 (3), 443-452.

Hassan, MU, Hassan, MS, & Mahmood, H., (2013). An empirical inquisition of the impact of exchange rate and economic growth on export performance of Pakistan. Middle-East Journal of Scientific Research 14 (2), 288-299.

Liaquat, S., & Mahmood, H., (2017). Electricity consumption and economic growth in Pakistan: Menace of circular debt. International Journal of Economics and Business Research, 13 (3), 227-245.

Mahmood, H. & Alkhateeb, T.T.Y. (2017). Trade and Environment Nexus in Saudi Arabia: An Environmental Kuznets Curve Hypothesis. International Journal of Energy Economics and Policy, 7(5), 291-295.

Mahmood, H. and Chaudhary, A.R. (2012). A Contribution of Foreign Direct Investment in Poverty Reduction in Pakistan. Middle-East Journal of Scientific Research, 12 (2), 243-248.

Mahmood, H., & Alkhateeb, T.T.Y. (2017). An Estimation of Service Quality in King Khalid Hospital, Saudi Arabia. International Journal of Applied Business and Economic Research, 15 (16), 459-467.

Mahmood, H., & Asif, M., (2016). An empirical investigation of stability of money demand for GCC countries. International Journal of Economics and Business Research, 11 (3), 274-286.

Mahmood, H., & Chaudhary, A.R. (2009). Application of endogenous growth model to the economy of Pakistan: A cointegration approach. Pakistan Journal of Commerce and Social Sciences, 2, 16-24.

Mahmood, H., (2016). Determinants of Bilateral Foreign Direct Investment Inflows in Pakistan from major investing countries: A dynamic panel approach. Journal of Applied Economic Sciences, 11 (7), 1471 – 1476.

Mahmood, H., (2016). Revisited Money Demand function for GCC countries and testing its stability. Journal of Economics and Economic Education Research, 17 (2), 137 – 148.

Mahmood, H., & Chaudhary, A.R. (2012). Impact OF FDI on Human Capital in Pakistan. Asian Journal of Empirical Research, 2(3), 84-91.

Mahmood, H., & Chaudhary, A.R. (2012). Impact of Sector-Specific FDI on Sector-Specific Labour Productivity in Pakistan. World Applied Sciences Journal, 19 (4), 566-574.

Mahmood, H., & Chaudhary, A.R. (2012). Foreign Direct Investment-Domestic Investment Nexus in Pakistan. Middle-East Journal of Scientific Research, 11 (11), 1500-1507.

Mahmood, H., & Chaudhary, A.R. (2012). A Contribution of Foreign Direct Investment in Poverty Reduction in Pakistan. Middle-East Journal of Scientific Research, 12 (2), 243-248.

Mahmood, H., & Chaudhary, A.R. (2012). FDI, Financial Market Development, Trade Openness and Economic Growth. World Applied Sciences Journal, 19 (8), 1125-1132.

Mahmood, H., & Chaudhary, A.R. (2012). FDI, Population Density and Carbon Dioxide Emissions: A Case Study of Pakistan. Iranica Journal of Energy & Environment, 3(4), 254-260.

Mahmood, H., & Chaudhary, A.R. (2012). Impact of Sector-Specific FDI on Sector-Specific Employment in Pakistan. Middle-East Journal of Scientific Research, 11 (11), 1514-1523.

Hassan, MS., Ahmad, I., & Mahmood, H., (2012). Does Growth Led Inflation Hypothesis & Locus Critique Exist in Pakistan? A Time Series Study. World Applied Sciences Journal, 20(7), 917-926.

Mahmood, H., (2016). Testing fiscal sustainability under inter-temporal budget constraint in Saudi Arabia. Actual Problems of Economics 185 (11), 356-362.

Mahmood, H., A Ali, MI Chani (2013). Determinant of Aggregate Imports Demand Function: A Case of Tunisia. International Journal of Economics and Empirical Research, 1 (6), 74 – 82.

Mahmood, H., Al Khateeb, V, & Ahmad, N (2017). Impact Of Devaluation On Industrial Exports In Saudi Arabia: J-Curve Analysis. Actual Problems in Economics 189 (3), 331-41.

Mahmood, H., Alkhateeb, T.T.Y., & Ahmad, N (2017). Impact of devaluation on service sector exports in Saudi Arabia: non-linear ARDL approach. Economic annals-XXI, 36-40.

Mahmood, H., Alkhateeb, T.T.Y., & Ahmad, N. (2017). Impact of Devaluation on Foreign Trade in Saudi Arabia. International Journal of Applied Business and Economic Research, 15 (17), 13.

Mahmood, H., Alkhateeb, T.T.Y., Ahmad, N. (2017). Impact of Devaluation on Saudi Oil Exports: The J-Curve Analysis. International Journal of Economic Research, 14 (9), 375-383.

Mahmood, H., Alkhateeb, T.T.Y., N Maalel (2016). Egyptian intra agriculture trade with Common Market for Eastern and Southern Africa trading partners: A gravity model. International Journal of Economics and Financial Issues 6 (6S), 177-182.