Capital Flight and Fiscal Policy in Developing Countries: Evidence from Ethiopia

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Abstract

This study examines the effect of fiscal policy on capital flight in Ethiopia using time series data from 1970 to 2012, employing the Autoregressive Distributed Lag (ARDL) model. The results indicate that past capital flight, changes in debt, and government expenditure had no significant impact on capital flight in Ethiopia, while external debt, taxation, and expenditure practices under different political regimes did have a significant effect. The study details policy implications emerging from the empirical results.

Keywords: Fiscal Policy, Capital flight, Autoregressive Distributed Lag model, Ethiopia
JEL Code: K28, T56, G80

1. Introduction

Capital flight refers to wealth that is earned, transferred, or used, through by breaking a country's laws. It is illegal or illicit. It also refers to wealth whose origin is connected with illegal activity, such as corruption, the illicit production of goods, other forms of crime, or the concealment of a company's wealth from a country's tax authorities (The Service Centre for Development Cooperation, 2010). Capital flows are illicit if they involve illicitly acquired funds or are transferred abroad and held there without full disclosure to national authorities, or both (Ndikumana, 2015).

In past decades, many countries have experienced considerable capital flight with residents moving their wealth abroad, using different ways to accumulate foreign assets (Hermes and Lensink, 2014). Since the emergence of the Asian financial crisis of 1997–98, fiscal policy has gained considerable

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attention in the literature. At the center of this discussion has been the way fiscal policy influences economic variables, specifically the flow of funds across borders. While tax rates can be used to attract foreign capital and government spending can be used to stabilize and boost of economic growth, the extent of fiscal policy's impact on economic variables is still an open empirical question (Muchai and Muchai, 2016). The past decades have witnessed growing attention in academia and policy circles to the issue of capital flight from developing countries in general and African countries in particular. Researchers have been intrigued by the stunning paradox posed by large-scale capital flows both to and from Africa. While the continent receives a substantial amount of capital inflows in the form of official development assistance, external borrowing, and foreign direct investment, it also suffers heavy financial hemorrhage through capital flight (Ndikumana, Boyce and Ndiaye, 2014). Capital flight has become a major issue of concern for Africa because it reduces the continent's much needed investible funds.

In Ethiopia, capital flight is estimated at $31 billion over the 1970–2012 period. On average, the country lost around half a billion dollars annually under the 'Derg' regime (1974-1991). But this amount more than doubled to over 1 billion per annum during the EPRDF regime (1991-). The empirical evidence suggests that macroeconomic instability, the degree to which the financial market expanded and deepened, exports, the interest rate differentials, political instability, corruption, and debt-creating flows have been the most important determinants of capital flight from Ethiopia with the political environment also found to be crucial. Generally, capital flight was high before the violent regime changes and low in the subsequent periods, when the new regimes were in the process of establishing a firmer grip on power; after this, however, capital flight began to rise significantly again. The historical analysis points to potential causality running from political factors to capital flight. A strong improvement in economic and political governance would therefore be key to abating the problems of capital flight in Ethiopia (Alemayehu and Addis, 2016).

Despite the serious capital flight problem, few country-specific studies have investigated the size and determinants of capital flight in Ethiopia. The few that exist have generally focused on economic determinants (Alemayehu and Addis, 2016), and while several studies have explored the relationship between fiscal policy and capital flight in Africa (see for example., Muchai and Muchai 2016), no paper has systemically examined just how fiscal decisions influence capital flight. Whether these fiscal decisions influence capital flight or not remains an issue.

This study defines fiscal policy as combined government decisions regarding a country's revenue and spending. It therefore relates to government taxation and the expenditure decisions that lead to budget deficit or surplus. In this context, the study addresses the following questions as they affect the case of Ethiopia: What is the effect of government consumption on capital flight? Do taxation practices influence capital flight? How do political regimes affect capital flight?

2. Capital Flight and Fiscal Policy

There are few studies of developing countries that analyze the relationship between capital flight and fiscal policy variables such as taxation, government expenditure, and debt. Alesina and Tabellini (1989), for example, state that uncertainty about which political group will be in control in the future, and uncertainty about future fiscal policies, is one of the main reasons for over-accumulation of public debt and private capital flight. Boyce (1992), using time series data from the Philippines between 1962 and 1986, finds evidence for debt-motivated capital flight and suggests foreign borrowing causes capital flight by contributing to an increased likelihood of debt crisis, worsening macroeconomic conditions, and the deterioration of general investment conditions. Eaton (1987) argues that the expectation of increased tax obligations created by the potential nationalization of private debt generates capital flight. Ize and Ortis (1987) also show that when fiscal rigidities create difficulties for servicing foreign debt, private capital flight is encouraged by foreign borrowing as there is the expectation of higher domestic asset taxation to service future debt. Foreign borrowing also provides the resources for channeling private capital abroad.

Boyce and Ndikumana (2012) examine 30 sub-Saharan African countries and show that funds borrowed abroad are often re-exported as private assets. By comparing cumulative capital flight with private net external assets, they conclude that Sub-Saharan African countries are net creditors vis-a-vis the rest of the world. In the case of capital flight driven debt, capital flight forces governments to borrow from abroad since capital flight decreases national resources by lowering domestic savings and investment. In this case, capital flight provides the resources to finance loans to the same residents who export their capital, leading to a situation of ‘round-tripping’ or ‘back-to-back loans’, motivated by the desire to obtain government guarantees on foreign borrowing.

2.1 Capital Flight from Ethiopia

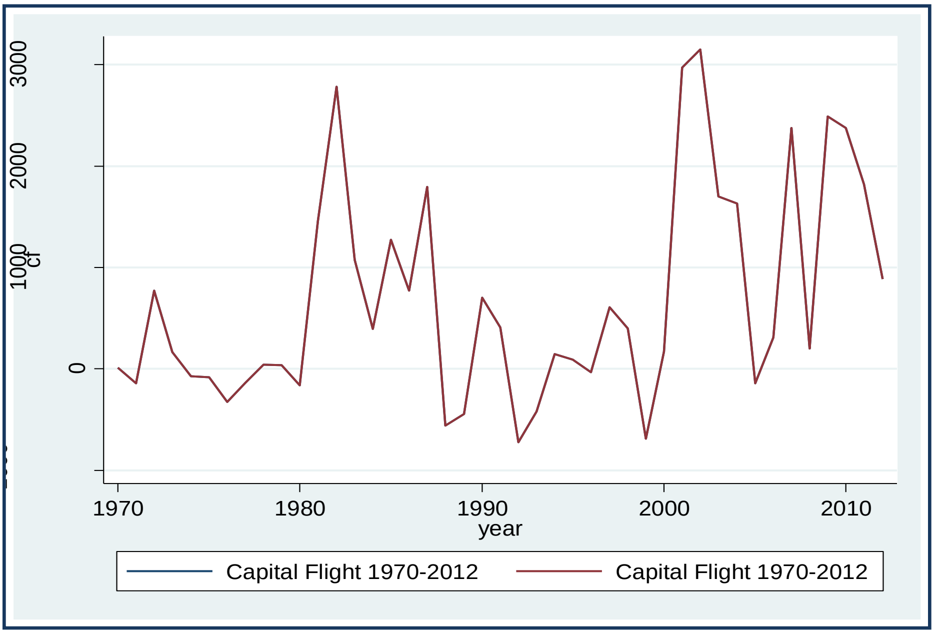
The capital flight from Ethiopian for the last 42 years is estimated and the results are summarized in Table 2 s. We find the total real capital flight during the period 1970 to 2012 to be USD 31 billion. On average, the country lost around half a billion dollars annually during the 'Derg' regime, with the amount more than doubled to over one billion per annum during the EPRDF regime. The reasons why capital flight accumulated more during the latter regime, despite being more stable and taking IMF and World Bank advice to create a more liberal market pro-private sector economy, deserves further research. Overall, capital flight amounted to about 50 percent of the country's average annual exports during the period.

Table 1: Capital flight from Ethiopia (1970-2012): in millions of real constant US Dollar (2012)

Year	Capital Flight 1970-90 The Derg Regime*	Year	Capital Flight (1991-2012) The EPRDF Regime
1970	10.7	1991	410.6
1971	-140.9	1992	-725.6
1972	771.6	1993	-420.5
1973	163.9	1994	145.6
1974*	-72.4	1995	91.9
1975	-84.5	1996	-33.3
1976	-324.7	1997	605.7
1977	-138.4	1998	398.3
1978	41.0	1999	-689.5
1979	37.6	2000	170.8
1980	-160.8	2001	2969.6
1981	1457.5	2002	3148.6
1982	2784.0	2003	1700.8
1983	1072.0	2004	1631.3
1984	392.1	2005	-144.5
1985	1272.1	2006	309.6
1986	771.4	2007	2376.2
1987	1794.8	2008	198.4
1988	-561.0	2009	2491.2
1989	-445.9	2007	2376.2
1990	702.2	2008	198.4
		2010	4096.3
		2011	1818.7
		2012	886.7
Total Capital Flight		9342.4	21437.1
Average Annual Capital flight		444.9	974.4
Grand Total (1970-2012) = USD 30779.5			
Average Annual Capital Flight (1970-2012) = USD 715.8			

Source: Alemayehu and Addis, 2017

Figure 1: Capital flight from Ethiopia (1970-2012)



Source: Own computation

The average annual capital flight during the Derg regime was half the amount that left under in the EPRDF regime, and the EPRDF regime also accounted for about 70 percent of the whole during the entire period under analysis. Under the Derg, capital flight reached its maximum point in the 1980s and then declined up to 2000. The highest level of capital flight was registered under the EPRDF in 2003. The overall shape of capital flight shows a cyclical pattern during the period under consideration.

3. Empirical Evidence on Fiscal Policy and Capital Flight

Much of the contemporary literature on African capital flight has focused, inter alia, on lessons from case studies on the causes and effects of capital flight (Ndikumana, 2016). Notably, the nexus between fiscal policy and capital flight in Kenya (Muchai and Muchai, 2016), determinants of capital flight in Madagascar (Ramiandrisoa and Rakotomanana, 2016) and Ethiopia (Alemayehu & Addis, 2016), capital flight and trade invoicing in Zimbabwe (Kwaramba et al., 2016) and capital flight in Cameroon connections between tax revenue and capital flight in Burkina Faso (Ndiaye and Siri, 2016) and the effect of capital flight on public social spending in Congo-Brazzaville (Moulemvo, 2016).

Muchai and Muchai (2016) noted capital flight has been an issue of concern for Africa because it has reduced the continent's much needed investible funds. Kenya lost US$ 4.9 billion in real terms from 1970 to 2010 through capital flight. Their study sought to provide fiscal evidence of capital flight from Kenya and the results established that previous capital flight, changes in debt, and government expenditure had no significant impact on capital flight from Kenya, though external debt, taxation, and expenditure practices under different political regimes did have a significant effect. The study also discussed policy implications emerging from their empirical results.

Alemayehu and Addis (2016 and 2017) focused on economic, institutional and political determinants to estimate the volume of capital flight, and its impact on growth and on poverty reduction in Ethiopia. With total capital flight (1970-2012) estimated at USD 31 billion, a simple ICOR-based growth model simulation found the average growth lost to capital flight to be about 2.2 percentage points per annum, between 2000/01-2012/13. Using the elasticity of poverty to income and inequality, we also found poverty would have been reduced by about 2.5 percentage points in the last decade had it not been for capital flight. We would also note that growth in Ethiopia in the last decade has been accompanied by rising inequality that wiped out the positive effects on poverty reduction. Had it not been for this inequality accompanying growth, the lost resources of capital flight would have led to around a 5-percentage point decline in poverty during the last decade.

4. Data and Methodology

The annual time series data for fiscal and control variables covering the period 1970–2012 uses figures obtained from the Ministry of Finance and Economic Cooperation, the National Bank of Ethiopia, and the World Bank's World Development Indicators. Capital flight was computed using the extended Balance of Payments residual method (Ndikumana and Boyce, 2010 and 2012). For this study, capital flight data from Boyce and Ndikumana (2012) were used.

Analysis in previous sections revealed a qualitative relationship between fiscal policy variables and capital flight in Ethiopia. Here, we undertake a quantitative analysis of the relationship between fiscal policy and capital flight. The fiscal policy variables included in the analysis are government expenditure, taxation, changes in the stock of debt, and external debt. For the proper specification of our model, the control variables presented in the literature are included. These are the exchange rate, which captures risk and returns on investment; political regimes; previous capital flight; financial deepening; and inflation, capturing the macroeconomic environment. To analyze empirically the fiscal policy variables that might induce capital flight in Ethiopia, we employed a regression model in the following form:

$$KF_t = \alpha_0 + \alpha_1 KF_{t-1} + \alpha_2 CD_t + \alpha_3 ED_t + \alpha_4 T_t + \alpha_5 EXP_t + \alpha_6 P_t + \alpha_7 FD_t + \alpha_8 INF_t + \alpha_9 ER_t + \varepsilon_t \quad \textbf{(1)}$$

Where α1 to α9 are parameters to be estimated, t is time and e is the error term. Capital flight (KF): Capital flight/GDP. Change in the Stock of Debt (CD): CD /GDP. Financial Deepening (FD): M2/GDP. Inflation (INF): Annual average inflation rate (consumer price index). External Debt (ED): Total external debt/GDP. Exchange Rate (ER): Annual average exchange rate; Ethiopian Birr against the US dollar. Tax rate (T): Total taxes/GDP. Expenditure (EXP): Government Expenditure/GDP. Political Regimes (P): Dummy variable: 1 in regimes that demonstrated fiscal discipline relatively (EPRDF), 0 otherwise (Derg regime).

5. Results and Discussion

Since we are using time series data, the stationarity of the time series is important. Traditionally, the Augmented Dickey-Fuller (ADF) has been used to test for the stationarity of macroeconomic variables, and the results are presented in Table 1 below. However, this test does not consider the fact that the data in question could have structural breaks. To take into account the existence of structural breaks, the Clemente-Montanes-Reyes (1998) test was applied in this study.

The Clemente-Montanes-Reyes (CMR) approach has two models: an additive outlier model (AO) which captures a sudden change in the mean of a time series, and an innovative outlier model (IO) which allows for a gradual shift in the mean of the series of the model. We employed the CMR-IO test, which is considered superior to the AO model since it can identify the long-run impact of changes (Kinuthia and Murshed, 2015). Breusch-Godfrey serial correlation LM test is presented in Appendix A3.

The diagnostic test was run on the residuals of the long-run equation presented in Appendix 6; it indicated no evidence of Serial Autocorrelation; the Breusch-Godfrey with the null hypothesis of no Serial Autocorrelation was accepted; and the white test for Hetroskedasticity also indicated no evidence of Heteroskedasticity. The test for checking the model specification, the Ramsey RESET for model specification, was conducted and the result indicated that the model had no evidence of any misspecification.

UNIT ROOT TEST

Determining the stationarity of a time series is a key step before moving to any analysis. Customarily, the Augmented Dickey-Fuller (ADF) has been used to test for the stationarity of macroeconomic variables. Consequently, capital flight, external debt, change in debt, tax rate, government expenditure, exchange rate, and financial deepening are integrated of order (1) while inflation is integrated of order (0). Since seven (of eight) of the variables are I(1) processes, it is possible to run a long-run equation with our stationary variables.

Table 1: Stationarity result

Variables	Without constant and trend	With constant only	With constant and trend	Order of integration
DLNKF	-5.240*	-5.180*	-5.115*	I(1)
DLNCD	-4.323*	-4.246*	-4.219**	I(1)
DLNFD	-4.499*	-4.485*	-5.203*	I(1)
LNINF	3.026*	0.406	-1.269	I(0)
DLNED	-3.680*	-3.638**	-3.580**	I(1)
DLNER	-2.729*	-3.319**	-3.511***	I(1)
DLNT	-3.991*	-3.978*	-4.831*	I(1)
DLNEXP	-3.730*	-3.697*	-4.372*	I(1)

*- significant at 1%, **- significant at 5% and ***- significant at 10%

BOUND TEST FOR CO-INTEGRATION

Our estimated F-statistics is outside the critical value bounds at 90, 95, and 99 percent. We, therefore, reject the null hypothesis of no co-integration and no long-run capital flight equation. The ARDL bounds test, therefore, confirms the existence of a long-run capital flight equation presented in Table 2 below. The regression results are presented in Table 3.

Table 2: Bound co-integration result

Test Statistics	Value	Lag	Level of significance	I0 Bound	I1 Bound
F-statistic	5.352466	2	10%	1.95	3.06
			5%	2.22	3.39
			2.5%	2.48	3.7
			1%	2.79	4.1

Table 3: Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNT	-13.987043	3.297720	-4.241429	0.0003
P	-15.464325	4.581440	-3.375429	0.0027
LNINF	-1.162713	0.935439	-1.242960	0.2270
LNFD	8.921147	3.557880	2.507434	0.0200
LNEXP	3.616109	3.830957	0.943918	0.3555
LNER	8.932589	3.266884	2.734285	0.0121
LNED	-0.016644	0.479176	-0.034735	0.9726
LNCD	-0.079615	0.128959	-0.617371	0.5433
C	-16.019901	9.374833	-1.708820	0.1016

Cointeq = LNKF - (-13.9870*LNT -15.4643*P -1.1627*LNINF + 8.9211 *LNFD + 3.6161*LNEXP + 8.9326*LNER -0.0166*LNED -0.0796*LNCD -16.0199)

The finding that previous capital flight had no significant effect on the current capital flight implies that there has been no habit formation. The change in the stock of debt was also found to have no significant effect on capital flight in Ethiopia and that result confirms the results of Muchai and Muchai (2016) for Kenya, and Nyoni (2000) who focused on Tanzania, though it is inconsistent with the findings of other studies such as Hermes and Lensink (1992), Lensink et al. (1998), and Ndikumana and Boyce (2003).

External debt had no positive and significant influence on capital flight. This finding was inconsistent with the findings of Muchai and Muchai (2016) for Kenya, of Hermes and Lensink (1992), Lensink et al. (1998), and Ndikumana and Boyce (2003) but it was consistent with the findings of Nyoni (2000). Financial deepening, however, did have a positive and significant influence on capital flight.

Table 4: ARDL Co-integrating and Short Run Form

ARDL Co-integrating and Short Run Form

Dependent Variable: Log of capital flight

Selected Model: ARDL (2, 1, 1, 0, 2, 2, 2, 0, 0)

Co-integrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNKF(-1))	0.476432	0.186824	2.550164	0.0182
D(LNT)	-10.446250	5.011589	-2.084419	0.0489
D(P)	-3.530503	3.751813	-0.941013	0.3569
D(LNINF)	-1.988996	1.655245	-1.201632	0.2423
D(LNFD)	-7.208446	5.969921	-1.207461	0.2401
D(LNFD(-1))	-8.754956	3.528175	-2.481440	0.0212
D(LNEXP)	15.816610	5.087023	3.109208	0.0051
D(LNEXP(-1))	10.367885	3.739880	2.772251	0.0111
D(LNER)	27.958649	8.282047	3.375814	0.0027
D(LNER(-1))	-10.208636	4.565486	-2.236046	0.0358
D(LNED)	-0.028472	0.821374	-0.034664	0.9727
D(LNCD)	-0.136194	0.214934	-0.633656	0.5328
ECM	-0.710650	0.287751	-5.944904	0.0000

Tax has a significant coefficient, implying that taxation significantly influenced capital flight. This finding is consistent with the study of Muchai and Muchai (2016), Alam and Quazi (2003) but is inconsistent with Pastor (1990) Vos (1992), Schineller (1997) and Ndikumana and Boyce (2003). While the political regimes' variable had a significant effect on capital flight, the impact of government expenditure was insignificant.

6. Conclusions and Policy Implications

This study examined how fiscal policy affected capital flight in Ethiopia using time series data from1970 to 2012. It defined fiscal policy as decisions taken by the government regarding the country's revenue and spending. Econometric analysis was done to ascertain the effect of tax and public expenditure on capital flight. This revealed that taxes had a negative and significant impact on capital flight from Ethiopia while external debt was found to have a negative and insignificant effect, invalidating the revolving door phenomenon for Ethiopia.

Fiscal policy regimes were also considered in the study in order to explore the effect of political regimes on capital flight and the result established that political regimes which exercised some form of budgetary discipline experienced less capital flight. Furthermore, financial deepening and exchange rates had a significant and positive effect on capital flight though government expenditure and change in the stock of debt had an insignificant impact. There was no evidence of debt-fueled capital flight. The inflation rate has always been kept within tolerable levels for economic players and this probably explains its insignificance in the econometric results. Previous capital flight had a significant effect on the current capital flight, implying that there was some habit formation.

Based on the findings from this study, we can derive some policy implications. The government should be prudent in managing public resources as fiscal discipline is shown to be a significant factor in deterring capital flight. Taxation policies in Ethiopia should be implemented cautiously, and the government should cease from a directed focus on tax incentives, rather focusing on the general tax rate in the economy.

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Appendices

Appendix 1: ARDL Estimation Result

Selected Model: ARDL (2, 1, 1, 0, 2, 2, 2, 0, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNKF(-1)	-0.234219	0.179499	-1.304846	0.2054
LNKF(-2)	-0.476432	0.186824	-2.550164	0.0182
LNT	-10.44625	5.011589	-2.084419	0.0489
LNT(-1)	-13.48069	5.208154	-2.588382	0.0168
P	-3.530503	3.751813	-0.941013	0.3569
P(-1)	-22.92355	7.412287	-3.092642	0.0053
LNINF	-1.988996	1.655245	-1.201632	0.2423
LNFD	-7.208446	5.969921	-1.207461	0.2401
LNFD(-1)	13.71445	6.423568	2.135021	0.0441
LNFD(-2)	8.754956	3.528175	2.481440	0.0212
LNEXP	15.81661	5.087023	3.109208	0.0051
LNEXP(-1)	0.737173	4.990640	0.147711	0.8839
LNEXP(-2)	-10.36788	3.739880	-2.772251	0.0111
LNER	27.95865	8.282047	3.375814	0.0027
LNER(-1)	-22.88675	6.796683	-3.367340	0.0028
LNER(-2)	10.20864	4.565486	2.236046	0.0358
LNED	-0.028472	0.821374	-0.034664	0.9727
LNCD	-0.136194	0.214934	-0.633656	0.5328
C	-27.40445	15.54777	-1.762597	0.0919
R-squared	0.656537	Mean dependent var		-3.994351
Adjusted R-squared	0.375522	S.D. dependent var		2.821711
S.E. of regression	2.229827	Akaike info criterion		4.746025
Sum squared resid	109.3868	Schwarz criterion		5.540119
Log likelihood	-78.29351	Hannan-Quinn criterion		5.035190
F-statistic	2.336304	Durbin-Watson stat		2.355482
Prob(F-statistic)	0.030165			

Appendix 2: Lag length selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-78.66520	NA	8.876170	5.009440	5.409387	5.147501
1	-78.06862	0.852260	9.124594	5.032492	5.476877	5.185894
2	-72.96474	6.999607*	7.258143*	4.797985*	5.286809*	4.966727*
3	-72.78957	0.230216	7.661290	4.845118	5.378381	5.029200
4	-72.63322	0.196552	8.107191	4.893327	5.471028	5.092749
5	-72.60237	0.037029	8.654916	4.948707	5.570846	5.163469
6	-71.63651	1.103839	8.775189	4.950658	5.617235	5.180760
7	-70.70298	1.013544	8.932353	4.954456	5.665472	5.199899
8	-70.54661	0.160836	9.527952	5.002663	5.758118	5.263446

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Appendix 3: Breusch-Godfrey Serial Correlation LM Test

F-statistic	1.714259	Prob. F(2,20)		0.2055
Obs*R-squared	5.999919	Prob. Chi-Square(2)		0.0498
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
LNKF(-1)	0.179249	0.276551	0.648159	0.5243
LNKF(-2)	0.217664	0.222101	0.980023	0.3388
LNT	1.085257	5.106510	0.212524	0.8338
LNT(-1)	2.167350	5.234542	0.414048	0.6832
P	0.087684	3.715660	0.023598	0.9814
P(-1)	1.173019	7.308620	0.160498	0.8741
LNINF	0.196869	1.678308	0.117302	0.9078
LNFD	0.610024	5.915828	0.103117	0.9189
LNFD(-1)	0.910243	6.477481	0.140524	0.8897
LNFD(-2)	-1.053817	3.624339	-0.290761	0.7742
LNEXP	-1.156514	5.011650	-0.230765	0.8198
LNEXP(-1)	-3.101341	5.180925	-0.598608	0.5562
LNEXP(-2)	1.048366	3.790487	0.276578	0.7849
LNER	-2.307302	8.180237	-0.282058	0.7808
LNER(-1)	0.080981	6.606914	0.012257	0.9903
LNER(-2)	1.229632	4.673768	0.263092	0.7952
LNED	0.170081	0.831144	0.204635	0.8399
LNCD	-0.111616	0.232346	-0.480388	0.6362
C	2.976128	15.55519	0.191327	0.8502
RESID(-1)	-0.478782	0.351707	-1.361309	0.1886
RESID(-2)	-0.359583	0.321579	-1.118179	0.2767
R-squared	0.146339	Mean dependent var		1.55E-14
Adjusted R-squared	-0.707321	S.D. dependent var		1.653684
S.E. of regression	2.160778	Akaike info criterion		4.685364
Sum squared resid	93.37923	Schwarz criterion		5.563047
Log likelihood	-75.04997	Hannan-Quinn criter.		5.004968
F-statistic	0.171426	Durbin-Watson stat		2.158257
Prob(F-statistic)	0.999884			

Appendix 4: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.410749	Prob. F(18,22)		0.9701
Obs*R-squared	10.31292	Prob. Chi-Square(18)		0.9212
Scaled explained SS	4.294299	Prob. Chi-Square(18)		0.9996
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-17.81438	37.36595	-0.476755	0.6382
LNKF(-1)	-0.170420	0.431390	-0.395048	0.6966
LNKF(-2)	-0.430487	0.448994	-0.958781	0.3481
LNT	-8.229395	12.04435	-0.683258	0.5016
LNT(-1)	-2.004187	12.51675	-0.160120	0.8742
P	-5.547786	9.016729	-0.615277	0.5447
P(-1)	-14.90422	17.81394	-0.836660	0.4118
LNINF	-2.138080	3.978049	-0.537469	0.5963
LNFD	-0.573779	14.34751	-0.039992	0.9685
LNFD(-1)	11.00610	15.43776	0.712934	0.4834
LNFD(-2)	9.000142	8.479261	1.061430	0.3000
LNEXP	8.573388	12.22564	0.701263	0.4905
LNEXP(-1)	-7.810517	11.99400	-0.651202	0.5217
LNEXP(-2)	-13.41368	8.988051	-1.492390	0.1498
LNER	10.50339	19.90424	0.527696	0.6030
LNER(-1)	-7.704293	16.33447	-0.471659	0.6418
LNER(-2)	10.22373	10.97223	0.931783	0.3616
LNED	-0.092985	1.974007	-0.047105	0.9629
LNCD	0.175977	0.516550	0.340678	0.7366
R-squared	0.251535	Mean dependent var		2.667972
Adjusted R-squared	-0.360846	S.D. dependent var		4.593827
S.E. of regression	5.358942	Akaike info criterion		6.499710
Sum squared resid	631.8018	Schwarz criterion		7.293804
Log likelihood	-114.2441	Hannan-Quinn criter.		6.788875
F-statistic	0.410749	Durbin-Watson stat		2.246464
Prob(F-statistic)	0.970140			

Appendix 5: Functional form

Ramsey RESET Test

	Value	df	Probability
t-statistic	1.395729	21	0.1774
F-statistic	1.948060	(1, 21)	0.1774

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	9.285845	1	9.285845
Restricted SSR	109.3868	22	4.972129
Unrestricted SSR	100.1010	21	4.766714

Unrestricted Test Equation:

Dependent Variable: LNKF

Method: ARDL

Date: 06/20/18 Time: 11:11

Sample: 1972 2012

Included observations: 41

Maximum dependent lags: 2 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (2 lags, automatic):

Fixed regressors: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNKF(-1)	-0.453513	0.235744	-1.923758	0.0680
LNKF(-2)	-1.041138	0.444026	-2.344769	0.0289
LNT	-25.84933	12.07761	-2.140268	0.0442
LNT(-1)	-27.13816	11.03422	-2.459453	0.0227
P	-7.535996	4.661592	-1.616614	0.1209
P(-1)	-49.96695	20.69045	-2.414977	0.0249
LNINF	-4.279794	2.306617	-1.855442	0.0776
LNFD	-12.89054	7.123278	-1.809636	0.0847
LNFD(-1)	27.11312	11.47663	2.362464	0.0279
LNFD(-2)	18.17432	7.581473	2.397201	0.0259
LNEXP	35.54378	14.98590	2.371814	0.0273
LNEXP(-1)	2.030143	4.973499	0.408192	0.6873
LNEXP(-2)	-22.30722	9.305005	-2.397336	0.0259
LNER	59.74629	24.17553	2.471354	0.0221

LNER(-1)	-47.00820	18.51933	-2.538332	0.0191
LNER(-2)	20.49197	8.617761	2.377877	0.0270
LNED	-0.277127	0.823724	-0.336431	0.7399
LNCD	-0.164502	0.211422	-0.778072	0.4452
C	-55.95215	25.49699	-2.194461	0.0396
FITTED^2	0.140520	0.100679	1.395729	0.1774
R-squared	0.685694	Mean dependent var		-3.994351
Adjusted R-squared	0.401321	S.D. dependent var		2.821711
S.E. of regression	2.183281	Akaike info criterion		4.706094
Sum squared resid	100.1010	Schwarz criterion		5.541983
Log likelihood	-76.47494	Hannan-Quinn criter.		5.010479
F-statistic	2.411251	Durbin-Watson stat		2.485346
Prob(F-statistic)	0.026646			

*Note: p-values and any subsequent tests do not account for model selection.

Appendix 6: Diagnostic tests

The diagnostic test run on the residuals of the long-run equation presented in the table below indicates no evidence of Serial Autocorrelation; the Breusch-Godfrey with the null hypothesis of no Serial Autocorrelation is accepted; the white test for Hetroskedasticity indicates no evidence of Heteroskedasticity.

Breusch-Godfrey Serial Correlation LM Test: Serial Autocorrelation			
F-statistic	1.714259	Probability	0.2055
Obs*R-squared	5.999919	Probability	0.0498
White Heteroskedasticity Test			
F-statistic	0.410749	Probability	0.9701
Obs*R-squared	10.31292	Probability	0.9212
Ramsey RESET Test: Model Misspecification			
F-statistic	1.948060	Probability	0.1774
Log likelihood ratio	-76.47494	Probability	5.010479

As shown in the above table the test for checking the model specification, i.e. the Ramsey RESET, also indicates that the model has no evidence of any misspecification.