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Capital Flight and Economic Growth in Iran

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Abstract
Beginning in the mid-1980s, the phenomenon of capital flight from developing countries received considerable attention in the economics literature. Capital flight destroys the domestic macroeconomic environment and decreases transparency and accountability. It restricts financial resources when a country is looking for economic growth and development. The purpose of this article is to measure the amount of capital flight in Iran during 1981-2012, and to investigate the long-run effects of estimated capital flight on the Iranian economic growth in this period. To do so, the amount of capital flight in Iran has been measured using World Bank (1985) and Erbe (1985) approach. Then, the Auto-Regressive Distributed Lag (ARDL) procedure has been applied in order to estimate a growth equation. Results show that capital flight has a negative impact on economic growth in Iran.

JEL Classification: O4, E22, C01.

Keywords: Capital flight, Economic Growth, ARDL, Iran.

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1. Introduction

Numerous opportunities for investment in developing countries such as Iran indicate the role and importance of capital and financial resources in economic growth and development. The persistently dismal economic performances, limited possibilities, structural and political difficulties in developing countries necessarily drive out capital out of these countries. The stylized fact is that when capital flees resources are lost to the domestic economy and these have serious implications on long-run macroeconomic performance. Many analysts have attributed sluggish economic growth and persistent balance of payment deficits in most developing countries to capital flight (Ajayi, 1997). Loss of capital suggests the lost resources that did not contribute to the expansion of domestic production or the improvements in domestic social welfares. Similarly, the accumulated capital flight is lost resources that did not contribute to the tax revenues of the government (Beja, 2007).

Given the fiscal constraints in Iran, lost tax revenues represent foregone public infrastructures, health services, and basic education that are crucial for engendering long-run economic growth. In the same manner, the lost resources are funds that were no longer be available for external debt servicing, making the social burden of debt heavier, which in turn contributing to aggravate the resource mobilization problems of the Iran. Therefore, in such and other related considerations, capital flight undermines macroeconomic integrity of the country. The worst part is that the impacts persist over time. Hence, from "an economic justice point-of-view, there are distributive dimensions to capital flight that must not be ignored" (Beja 2006: 264).

This paper does not deal with the question where capital flight went, who was engaged in it, or even how it was undertaken. The main aim in this paper is to find out the long-run effect of capital flight on economic growth, which has not been adequately investigated. To do so, a measurement of capital flight will be provided. Then, the Auto-Regressive Distributed Lag (ARDL) procedure will be used to estimate the long-run effect of capital flight on economic growth.

The paper has been organized as follows. We discuss the theoretical and empirical literature of capital flight and its relation with economic growth in Section 2. Then, methodology of the paper is explained in Section 3. This section includes measurement of capital flight, econometric model, and data description. Empirical results of the paper are discussed in Section 4. Finally, Section 5 dedicated to conclusion and recommendations.

2. Theoretical Framework and Literature Review

Since data for capital flight is not readily available and would be constructed, there is no universal definition of capital flight. However, it is accepted in all definition that capital flight occurs in the condition of distrust and high risk in the economy. The World Bank (1985) defines capital flight as the change in a nation's foreign assets. It is premised on trying to identify both the sources and uses of international funds by a nation; source funds consist of the increase in recorded gross external debt and net foreign direct investment, which can in turn be used to finance the current account and/or to increase official reserves. In essence, it equates capital flight with all non-official capital outflows.

Dooley (1988) presents another variation of the residual approach which attempts to distinguish between so called normal and flight capital flows. According to Dooley, flight stems from the desire to avoid domestic taxation. As such, flight need not be a current transaction, but merely reflect a change in the motive for holding a previously acquired foreign asset as the domestic investment climate changes. He defines flight as that stock of foreign assets whose returns have not been reported as investment income (in BOP statistics).

Beja (2006) expressed that capital flight is a movement of capital from a resource-scare developing country to avoid social control or losses due to higher domestic risks and uncertainties. In his view, capital flight is the net unrecorded capital outflow or the residual of officially recorded sources and uses of funds.

Four main approaches have been identified in the area of capital flight. These include: (1) The investment diversion; (2) Debt- driven capital flight so-called debt-overhang approach; (3) Tax - depressing approach; and (4) austerity generating approach (Forgha, 2008). We discuss these theories in the following:

The Investment Diversion: Capital flight is due to the macroeconomic and political

uncertainty in developing country and the simultaneous existence of better investment opportunities in advanced countries (like high foreign interest rates, wide array of financial instruments, political and economic stability, favorable tax climate and secrecy of accounts). Some, unscrupulous, corrupt leaders and bureaucrats usually siphon scarce capital resources from their countries to advanced countries. Therefore, these funds are not available for investment at home, leading to a decline in aggregate investment, low economic growth, and hence, a decrease of employment, increase in dependency ratio, and high death rate. Sometimes, these negative macroeconomic effects necessitate borrowing from aboard to reactivate the domestic economy, which sometimes furthers siphon, causing external dependency and indebtedness (Forgha, 2008).

The investment diversion thesis provides one of the well-known negative consequences of capital flight in the countries involved. By itself however, it provides only partial explanation of the consequences of capital flight on the economy (Henry, 2013).

The Debt-Driven Theory (Debt Overhang Approach): This is the continuation of the investment diversion thesis. This thesis postulates that given the heavy external debt of a country, residents of the country are motivated to move their resources outside the country, to foreign countries. Borrowed money is sold to domestic economic agents who transfer these funds partly or completely abroad. According to this thesis, external debt is one of the propellants or fuel to capital flight. This thesis states that capital flight reduces the incentive to save and invest. The assumption here is that with large foreign debt, there are the expectations of exchange rate devaluation, fiscal crisis, and the propensity of the crowding out of domestic capital and expropriation of assets to pay for the debt (Forgha, 2008).

The debt driven approach and the investment driven thesis taken together suggest interdependency between capital flight, growth and external debt with the linkages being mutually reinforcing. Capital flight leads to poor growth, which calls for the necessity to borrow in order to promote growth. Further borrowing or indebtedness promotes capital flight, which in turns leads to poor economic growth, and the cycle continues (Henry, 2013).

The Tax-Depressing Approach: Based on this thesis, capital flight leads to a potential revenue loss because wealth held abroad is outside the control of the domestic government, and therefore cannot be taxed. The fall in government revenue complicated the task of politico-economic engineering to promote growth and development. The outcome is the reduction in debt–servicing capacity of the government. This in turns increases the debt burden, which constrains economic growth and development. Thus, a direct resultant of capital flight is the reduction in revenue generating potential of government (Forgha, 2008).

Austerity Generating Approach: This thesis views the poor in a severely indebted situation due to capital flight. They suffer more because they are exposed to excruciating austerity measures by government to pay for debt obligations to international banks that in turns pay interests to flight capital from residents in these countries (Pastor, 1989). Poverty in developing countries reduces them to hewers of wood and drawers of water while perpetrating international inequality and dependency and, widening the gap between the rich countries and poor countries. Furthermore, the tax that the poor may pay is small, which again constrains the ability of government to muster enough resources to promote growth and development with poverty alleviation. Thus, a vicious circle of external debt, capital flight, poor growth, poverty and external debt is created (Henry, 2013).

From the above, capital flight destroys the domestic macroeconomic environment and decrease transparency and accountability. These distortions manifest themselves in weak governance, large government deficits, overvalued exchange rate, high and variable inflation coupled with financial repression. Thus, we can conclude that where there is heavy debt, capital flight increases, exacerbating and magnifying the debt problems of the country (Glynn and Koening, 1984).

There are now several channels through which capital flight affects economic growth. According to the previous sub-section and the literature, we can distinguish the following main channels (Ndiaye, 2014):

The investment channel: The phenomenon of capital flight takes place through transferring abroad a portion of domestic private savings. The persistence of this phenomenon can lead to a decline in domestic savings, resulting in fewer resources available for the financing of domestic investment and for the promotion of economic growth. Ndikumana (2009) asserts that capital flight reduces domestic investment by decreasing the volume of savings channeled through the domestic financial system, hence retarding economic growth.

Tax base channel: Researchers also note that capital flight leads to the erosion of the tax base through reduced domestic economic activity, inducing a fall in government revenue and, consequently, a decline in public investment that, in turn, can lower private investment and growth (Ajayi 1997, Cervena, 2006, Ndikumana 2009). Ndikumana and Boyce (2011) have shown empirically that countries with higher capital flight tend to have lower tax revenues.

Imports channel: With respect to imports, if scarce foreign exchanges in developing countries are used to finance capital flight, they will not be available for financing imports that may be crucial for economic growth (Lessard and Williamson, 1987). If capital flight money had been invested in the production of either domestically-produced intermediates or export goods that could finance imports, the import constraint on growth could have been relaxed (Pastor, 1990).

Capital inflows channels: According to Ndikumana (2009), capital flight forces the government to increase its borrowing from abroad, which further increases the debt burden and worsens the fiscal balance. As external debt and foreign aid are supposed to contribute to the financing of domestic investment, the more the phenomenon of capital flight increases, the less the resources from external debt and foreign aid are used to finance investment. Therefore, through external debt and foreign aid, capital flight can lead to a fall in domestic investment, and then in economic growth (Boyce, 1992; Cerra, et. al, 2008, Ndiaye, 2014).

Balance of payments difficulties channel: According to Ajayi (1995), the persistent deficits of balance of payments in most developing countries have been attributed to capital flight. Capital flight may negatively contribute to economic growth by exacerbating the balance of payments problems (Menbere, 2003).

Financial system channel: Capital flight can also reduce growth by destabilizing the financial system, as sudden outflows of large resources would call for an adjustment in interest and exchange rates policies (Menbere, 2003). The phenomenon of capital flight occurs through transferring abroad a part of domestic private savings. The persistence of this phenomenon can thus lead to a decline in domestic savings. Therefore, banks will receive less resource in the form of savings, which may induce a fall in their provision of credit to the private sector. Consequently, capital flight can lower the volume of financial intermediation, thereby negatively affecting economic growth (Ndikumana, 2003 and Ndiaye, 2014).

Corruption channel: Capital flight can affect economic growth through corruption. Indeed, high capital flight is symptomatic of an environment characterized by corruption (Ndikumana and Boyce, 2011). This can hurt economic performance by reducing private investment through adversely affecting the quantity and quality of public infrastructures, by lowering tax revenues and by declining human capital accumulation (Ndiaye, 2014).

There are lots of studies on the area of capital flight. Most of these studies have dedicated to calculate or estimate capital flight for different purpose. Some of them have been conducted to identify the key determinants of capital flight in different countries of the world. We have summed up these studies in the Table 1.

The other group of studies on capital flight has considered the impacts of capital flight on the macroeconomic variables such as economic growth. So, the goal of this group of researches is the same as our paper. There is numerous evidence of the adverse effect of capital flight on economic growth in the literature. We have summarized these studies in the Table 2. As it is seen in Table 2, all the considered studies confirm that capital flight has a negative impact on economic growth.

Table 1: Studies for Identifying the Key Determinants of Capital Flight

Researcher(s)	Year	Key Determinants of Capital Flight
Dornbusch	1985	exchange rate misalignment, large fiscal deficit
Walter	1987	domestic policy shortcomings, political and economic instability and unfavorable tax climate
Pastor	1989	exchange rate misalignment
Ajayi	1992 2001	exchange rate misalignment
Schineller	1997	financial and current account deficit, appreciated exchange rate, high inflation rate, unclear and overreaching deregulations
Alam and Quazi	2003	political instability, increase of corporate income taxes, higher real interest rate differentials between countries, and lower GDP growth rates
Beja	2007	unending political crises, lack of confidence on government, corruption, unwillingness of investors to domestic investing
Ndikumana and Boyce	2011	existence of widespread debt
Abuzayed	2012	lagged capital flight, external debt, foreign direct investment, real GDP growth rate, and uncertainty
Maski and Wahyudi	2012	foreign direct investment

Source: Authors

Table 2: Studies on Investigating the Impacts of Capital Flight on Economic Growth

Researcher	Year	Method	Impacts of Capital Flight on the Macroeconomic
Cervena	2006	Generalized Least Squares	Capital flight has detrimental effects on long-run economic growth.
Beja	2007	Comparitive analysis	Capital flight contributes to the lowering of the quality of long-run economic growth.
Forgha	2008	Two Stage Least Squares technique	Capital flight has a negative impact on economic growth.
Okoli	2008	Least square Regression Model	Capital flight exerts a negative effect on the economic development.
Lan	2009	Auto-Regressive Distributed Lag	Capital flight plays a crucial role in influencing economic growth.
Gusarova	2009	Panel Data Regression	Capital flight has a negative impact on economic growth.
Bakare	2011	Auto Regressive Vector Model	Capital flight limits economic growth.
Henry	2013	Multiple Regression	Capital flight has a negative impact on economic growth.
Ndiaye	2014	Generalized Method of Moments (GMM)	Capital flight significantly reduces economic growth.

Source: Authors

3. Methodology

3.1. Measurement of Capital Flight

There are four popular measures of capital flight (Forgha, 2008).

World Bank (1985) and Erbe (1985) measure of capital flight:

$$KF = CA + FDI + ED + FR \quad (1)$$

where, KF is capital flight, CA is current account balance, FDI is foreign direct investments, ED is changes in external debt, and FR is changes in foreign reserves.

Morgan Guaranty Trust Company (1986) measure of capital flight:

$$KF = CA + FDI + ED + FR + BFA \quad (2)$$

Where, BFA represents Bank system foreign assets. This method of capital flight measurement is the reported and unreported acquisition of foreign assets by the public and non-bank private sector.

Duwendag (1987) measure of capital flight:

$$KF = CA + FDI + ED + FR + EBOP + IMFC + C \quad (3)$$

where, EBOP, IMFC, and CI represent errors and omissions in the balance of payments statistics, IMF Credit, and Counterpart items, respectively. Under this measure, capital flight is considered as short-run speculative capital flows, or external assets by non-bank private sector plus the errors and omissions in the balance of payments account. Duwendag's measure is referred to "hot money flows" approach according to Ajayi (1992). This dimension of capital flight is expected to respond quickly to changes in expected returns. There is also another narrow version of the hot money flows approach by Cuddington (1986) and Ajayi (1997).

$$KF = -(EBOP + OI) \quad (4)$$

where OI is other assets/investment particularly net short-run private capital flows. Sources and uses approach to measure capital flight:

$$KF = (ED + FDI) - (CA + FR) \quad (5)$$

This measure was developed by Pastor (1989, 1990) to measure capital flight. Following Beja (2006)'s definition of capital flight, we have used World Bank (1985) and Erbe (1985) approach to measure capital flight in this paper.

3.2. Econometric Model

In this section, we will introduce a model for investigating the effect of capital flight on economic growth. Capital flight arises from portfolio diversification incentives, return differential incentives, and relative risk incentives. The standard portfolio model suggests two key incentives for capital flight: after-tax domestic returns adjusted for expected depreciation that are lower than after-tax foreign returns, and domestic returns that have higher volatility or risk than foreign returns (Collier et al., 2001). So, Agents have incentives to transform the capital abroad, which can be caused by macroeconomic instability and other factors. This will limit capital available for domestic investment and therefore, undermine economic growth (Gusarova, 2009).[2]

Our model for studying the growth impact of capital flight is based on the standard theory of growth, which was significantly extended by empirical testing to explain the economic growth by the increasing number of factors. In particular, we have used a model based on Hadjimichael (1994). In our model, economic growth (EG) is a function of capital flight growth rate (KFG), active population growth rate (PG) as a proxy for labour force, the growth of capital accumulation (KG) as a proxy for physical capital, the change of terms of trade (TOT), and inflation rate (INF). So:

$$EG = f(PG, KG, KFG, TOT, INF) \quad (6)$$

By the theoretical notion of the growth model, active population growth is believed to have a significant positive effect on the economic growth (Fisher, 1991; Barro, 1996). Also, it is expected by the theory of growth that physical capital has a positive effect on the growth. As discussed before, it is expected that capital flight has a negative impact on the economic growth. Furthermore, an improvement in the terms of trade may reduce input prices relative to output prices. So, firms would have an incentive to raise quantity supplied (Hadjimichael, 1994; Barro, 1996; Gusarova, 2009). Thus, we would expect that increase of the terms of trade has a positive influence on the growth of GDP. It is believed that inflation has an important negative impact on growth; because businesses and households are thought to perform poorly when inflation is high and unpredictable (Hadjimichael, 1994; Barro, 1996).

We have employed the Auto-Regressive Distributed Lag (ARDL) approach proposed by Pesaran & Shin (1999) to specify above growth equation. The main advantage of the ARDL lies in the fact that it can be applied irrespective of whether the regressors are I(0) or I(1), and this avoids

[2] We explained previously several channels which capital flight affects economic growth in Section 2.

the pre-testing problems associated with standard cointegration analysis which requires the classification of variables into I(0) and I(1).

The ARDL procedure involves two stages. At the first, the existence of the long-run relation between the variables under investigation is tested. In fact, before the estimation of the long-run relationship, it is necessary to test the existence or lack of a long-term relationship among the dependent and independent variables. If the existence of long-run relation is confirmed, then we can go to stage two. The second stage of the analysis is to estimate the coefficients of the long-run relations and make inferences about their values using the ARDL (Pesaran and Pesaran, 1997).

The general form of the model ARDL-$(p,q_1,q_2,\ldots,q_k)$ is as follows:

$$\varphi(L,P)Y_t = \sum_{i=1}^{k} \beta_i(L,q_i)X_{it} + \delta W_t + u_t \quad (7)$$
$$\varphi(L,P) = 1 - \varphi_1 L - \varphi_2 L^2 - \cdots - \varphi_P L^P$$
$$\beta_i(L,q_i) = \beta_{i0} + \beta_{i1}L + \cdots + \beta_{iq}L^P$$

where, L shows the lag operator; Y_t stand for the dependent variable; X_{it} is the explanatory variable vector; $q_i(i=1,2,\ldots,k)$ is the number of optimal lags relevant to each of explanatory variables; p stands for the number of optimal lags for the dependent variable; and W_t is the vector of definitive variables including intercept, seasonal variables, time trend or endogenous variables with fixed lags. Optimal lags for each variable can be determined by Schwarz Bayesian (SBC), Hannan-Quinn (HQC), or Akaike (AIC) criteria.

In the long-run, $Y_t = Y_{t-1} = \cdots = Y_{t-P}$ and $X_{it} = X_{it-1} = \cdots = X_{it-q}$. Therefore, long-run equation for the ARDL procedure as follows:

$$Y_t = \sum_{i=1}^{k} \theta_i X_i + \gamma W_t + v_t \quad (8)$$

To test the long-term co-integration relationship, following null hypothesis test should be conducted:

$H_0: \sum_{i=1}^{p} \varphi_i - 1 \geq 0$

$H_a: \sum_{i=1}^{p} \varphi_i - 1 < 0$

The prerequisite for the dynamic model estimated through the ARDL method to be inclined towards the long-term equilibrium is that the sum of dependent variable coefficients in the various short-term estimated lags (φ_i) be less than one. The needed statistic (t) to test the hypothesis is calculated as follows:

$$t = \frac{\sum_{i=1}^{p} \hat{\varphi}_i - 1}{\sum_{i=1}^{p} SE_{\hat{\varphi}_i}} \quad (9)$$

where, $SE_{\hat{\varphi}_i}$ is the standard deviation of the φ_i. The calculated t should be compared with the critical value by Banerjee, Dolado and Mestre (1998). If the absolute value of test statistic is greater than the absolute value of critical value, then we reject the null hypothesis, and therefore, confirm the long-run relation.

This paper is based on the time-series data of Iran during 1981-2012. The data needed are taken from the Central Bank of the Islamic Republic of Iran and World Bank. In particular, we derived data for terms of trade, economic growth, inflation rate, active population growth, and capital growth from the Central Bank of the Islamic Republic of Iran. As it said before, we have employed World Bank (1985) and Erbe (1985) approach to measure capital flight in this paper. To do so, we used World Bank data of current account balance, foreign direct investments, changes in external debt, and changes in foreign reserves.[3] Variables used in the paper, their definition, and their data resources are represented in Table 3.

4. Empirical Results

In this study, we have adopted World Bank (1985) and Erbe (1985) approach to calculate capital flight. We chose this approach not only because it is widely used, but also because of the availability of data. Figure 1 shows the trend of Iran's capital flight calculated for 1981-2012.

[3] The Central Bank of the Islamic Republic of Iran does not have these data for the early years of the considered period.

Table 3: Variables Used in the Paper, Their Definition, and Data Resources

Variable	Symbol	Definition	Resource of Data
Economic growth	EG	Percent change in real GDP	Central Bank of the Islamic Republic of Iran
Capital flight	KFG	KF=Current account balance + foreign direct investments + changes in external debt + changes in foreign reserves KFG= Percent change in the capital flight	World Bank
Active population growth	PG	Percent change in the active population	Central Bank of the Islamic Republic of Iran
Investment	KG	Percent Change in capital level	Central Bank of the Islamic Republic of Iran
Change of terms of trade	TOT	Change in the ratio of export prices to import prices	Central Bank of the Islamic Republic of Iran
Inflation	INF	Percent Change in consumer price index	Central Bank of the Islamic Republic of Iran

Source: Authors

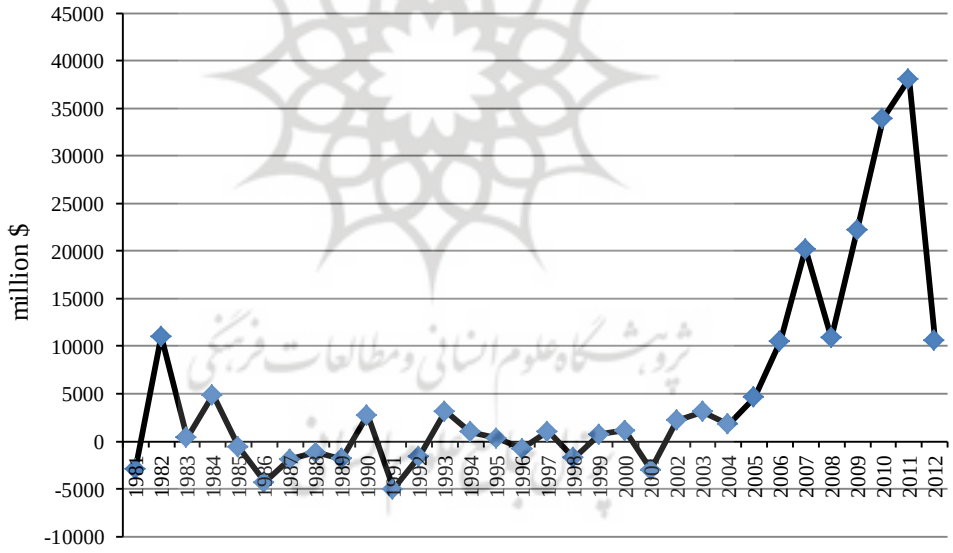

Fig. 1: The Trends of Capital Flight in Iran during 1981-2011

Source: Authors

As it shown in the Fig. 1, capital flight has totally had an increasing trend in the considered period. But it has grown substantially from 2005 to 2007.[4] After that, it began to decrease in 2008, and then, it rose significantly and reached to its peak in 2011(38095.94 million dollars). It seems that capital flight has started to decrease in recent years.

4.2. Econometric Results

4.2.1. Results of Unit Root Test

Having estimated a model that includes time series variables, the first thing needed is to conduct unit root test to determine whether variables under investigation are stationary or not. This is necessary to avoid estimating spurious regression. Several procedures for the test of order of integration have been developed. We applied Philips and Perron unit root test because of its great advantage that it is non-parametric, i.e. it does not require selecting the level of serial correlation as in ADF. It rather takes the same estimation scheme as in DF test, but corrects the statistic to conduct for autocorrelations and heteroscedasticity. As shown in Table 4, the results suggest that all the variables (except active population growth) are stationary at level. Active population growth is I(1); so, it will be stationary in its first difference.

Table 4: Results of Philips and Perron Test

Variable	Level		1st difference		Result
	Statistic	Prob.	Statistic	Prob.	
EG	-3.074	0.0417	-	-	I(0)
KFG	-5.829	0.0000	-	-	I(0)
PG	-1.148	0.3540	-5.057	0.0003	I(1)
KG	-3.844	0.0067	-	-	I(0)
TOT	-8.258	0.0000	-	-	I(0)
INF	-3.013	0.0446	-	-	I(0)

Source: Authors

According to Pesaran and Pesaran (1997), we can use ARDL procedure when the regressors are I(0) or I(1). But before the estimation, it is needed to determine optimal lag in the Vector Auto-Regressive (VAR) model. We employed Schwarz criterion (SC) for this purpose. Table 5 shows the result of lag order selection by SC. Regarding the results, optimal lag is 1.

Table 5: Results of Lag Order Selection

Lag	SC
0	3.8295
1	2.9723*
2	5.2282
3	3.5021

Source: Authors

Schwarz Bayesian criterion is applied to select the optimal lags of each variable, and therefore the best model. The estimation results of ARDL dynamic equation are summarized in Table 6.

Table 6: Estimation Results of ARDL Dynamic Equation Model

Variable	Coefficient	t-statistic	p-value
EG(-1)	0.298	1.976	0.041
KFG	-0.007	-2.794	0.010
PG	0.535	1.789	0.086
KG	0.143	2.184	0.039
TOT	0.054	2.205	0.037
INF	-0.002	-2.272	0.032
C	0.011	0.766	0.452
R-Squared	0.6070	DW-Statistic	2.0047

Source: Authors

To investigate the long-run relation between dependent and independent variables, we test the null hypothesis that there is no co-integration relationship between variables of the model. Thus, the test statistic is calculated as follows:

$$t = \frac{\hat{\varphi}_1 - 1}{SE_{\hat{\varphi}_1}} = \frac{0.29807 - 1}{0.15078} = -4.65533$$

As the absolute value of the test statistic is greater than the absolute value of the critical value provided by Banerjee, Dolado and Mestre (1998) at 5 percent level (-4.46), we reject the null hypothesis, and therefore, confirm the long-run relation between variables of the model. Then, we can estimate long-run relation between economic growth and independent variables including capital flight growth, active population growth rate, capital growth, inflation, and the change of terms of trade. The estimation results of long-run relation based on ARDL(1,0,0,0,0) are presented in Table 7.

[4] According to Figure1, there is a breakpoint at 2006 in capital flight data. We introduced a dummy variable for the break-point. But the coefficient of dummy variable was statistically insignificant, and so, we omitted it from the model.

Table 7: Results of Long-Run Relationship Estimation

Variable	Coefficient	t-statistic	p-value
KFG	-0.0114	-1.9932	0.058
PG	0.9175	1.8149	0.082
KG	0.2456	2.6767	0.013
TOT	0.0931	1.8088	0.083
INF	-0.0030	-2.3707	0.026
C	0.0198	0.7844	0.441

Source: Authors

Regarding the results, the estimated long-run equation is:

$$EG = 0.0198 - 0.0114\,KFG + 0.9175\,PG + 0.2456\,KG + 0.0931 TOT - 0.0030\,INF \quad (10)$$

As can be seen from the Table7, coefficients of all the variables are significant at the 10% level, and the signs of all estimated coefficient are consistent with the theory. Thus, capital flight, active population growth rate, capital growth, inflation, and the change of terms of trade have significant effects on economic growth in the long-run.

The results reveal that an increase of capital flight has a significant negative impact on economic growth. Also, inflation affects economic growth negatively. Other explanatory variables including active population growth rate, capital growth, and the change of terms of trade have significant positive effects on real GDP growth; so, increases in these variables will promote economic growth in long-run.

The presence of co-integration between a set of variables make the ground for use of Error Correction Model (ECM). The purpose of the ECM is to indicate the speed of adjustment from the short-run equilibrium to the long-run equilibrium state. The greater the coefficient of the parameter, the higher the speed of adjustment of the model from the short-run to the long run state will be. Therefore, we can change the considered equation to include ECM to reflect the short run dynamics.

$$\begin{aligned}\Delta EG_t &= \alpha_0 + \sum_{i=1}^{n} \alpha_{1t} \Delta EG_{t-1} \\ &+ \sum_{i=1}^{n} \alpha_{2t} \Delta KFG_{t-1} + \sum_{i=1}^{n} \alpha_{3t} \Delta KG_{t-1} \\ &+ \sum_{i=1}^{n} \alpha_{4t} \Delta PG_{t-1} + \sum_{i=1}^{n} \alpha_{5t} \Delta TOT_{t-1} \\ &+ \sum_{i=1} \alpha_{6t} \Delta INF_{t-1} + \lambda ECM_{t-1} + \varepsilon_t\end{aligned} \quad (11)$$

where, Δ is the first difference operator, and λ is ECM coefficient and the remaining variables are as already defined above. The estimation results of this model have been shown in Table8.

Table 8: Results of Error Correction Model Estimation

Variable	Coefficient	t-statistic	p-value
ΔKFG	-0.0067	-2.7944	0.010
ΔPG	0.5349	1.7894	0.086
ΔKG	0.1432	2.1842	0.039
ΔTOT	0.0543	2.2050	0.037
ΔINF	-0.0017	-2.2723	0.010
ECM(-1)	-0.5829	-3.8660	0.001
R-Squared	0.6566	DW-Statistic	2.0047

Source: Authors

According to these results, ECM coefficient in our model is significant and equal to -0.5829. The coefficient of the error correction model (ECM(-1)) indicates the speed at which economic growth adjusts to its steady state in the long run. It further shows that the variables are well defined as it has the usual negative sign that enable the system to adjust to the equilibrium position whenever it is out of equilibrium. Whit regard to the estimated ECM coefficient, whenever the system is out of equilibrium, it will restore back to the equilibrium with a speed of about 58 percent.

5. Conclusion

This study has been an attempt to provide insight about capital flight in Iran, and to examine its long-run impacts on the country's economic growth. Calculating capital flight by World Bank (1985) and Erbe (1985) approach shows that capital flight in Iran has generally grown in the period under investigation. Started from 2005, it has increased substantially, reaching to 38095.94 million dollars in 2011.

Then, we developed a model to study the growth impact of capital flight. For this purpose, we introduced a growth equation in which economic growth is a function of capital flight growth rate, active population growth rate, capital growth rate, change of terms of trade, and inflation. We use ARDL approach to specify the equation. The findings show that there is a significant negative relation between capital flight growth and economic growth in long-run. An increase in inflation rate will reduce

economic growth, and other explanatory variables have positive effects on economic growth, as theories predict.

There is no doubt that capital flight is a lost opportunity for the economic growth. So, repatriating lost capital back to the country can help to economic growth development. There are some suggestions and recommendations to undermine capital flight. First, it is necessary for government to make policies that discourage capital flight. Improving and easing of the investment and licensing procedures in Iran can be an effective tool to decrease capital flight. Second, capital flight repatriation requires the minimization of uncertainty with respect to the macroeconomic, political, and institutional environment. This reduces risks of losses in the real value of the domestic assets of private investors. So, the monetary and fiscal authorities should strengthen monetary and fiscal policies to increase stability. For example, measures accomplished to reduce inflation rate and make exchange rate stable will reduce investors' preference for foreign assets over domestic assets. Also, tax and tax-like distortions that lower returns and add risk to domestic financial and physical assets, leading to capital flight should be changed. Third, there should be necessary efforts to promote economic growth in Iran. A good economic performance will give citizens the incentives to invest inside the border of country.

Reference

1. Ajayi S.I. (1992), An Econometric Analysis of Capital Flight from Nigeria, World Bank Working Paper, No. 993.
2. Ajayi S.I. (1995), An Analysis of External Debt and Capital flight in Severely Indebted Low Income Countries in Africa (IMF Research Paper, No. 35).
3. Ajayi, S. I. (1997), An Analysis of External Debt and Capital Flight in the Severely Indebted Low Income Countries in Sub-Saharan Africa, IMF Working Paper, WP/97/68.
4. Barro, R. J. (1996), Determinants of Economic Growth: A Cross-Country Empirical Study, NBER Working Paper, No. 5698.
5. Beja, E. Jr. (2006), "Was Capital Fleeing Southeast Asia? Estimates from Indonesia," Malaysia, the Philippines, and Thailand. Asia Pacific Business Review, 12(A3), 261–283.
6. Beja, E. Jr. (2007), Capital Flight and Economic Performance, Munich Personal RePEc Archive, No. 4885.
7. Banerjee, A., J.J. Dolado And R. Mestre (1998), "On Some Simple Tests for Co-integration: The Cost of Simplicity," Journal of Time Series Analysis, 19(3), 267-283.
8. Boyce, J.K. (1992), "The Revolving Door? External Debt and Capital Flight: A Philippine Case Study," World Development, 20(3), 335–49.
9. Cerra, V., M. Rishi and S.C. Saxena (2008),. "Robbing the Riches: Capital Flight, Institutions, and Debt," Journal of Development Studies, 44(8), 1190–213.
10. Cervena, M. (2006). The Measurement of Capital Flight and Its Impact on Long-term Economic Growth: Empirical Evidence from a Cross-section of Countries. Master's thesis. Comenius University Bratislava.
11. Collier, P., A. Hoeffler and C. Pattill (2001), "Flight Capital as a Portfolio Choice," The World Bank Economic Review, 15(1), 55–80.
12. Cuddington, J. (1986), Capital Flight: Estimates, Issues, and Explanations, Princeton Studies in International Finance, No. 58.
13. Dooley, M. (1988), Capital Flight: A Response to Differences in Financial Risks, Fund Staff Papers
14. Duwendag, D. (1987), "Capital Flight from Developing Countries," Journal of Development Economics, 29(4), 6-15.
15. Erbe, S. (1985), "The Flight of Capital from Developing Countries,' Intereconomics, 20(4), 268–75.
16. Fisher, S. (1991), Growth, Macroeconomics and Development, NBER Working Paper, No. 3702.
17. Fofack, H. and L. Ndikumana (2010), 'Capital Flight Repatriation: Investigation of its Potential Gains for

sub-Saharan African Countries,' African Development Review, 22(1), 4–22.
18. Forgha, N.G. (2008), "Capital Flight, Measurability and Economic Growth in Cameroon: An Econometric Investigation," International Review of Business Research Papers, 4(2), 74-90.
19. Glynn, l. and P. Koenig (1984), The Capital Flight Crisis, Institutional Investor: International Edition, new York.
20. Gusarova, V. (2009), The Impact of Capital Flight on Economic Growth, Master's thesis, Kyiv School of Economics.
21. Hadjimichael, M. (1994), Effect of Macroeconomic Stability on Growth, Savings and Investment: An Empirical Investigation, IMF Working Paper, WP/94/98.
22. Henry, A. W. (2013), "Analysis of the Effects of Capital Flight on Economic Growth: Evidence from Nigerian Economy (1980 – 2011)," European Journal of Business and Management, 5(17), 21-33.
23. Lessard, D.R. and J. Williamson (1987), Capital Flight and Third World Debt, Washington D.C.: Institute for International Economics.
24. Menbere, W.T. (2003), "Absolute Convergence across Time and Space: New Empirical Evidence for an Old Debate," Ekonomick´y ˇcasopis, 51(10), 1270–91.
25. Morgan, G. T.C (1986), "LDC Capital Flight," World Financial Markets, 2(1), 13–16.
26. Ndiaye, A. S. (2014), Is Capital Flight Decisive in Explaining Economic Growth Performance in the African Franc Zone? Paper presented at 15th Annual Global Development Conference: Structural Transformation in Africa and Beyond, Accra, Ghana.
27. Ndikumana, L. (2009), Capital flight, In Reinert, K. & Rajan, R. (eds.), The Princeton Encyclopedia of the World Economy. Princeton University Press: Princeton.
28. Ndikumana, L. and J.K. Boyce (2003), "Public Debts and Private Assets: Explaining Capital Flight from Sub-Saharan African Countries," World Development, 31(1),107-130.
29. Ndikumana, L. and J.K. Boyce (2011), "Capital Flight from Sub-Saharan Africa: Linkages with External Borrowing and Policy Options," International Review of Applied Economics, 25(2), 149–70.
30. Pastor, M. (1989), Capital Flight and the Latin American Debt Crisis, Washington D.C.: Economic Policy Institute.
31. Pastor, M. (1990), "Capital Flight from Latin America," World Development, 18(1), 1–18.
32. Pesaran, M.H. and B. Pesaran (1997), Working with Microfit 4.0, Interactive Econometric Analysis. London: Cambridge.
33. Pesaran, M.H. and Y. Shin (1999), An Autoregressive Distributed Lag Modeling Approach to Co-integration Analysis. In Strom, S. (Ed). Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium (Chapter 11), Cambridge: Cambridge University Press.
34. World Bank (1985), World Development Report 1985, Washington D.C.: World Bank.