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   RESULTS & DISCUSSION

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BALANCE OF PAYMENTS CONSTRAINT GROWTH: AN ARDL APPROACH

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ABSTRACT

The relationship between balance of payments and economic growth is investigated with the concept of "balance of payments constrained growth". Although Dornbusch (1971) stated that economic growth is not associated with the balance of payments in small open economies, this discussion became very popular in the last decades. In a Keynesian framework, when it is assumed that prices are sticky, exchange rates are fixed and exports are exogenous, one can conclude that balance of payments deteriorates following a positive economic growth. The reason is that an increase in national income leads to an increase in imports demand. This discussion has started with Thirlwall (1979) (Thirlwall's Rule). According to this rule, economic growth is closely related to the balance of payments. The reason is that the balance of payments surplus or deficit affects the demand. In this paper, Thirlwall's Rule is investigated in selected European economies by applying an ARDL model.

JEL CLASSIFICATIONS
C53, F43, O52.

KEYWORDS
ARDL, European economies, Thirlwall's Rule.

I. INTRODUCTION

One of the main discussions of the open economy macroeconomics has been the relationship between economic growth and balance of payments after the leading work of Keynes. The relationship between balance of payments and economic growth is investigated with the concept of "balance of payments constrained growth". Although Dornbush (1971) stated that economic growth is not associated with the balance of payments in small open economies, this discussion became very popular in the last decades. In a Keynesian framework, when it is assumed that prices are sticky, exchange rates are fixed and exports are exogenous, one can conclude that balance of payments deteriorates following a positive economic growth. The reason is that an increase in national income leads to an increase in imports demand. However, Mundell (1968) concluded that European countries grew rapidly while they had balance of payments surpluses after the Second World War. If export-led growth strategy is adopted in these countries, one can claim that this observation does not contradict with the Keynesian model. In this context, Gandolfo (2002) showed that balance of payments can be written as a function of an increase in national income by using Lamfalussy's Model:

$$\frac{x-m}{y}=\frac{s'-h'\mu'}{1+h'}\frac{\Delta y}{y}+\frac{s-h-h'\mu}{1+h'} \qquad (1)$$

To this equation, an increase in national income arising from an increase in exports affects the balance of payments in two different ways. If $s'-h'\mu'>0$, economic growth affects the balance of payments in a positive way and vice versa. as a clarifying assumption, economic growth may originate from the factors other than exports. Under this assumption, two possible explanations emerge: Keynesian model and monetary approach to the balance of payments. Keynesian model puts that economic growth affects balance of payments in a negative way. As for the monetary approach, economic growth has a positive impact on balance of payments under the assumptions of full employment and sticky prices and exchange rates. Because an increase in national income leads to an increase in demand for money, the balance of payments improves. It is impossible for balance of payments of all countries to improve simultaneously in a real world. Due to that reason Gandolfo (2002) offers flexible exchange rates to loosen the balance of payments constraint on growth. Komiya (1969) introduced a general equilibrium model for that relationship. The main finding is that increases in national income deteriorate the capital account while it affects the trade balance and the balance of payments positively.

The number of the studies on this topic has gone up after the leading work of Thirlwall (1979) (Thirlwall's Rule). According to this rule, economic growth is closely related to the balance of payments. The reason is that the balance of payments surplus or deficit affects the demand. Thirlwall's Rule puts forward that there is a strong relationship between the rate of increase in national income and the rate of increase in exports under the assumptions of fixed exchange rates and trade balance. This implies the demand side of the rule. On the other hand, Thirlwall (1979) also considered the supply side by regarding income elasticities for exports and imports. Thirlwall's Rule can be written as follows:

$$P_dX=P_fM \qquad (2)$$

Equation (2) represents the equilibrium condition for balance of payments. P_d shows price for exports, P_f shows price for imports in terms of national currency, X shows quantity of exports and M shows quantity of imports. Demand functions for imports and exports are written as follows:

$$M=(P_f/P_d)^gY^h \qquad (3)$$

$$X=(P_d/P_f)^vY^{*w} \qquad (4)$$

In these equations, Y represents national income, Y^* represents national income of foreign countries, g shows price elasticity of demand for imports, v shows price elasticity of demand for exports, h stands for income elasticity of demand for imports, and w stands for income elasticity of demand for exports. After taking the natural logarithms and differences with respect to time, rates of increase in imports and exports can be given in equations (5) and (6):

$$m=g(p_f-p_d)+hy \qquad (5)$$

$$x=v(p_d-p_f)+wy^* \qquad (6)$$

In this context, equation (2) can be rewritten as equation (7):

$$p_d+x=p_f+m \qquad (7)$$

The balance of payments growth rate (y_b) is obtained by considering equations (4) and (5) in the same equation namely, equation (7):

$$y_b=[(1+v+g)(p_d-p_f)+wy^*]/h \qquad (8)$$

Thirlwall (1979) and McCombie and Thirlwall (1994) put forward that the effect of the changes in relative prices on exports and imports is very limited. So, $(1+v+g)(p_d-p_f)=0$ can be written. Then, it is possible to rewrite the equation (8) as equation (9):

$$y_b=\frac{wy^*}{h} \quad (9)$$

When we substitute equation (6) into equation (9), we get equation (10) which represents The Thirlwall's Rule.

$$y_b=\frac{x}{h} \quad (10)$$

According to the rule, when there is no capital flows and relative price changes do not play an important role in international trade, economic growth is determined by the increase in the rate of exports (x) and the income elasticity of demand for imports (h).

As for empirical literature, McCombie (1997) investigates the validity of the hypothesis of balance of payments constraint growth in the USA, Japan and the UK. It is concluded that growth rates in the USA and the UK especially after the period of the Second World War are so close to the balance of payments constraint growth rates. In addition to that the growth rate in Japan is less than the balance of payments equilibrium growth rate, which is consistent with the balance of payments surplus in Japan. Jayme (2003) tests Thirlwall's Rule for Brasil for the period 1955-1998 by applying cointegration and vector error correction models by following the works of Thirlwall (1979) and McCombie and Thirlwall (1994) and the findings suggest that there is a positive cointegration between growth in exports and long-run economic growth. Holland *et al.* (2004) test Thirlwall's Rule by implementing VAR models for 10 Latin American countries for the period 1950-2000. To the results, there is a strong and long-term relationship among national income, exports, and imports.

Thirlwall's Rule has been developed by many other researchers. For example, Thirlwall and Hussain (1982) further developed the Thirlwall's Rule by considering international capital flows. This approach enables to model the effects of foreign exchange rates on the long-run economic growth performance in open economies. When current account disequilibrium is assumed at first, the following equation can be written:

$$P_{dt}+X_t+C_t=P_{ft}M_tE_t \quad (11)$$

Where X_t represents volume of exports, P_{dt} shows domestic price of exports, M_t, P_{ft}, E_t, and C_t stand for the volume of imports, foreign price of imports, exchange rates and the value of capital flows measured in national currency respectively. If C_t is positive, it represents the capital inflows. If it is negative, it implies the capital outflows. After taking the rates of changes for the variables in equation (11), equation (12) is achieved:

$$\left(\frac{E}{R}\right)(p_{dt}+x_t)+\left(\frac{C}{R}\right)(c_t)=p_{ft}+m_t+e_t \quad (12)$$

In equation (12) $\frac{E}{R}$ and $\frac{C}{R}$ represent the shares of exports and capital flows respectively in total receipts. In the model it is assumed that imports and exports demand functions have constant elasticity:

$$M_t=\left(\frac{P_{ft}E_t}{P_{dt}}\right)^{\psi}Y_t^{\pi} \quad (13)$$

$$X_t=\left(\frac{P_{dt}}{P_{ft}E_t}\right)^{\eta}Z_t^{\varepsilon} \quad (14)$$

In equations (13) and (14), ψ represents the price elasticity of demand for imports $(\psi<0)$, η stands for price elasticity of demand for exports $(\eta<0)$, Y_t represents domestic income, Z_t shows the world income, π represents income elasticity of demand for imports, and finally ε implies income elasticity of demand for exports. These equations can be rewritten by taking rates of changes in variables:

$$m_t=\psi(p_{ft}+e_t-p_{dt})+\pi(y_t) \quad (15)$$

$$x_t=\eta(p_{dt}-e_t-p_{ft})+\varepsilon(z_t) \quad (16)$$

Substituting equations (15) and (16) into equation (12) leads to the balance of payments constraint growth rate:

$$y_{Bt}=\frac{\left(\frac{E}{R}\eta+\psi\right)(p_{dt}-e_t-p_{ft})+(p_{dt}-p_{ft}-e_t)+\frac{E}{R}(\varepsilon(z_t))+\frac{C}{R}(c_t-p_{dt})}{\pi} \quad (17)$$

The right-hand side of equation (17) involves a ratio, the numerator of which is made up of the addition of four components. The first component gives the volume effect of relative price changes on the balance of payments constrained real growth, the second component implies the effects of the terms of trade, the third component represents the effects of the exogenous changes in incomes of the other countries, and finally the fourth component represents the effects of increases in capital flows. If $p_{dt}=e_t+p_{ft}$, equation (17) would be reduced to equation (18):

$$y^*_{Bt}=\frac{\frac{E}{R}(\varepsilon(z_t))+\frac{C}{R}(c_t-p_{dt})}{\pi} \quad (18)$$

Then, one can claim that the balance of payments constraint growth is determined by the growth rate of income abroad, real capital flows, and income elasticity of demand for imports. It is impossible to know the value of $\varepsilon(z_t)$ for any country. Therefore, $\varepsilon(z_t)$=x_t and the following equation can be written:

$$y^*_{Bt}=\frac{\frac{E}{R}(x_t)+\frac{C}{R}(c_t-p_{dt})}{\pi} \quad (19)$$

Thirlwall's Rule has been developed by considering the effect of interest payments by Moreno-Brid (2003). Accordingly, the balance of payments constraint growth is presented as follows:

$$y_b=\frac{\theta_1\pi\left(\frac{dw}{w}\right)-\theta_2\left(\frac{dr}{r}\right)+(\theta_1\eta+\varphi+1)\left(\frac{dp}{p}-\frac{dp^*}{p^*}\right)}{\xi-(1-\theta_1-\theta_2)} \quad (20)$$

Where, θ_1 is the proportion of import bill covered by export earnings, θ_2 is the proportion of net interest payments abroad relative to imports, w is the world real income, p and p^*stand for the domestic and foreign prices respectively and η is the price elasticity of exports $(\eta<0)$, π is the income elasticity of exports $(\pi>0)$, φ is the price elasticity of imports $(\varphi<0)$, ξ is the income elasticity of imports $(\xi>0)$, and r is the real value of net interest payments.

Araujo and Lima (2007) put forward a multisectoral version of the rule which is called as the Multisectoral Thirlwall's Rule and presented as follows:

$$\sigma_y{}^U=\frac{\sum_{i=1}^{n-1}\xi\beta_i a_{i\hat{n}}a_{ni}}{(\sum_{i=1}^{n-1}\phi_i a_{in}a_{ni})(\sum_{i=1}^{n-1}\beta_i)}\sum_{i=1}^{n-1}\frac{a_{i\hat{n}}}{a_{in}} \quad (21)$$

Left-hand side of equation (21) represents the per capita growth rate of the country U. The right-hand side of the equation is composed of the product of two components. The first component shows that the increase in foreign demand has a positive impact on economic growth. ϕ_i is the sectoral income elasticity of demand for imports, β_i is the sectoral income elasticity of demand for exports, $a_{i\hat{n}}$ is the per capita export demand for good i, and a_{in} is the per capita import demand for good i. This new version of the rule is of great importance on the grounds that it implies that countries would grow depending on the composition of exports and imports even if the foreign income level remains the same. Gouvêa and Lima (2011) investigate this rule for 90 countries for the period 1965-1999 by applying panel data analysis and found evidence for the validity of the Multisectoral Thirlwall's Rule.

The organisation of the study is as follows. Second section discusses the empirical procedures applied in this study. Third section presents the data and the empirical results. Finally, policy recommendations deducted from the empirical findings are discussed.

II. EMPIRICAL METHODOLOGY

Time series properties of the variables are tested by applying unit root tests introduced by Dickey and Fuller (1979), Philips and Peron (1988) and Kwiatkowski *et al.* (1992). The Phillips – Perron (PP) unit root test differs from the ADF test mainly in the consideration of serial correlation and heteroskedasticity in the errors. The ADF test uses a parametric autoregression to approximate the ARMA structure of the errors in the test regression while the PP test ignores any serial correlation in the regression. The Dickey – Fuller test assumes that the errors are statistically independent and have a constant variance. Phillips and Perron (1988) developed a generalized procedure by allowing mild assumptions. For example, PP test lets the disturbances be weakly dependent and heterogeneously distributed. KPSS (1992) test makes the series stationary by eliminating the deterministic trend. The main distinctive feature of this unit root test is its null hypothesis of stationarity.

After applying the unit root tests, we use an ARDL model initially introduced by Pesaran *et al.* (2001). This procedure has some advantages compared to the other cointegration procedures. Firstly, one can use this procedure when the variables are integrated of different orders. So, it is not necessary to check the stationarity properties of the series. Besides, error correction model (ERM) is easily obtained by a linear transformation in this procedure. So, the short-run and the long-run parameters of the model can be estimated simultaneously. More importantly, all of the variables are considered as endogenous. Before estimating the model, it is necessary to determine the optimal lag length and test for autocorrelation. The first step of the ARDL modeling involves testing the null hypothesis of no-cointegration by applying F-test or Wald Test. In the second step, the error correction term is defined.

III. DATA AND FINDINGS

The model is estimated on annual data from 1961 to 2011 for Hungary, Italy, The Netherlands, and The United Kingdom. Due to the lack of data, the abovementioned model is estimated on annual data from 1971 to 2011 for Germany. All of the variables are transformed into natural logarithms. The dataset is gathered from the database of the World Bank. Natural logarithm of gross domestic product (GDP) is used as an indicator for economic growth (y). Similarly, the natural logarithm of exports of goods and services is considered as a growth rate of exports (x). Finally, income elasticity of imports (h) is measured by the ratio $\frac{\Delta M}{\Delta Y}$. Here, M represents imports of goods and services and Y represents real GDP. Thus, the dependent variable of the model is economic growth and the independent variable is $\frac{x}{h}$.

According to the unit root test results, growth rate is difference stationary while $\frac{x}{h}$ is stationary at the level[1]. Since the variables are integrated at different levels, we apply an ARDL model in order to test the Thirlwall's Rule. Applying an ARDL model involves testing the null hypothesis of no-cointegration by F-test (or Wald Test). If the calculated F-statistics is greater than the upper limit, then one can conclude that there is cointegration. If it is lower than the lower limit then there is no- cointegration. If the F-statistics is between these two limits, then the result would be inconclusive. To our F-test results, there is a cointegration between y and $\frac{x}{h}$[2]. After the transformation of the coefficients, the long-run coefficient estimates would be reliable. In the second step, error correction term is defined. According to the results of the short run model, error correction terms are statistically significant and take values between 0 and 1. So, the error correction mechanism works in each case[3]. As far as the estimated models are considered, it is possible to say that effective growth rates of the countries are very close to their balance of payments equilibrium growth rates[4].

IV. CONCLUSION

The interaction between balance of payments and economic growth is examined within the concept of balance of payments constraint growth. The number of both theoretical and empirical studies about this issue has gone up after the leading work of Thirlwall (1979). Under the assumption that the effect of capital flows and relative price changes on international trade is very limited, Thirlwall's Rule puts forward that economic growth is determined by the increase in the rate of exports and the income elasticity of demand for imports.

In this paper, Thirlwall's model was tested for the selected European economies (Germany, Hungary, Italy, The Netherlands and The United Kingdom) by developing an ARDL Model. To the findings, external constraints are of vital importance in terms of long run economic growth. Effective growth rates of the countries are very close to their balance of payments equilibrium growth rates. On the other hand, countries grow faster than the balance of payments equilibrium growth rates. As far as the related literature concerned, the difference between two growth rates can be explained by the effects of capital flows and relative prices.

Our findings are consistent with the ones from Thirlwall's famous paper which suggests that exports play an important role in inducing economic growth. One can observe that property by examining the graphs of the two growth series against time. By taking these into consideration export-led growth is supported by the data for the selected countries.

IV. ACKNOWLEDGEMENT

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[1] See appendices A1.
[2] See appendices A2.
[3] See appendices A3.
[4] See appendices A4.

APPENDICES

A1. UNIT ROOT TEST RESULTS

TABLE 1: UNIT ROOT TEST RESULTS (GERMANY)

Variable	Level	ADF Unit Root		Phillips Perron		KPSS	
	1st Dif.	No Trend	Trend	No Trend	Trend	No Trend	Trend
GDP	Level	-1.945 (0.309)	-1.661 (0.750)	-2.891 (0.055)	-1.579 (0.783)	0.803	0.196
	1st Dif.	-5.150 (0.000)	-5.353 (0.000)	-5.039 (0.000)	-6.468 (0.000)	0.355	0.137
x/h	Level	-1.679 (0.433)	-3.761 (0.029)	-1.422 (0.561)	-3.075 (0.125)	0.668	0.081
	1st Dif.	-6.505 (0.000)	-6.448 (0.000)	-7.157 (0.000)	-6.985 (0.000)	0.352	0.352

Notes:

1- Numbers in parentheses denote the probabilities.
2- Augmented Dickey-Fuller test statistics: 1% level: -3.568, 5% level: -2.921, 10% level -2.598
3- Asymptotic critical values for KPSS Test with Constant: 1% level: 0.739, 5% level: 0.463, 10% level 0.347
Asymptotic critical values for KPSS Test with Constant and Trend: 1% level: 0.216, 5% level: 0.146, 10% level 0.119

TABLE 2: UNIT ROOT TEST RESULTS (HUNGARY)

Variable	Level	ADF Unit Root		Phillips Perron		KPSS	
	1st Dif.	No Trend	Trend	No Trend	Trend	No Trend	Trend
GDP	Level	-3.718 (0.006)	-6.287 (0.246)	-4.072 (0.002)	-2.333 (0.408)	0.785	0.202
	1st Dif.	-4.780 (0.000)	-5.632 (0.000)	-4.864 (0.002)	-5.660 (0.000)	0.529	0.147
x/h	Level	-2.421 (0.141)	-2.731 (0.228)	-2.226 (0.199)	-2.767 (0.215)	0.501	0.164
	1st Dif.	-7.997 (0.0009	-7.931 (0.000)	-8.397 (0.000)	-8.310 (0.000)	0.169	0.153

Notes:

1- Numbers in parentheses denote the probabilities.
2- Augmented Dickey-Fuller test statistics: 1% level: -3.568, 5% level: -2.921, 10% level -2.598
3- Asymptotic critical values for KPSS Test with Constant: 1% level: 0.739, 5% level: 0.463, 10% level 0.347
Asymptotic critical values for KPSS Test with Constant and Trend: 1% level: 0.216, 5% level: 0.146, 10% level 0.119

TABLE 3: UNIT ROOT TEST RESULTS (ITALY)

Variable	Level	ADF Unit Root		Phillips Perron		KPSS	
	1st Dif.	No Trend	Trend	No Trend	Trend	No Trend	Trend
GDP	Level	-5,642 (0.000)	-0,715 (0.966)	-7.301 (0.000)	-0.480 (0.981)	0.896	0.238
	1st Dif.	-4,545 (0.0006)	-6,702 (0.000)	-4,586 (0.000)	-7,284 (0.000)	0.875	0.081
x/h	Level	-6,662 (0.000)	-7,838 (0.000)	-6.703 (0.000)	-8.086 (0.000)	0.662	0.070
	1st Dif.	-5,972 (0.009)	-5,907 (0.000)	-18.31 (0.000)	-18.497 (0.000)	0.048	0.042

Notes:

1- Numbers in parentheses denote the probabilities.
2- Augmented Dickey-Fuller test statistics: 1% level: -3.568, 5% level: -2.921, 10% level -2.598
3- Asymptotic critical values for KPSS Test with Constant: 1% level: 0.739, 5% level: 0.463, 10% level 0.347
Asymptotic critical values for KPSS Test with Constant and Trend: 1% level: 0.216, 5% level: 0.146, 10% level 0.119

TABLE 4: UNIT ROOT TEST RESULTS (THE NETHERLANDS)

Variable	Level	ADF Unit Root		Phillips Perron		KPSS	
	1st Dif.	No Trend	Trend	No Trend	Trend	No Trend	Trend
GDP	Level	-3.899 (0.003)	-2.978 (0.148)	-3.458 (0.013)	-1.699 (0.737)	0.955	0.165
	1st Dif.	-4.531 (0.000)	-5.813 (0.001)	-4.770 (0.000)	-5.878 (0.000)	0.508	0.103
x/h	Level	-0.444 (0.893)	-1.862 (0.659)	-0.447 (0.892)	-2.033 (0.569)	0.952	0.132
	1st Dif.	-6.652 (0.000)	-6.580 (0.000)	-6.656 (0.000)	-6.585 (0.000)	0.090	0.092

Notes:

1- Numbers in parentheses denote the probabilities.
2- Augmented Dickey-Fuller test statistics: 1% level: -3.568, 5% level: -2.921, 10% level -2.598
3- Asymptotic critical values for KPSS Test with Constant: 1% level: 0.739, 5% level: 0.463, 10% level 0.347
Asymptotic critical values for KPSS Test with Constant and Trend: 1% level: 0.216, 5% level: 0.146, 10% level 0.119

TABLE 5: UNIT ROOT TEST RESULTS (THE UNITED KINGDOM)

Variable	Level / 1^{st} Dif.	ADF Unit Root No Trend	ADF Unit Root Trend	Phillips Perron No Trend	Phillips Perron Trend	KPSS No Trend	KPSS Trend
GDP	Level	-1.201 (0.667)	-2.797 (0.204)	-1.283 (0.630)	-2.195 (0.481)	0.963	0.070
	1^{st} Dif.	-5.020 (0.000)	-5.101 (0.000)	-5.020 (0.000)	-5.101 (0.000)	0.144	0.065
x/h	Level	-1.616 (0.467)	-2.250 (0.451)	-1.726 (0.412)	-2.236 (0.459)	0.408	0.164
	1^{st} Dif.	-6.017 (0.000)	-5.937 (0.000)	-5.945 (0.000)	-5.850 (0.000)	0.119	0.086

Notes:

1- Numbers in parentheses denote the probabilities.
2- Augmented Dickey-Fuller test statistics: 1% level: -3.568, 5% level: -2.921, 10% level -2.598
3- Asymptotic critical values for KPSS Test with Constant: 1% level: 0.739, 5% level: 0.463, 10% level 0.347
Asymptotic critical values for KPSS Test with Constant and Trend: 1% level: 0.216, 5% level: 0.146, 10% level 0.119

A2. F-TEST RESULTS

TABLE 7: F-TEST RESULT (GERMANY)

k	F-Statistics	Asymptotic critical value bounds for the F-statistic	
		I(0)	**I(1)**
1	60,6685	4.94	5.73

TABLE 8: F-TEST RESULT (HUNGARY)

k	F-Statistics	Asymptotic critical value bounds for the F-statistic	
		I(0)	**I(1)**
1	104,862	4.94	5.73

TABLE 9: F-TEST RESULT (ITALY)

k	F-Statistics	Asymptotic critical value bounds for the F-statistic	
		I(0)	**I(1)**
1	20,8771	4.94	5.73

TABLE 10: F-TEST RESULT (THE NETHERLANDS)

k	F-Statistics	Asymptotic critical value bounds for the F-statistic	
		I(0)	**I(1)**
1	21,3193	4.94	5.73

TABLE 11: F-TEST RESULT (THE UNITED KINGDOM)

k	F-Statistics	Asymptotic critical value bounds for the F-statistic	
		I(0)	**I(1)**
1	21,4049	4.94	5.73

A3. ESTIMATIONS OF ARDL MODEL

TABLE 12: ESTİMATES OF THE SELECTED ARDL (1,1) REGRESSİON (GERMANY)

Variables	Coefficient	Std. Error	t-Statistics
y_{GER}	1		
$y_{GER}(-1)$	0,170	0,111	1,526
$(x/h)_{GER}$	0,564	0,072	7,789
$(x/h)_{GER}(-1)$	-0,095	0,051	-1,863
C	0,006	0,003	2,305
R^2= 0,672 DW= 2,23 F= 22,559			
Estimated Long-Run Coefficients			
$(x/h)_{GER}$	0,565	0,110	5,13
C	0,008	0,003	2,54

TABLE 13: SHORT-RUN ESTİMATİON (GERMANY)

Variables	Coefficient	Std. Error	t-Statistics
dy_{GER}	1		
$d(x/h)_{GER}$	0,564	0,072	7,789
dC	0,006	0,003	2,305
ECM	-0,829	0,111	-7,425

TABLE 14: ESTİMATES OF THE SELECTED ARDL (2,0) REGRESSİON (HUNGARY)

Variables	Coefficient	Std. Error	t-Statistics
y_{HUN}	1		
y_{HUN}(-1)	-0,078	0,087	-0,902
y_{HUN}(-2)	0,204	0,083	2,452
$(x/h)_{HUN}$	0,251	0,024	10,240
C	0,016	0,005	2,902
R^2= 0,759 DW= 1,76 F= 44,096			
Estimated Long-Run Coefficients			
$(x/h)_{HUN}$	0,287	0,035	8,216
C	0,018	0,005	3,354

TABLE 15: SHORT-RUN ESTİMATİON (HUNGARY)

Variables	Coefficient	Std. Error	t-Statistics
dy_{HUN}	1		
dy_{HUN}(-1)	-0,204	0,083	-2,452
$d(x/h)_{HUN}$	0,251	0,024	10,240
dC	0,016	0,005	2,902
ECM	-0,874	0,100	-8,689

TABLE 16: ESTİMATES OF THE SELECTED ARDL (0,2) REGRESSİON (ITALY)

Variables	Coefficient	Std. Error	t-Statistics
y_{ITA}	1		
$(x/h)_{ITA}$	0,166	0,043	3,817
$(x/h)_{ITA}$(-1)	0,114	0,043	2,620
$(x/h)_{ITA}$(-2)	0,181	0,043	4,150
C	0,011	0,003	3,528
R^2= 0,470 DW= 2,06 F=13,043			
Estimated Long-Run Coefficients			
$(x/h)_{ITA}$	0,495	0,080	6,158
C	0,010	0,003	3,362

TABLE 17: SHORT-RUN ESTİMATİON (ITALY)

Variables	Coefficient	Std. Error	t-Statistics
dy_{ITA}	1		
$d(x/h)_{ITA}$	0,161	0,038	4,155
$d(x/h)_{ITA}$(-1)	-0,174	0,040	-4,297
dC	-0,000	0,002	-0,018
ECM	-0,956	0,130	-7,350

TABLE 18: ESTİMATES OF THE SELECTED ARDL (1,0) REGRESSİON (THE NETHERLANDS)

Variables	Coefficient	Std. Error	t-Statistics
y_{NET}	1		
y_{NET}(-1)	0,369	0,124	2,975
$(x/h)_{NET}$	0,212	0,063	3,330
C	0,012	0,005	2,407
R^2= 0,423 DW= 2,01 F= 12,511			
Estimated Long-Run Coefficients			
$(x/h)_{NET}$	0,431	0,100	4,280
C	0,013	0,004	2,895

TABLE 19: SHORT-RUN ESTİMATİON (THE NETHERLANDS)

Variables	Coefficient	Std. Error	t-Statistics
dy_{NET}	1		
$d(x/h)_{NET}$	0,085	0,061	4,617
dC	0,009	0,003	2,316
ECM	-0,661	0,106	-6,234

TABLE 20: ESTİMATES OF THE SELECTED ARDL (1,0) REGRESSİON (THE UK)

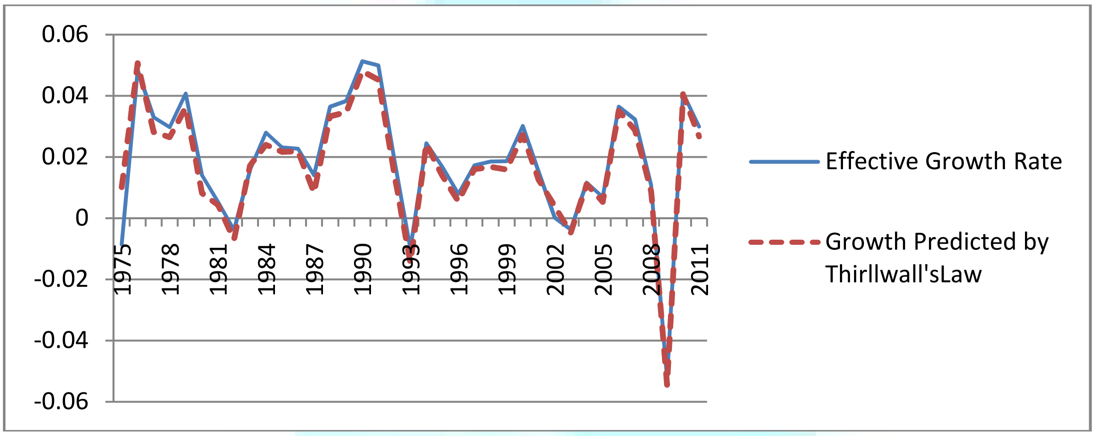
Variables	Coefficient	Std. Error	t-Statistics
y_{UK}	1		
$y_{UK}(-1)$	0,275	0,116	2,358
$(x/h)_{UK}$	0,326	0,070	4,626
C	0,007	0,004	1,858
R^2= 0,389 DW= 1,71 F= 14,0302			
Estimated Long-Run Coefficients			
$(x/h)_{UK}$	0,450	0,118	3,79
C	0,010	0,004	2,22

TABLE 21: SHORT-RUN ESTİMATİON (THE UK)

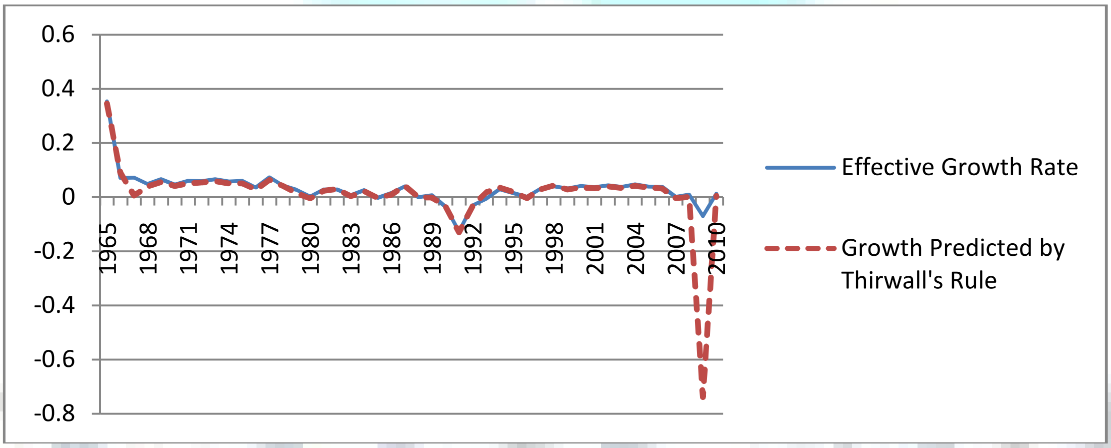
Variables	Coefficient	Std. Error	t-Statistics
dy_{UK}	1		
$d(x/h)_{UK}$	0,326	0,070	4,62
dC	0,007	0,004	1,858
ECM	-0,724	0,116	-6,199

A4. EFFECTIVE GROWTH AND GROWTH PREDICTED BY THIRLWALL (1979)

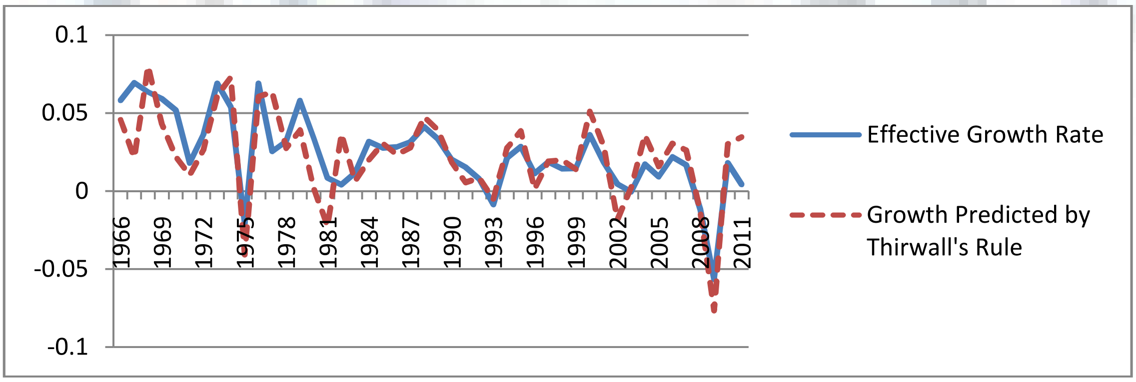
GRAPH 1: GERMANY



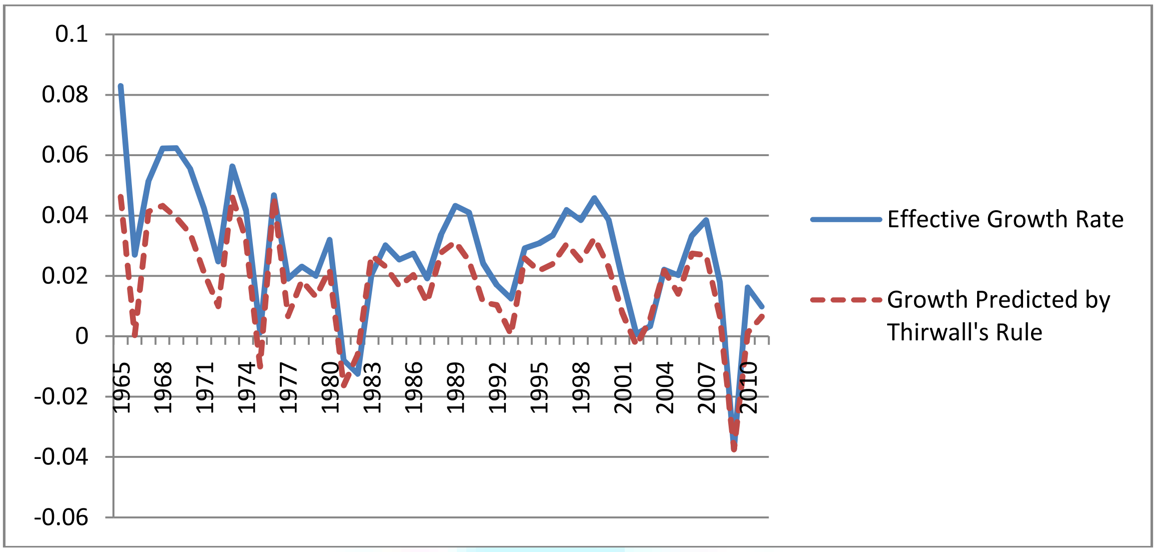
GRAPH 2: HUNGARY



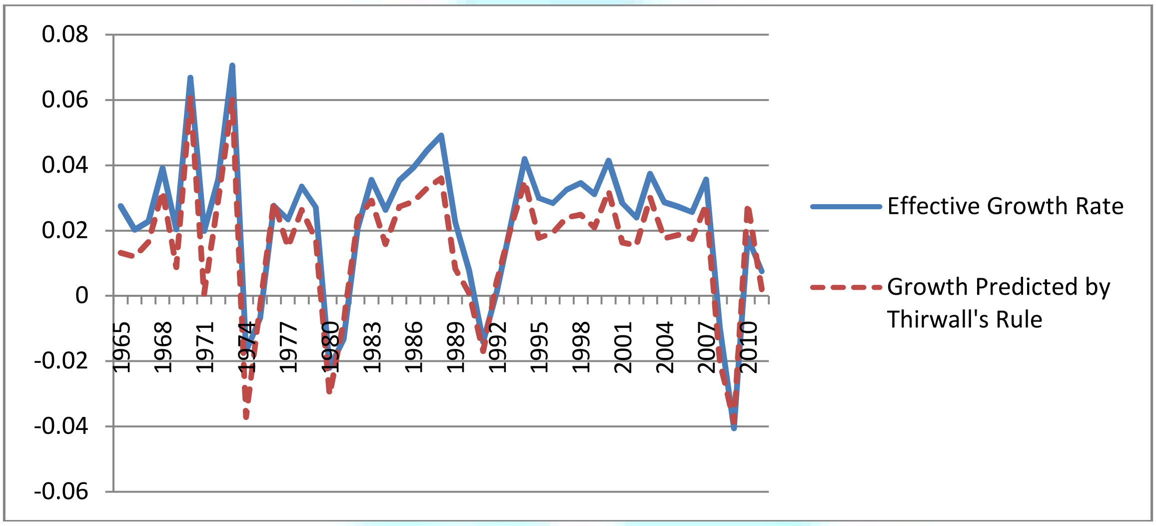
GRAPH 3: ITALY



GRAPH 4: THE NETHERLANDS



GRAPH 5: THE UNITED KINGDOM



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