

**Estimating the Impact of Fiscal Consolidation on
Economic Growth in Egypt.**

Hoda Abd-Elhamid Ali¹

Hend Abo Elmagd Mohamed²

Abstract

This research aims at analyzing and estimating the impact of fiscal consolidation on economic growth in Egypt during the period from 1989 to 2019 using the ARDL and ECM model, with hypothesis states that fiscal consolidation has a positive impact on economic growth in Egypt. There is evidence from economic literature for the existence of expansionary (Non-Keynesian) effects of fiscal consolidation such as A. Alesina and S. Ardagna (1998) and F. Giavazzi and M. Pagano (1990).

The research concluded, through the economic analysis and econometric model, that the fiscal consolidation in Egypt affected economic growth positively, and this result is consistent with the evidences of expansionary effects of fiscal consolidation. The research presented some conditions that may contribute to the expansionary effects of fiscal consolidation on economic growth, such as its success in reducing the public debt to-GDP-ratio as well as reducing the budget deficit and achieving primary surplus, in addition to the composition of fiscal consolidation, as it is argued that fiscal consolidations that based on expenditure cuts are associated with expansionary effects more than those that based on tax increase.

¹ Professor of Economics and Foreign Trade, Faculty of Commerce and Business Administration, Helwan University.

² Teaching Assistant in the Economics and Foreign Trade Department, Faculty of Commerce and Business Administration, Helwan University.

المخلص:

يهدف هذا البحث الي تحليل وتقدير تأثير الضبط المالي على النمو الاقتصادي في مصر خلال الفترة من 1989 إلى 2019 بأستخدام نموذج ARDL & ECM، مع افتراض أن ضبط الأوضاع المالية له تأثير إيجابي على النمو الإقتصادي في مصر. هناك دليل من الأدبيات الأقتصادية على وجود تأثيرات توسعية (غير كيننزية) لضبط الأوضاع المالية مثل (A. Alesina (1998) و S. Ardagna . وخلص البحث من خلال كلاً من التحليل الأقتصادي والنموذج القياسي ،أن ضبط الأوضاع المالية في مصر أثر بشكل إيجابي على النمو الإقتصادي، وتتفق هذه النتيجة مع الأدلة على الآثار التوسعية لضبط الأوضاع المالية. كما يستعرض البحث بعض الظروف التي قد تسهم في التأثير التوسعي لضبط الأوضاع المالية على النمو الأقتصادي ،مثل نجاحه في خفض نسبة الدين العام للنتاج المحلي الأجمالي ،وكذلك تخفيض عجز الموازنة وتحقيق فائض أولي، بالإضافة إلي تكوين الضبط المالي، حيث يقال أن ضبط الأوضاع المالية القائمً على تخفيض النفقات يرتبط بأثار توسعية أكثر من القائم على زيادة الضرائب .

1. Introduction:

In recession times, unlike developed countries that use counter-cyclical fiscal policy to achieve economic stability through increasing public expenditure and cutting down taxes, developing countries use pro-cyclical fiscal policy which represented in cutting public spending and increasing tax rates “contractionary policy” (A. Alesina and G. Tabellini, 2005, p2), as they have no sufficient fiscal space that can enable them to conduct fiscal stimulation.

So those developing countries have to address their fiscal imbalances that cause low fiscal space, as high fiscal deficits lead to low reserves, high public debt, or high inflation rates, or both according to type of finance, in addition to other bad economic circumstances, therefore, the need for fiscal consolidation has become a necessity for many countries to rebuild a strong fiscal position that enables them to spend in productive areas, make economic stimulation when needed, and achieve economic growth.

Fiscal consolidation refers to policies undertaken by governments to reduce budget deficits and debt accumulation; it can be through expenditures cuts or revenue increases or both simultaneously (OECD, 2011).

Fiscal consolidation “contractionary fiscal policy” may have some negative impacts in the short run, as it may depress aggregate demand through low public expenditures and high tax rates, and thus the economic growth will be negatively affected. However, in the long run, the negative effects may fade away due to restore the investors and households’ confidence in the economy, free fiscal space to spend in productive areas, create more jobs and have no need for government to crowd out private investment.

These negative impacts may not be very costly if it combined with structural reforms (S. Pelin Berkmen, 2011, p3). The composition of fiscal adjustment also plays a crucial role in capturing the positive effects on economic growth (A. Alesina and S. Ardagna, 2013, p22). Besides the importance of composition of fiscal consolidation for producing expansionary effects, initial conditions also matter; the worse the fiscal conditions the higher the likelihood of expansionary effects to occur (A. Alesina and S. Ardagna. 1998, p4).

The potential negative effects of fiscal consolidation on economic activity and social conditions make it difficult for policy makers to execute it. So many governments postpone it, which makes their fiscal conditions getting worse.

Egypt as many developing countries witnessed a number of fiscal deteriorations for many periods; the high fiscal deficit and accumulated public debt form a serious challenge for the government, as they put pressure on the fiscal stance of the economy, and represent a burden on future generations.

Trails to correct the fiscal imbalances were not a new phenomenon for the Egyptian economy. The government had been forced to implement fiscal adjustment for two times, regardless the failure of the Egyptian government's trail in 1970s to reduce the government subsidies, because of political and social matters.

The first time was in 1991, when the Egyptian economy has suffered from huge bad economic conditions and needed to get a loan from the IMF; the fiscal adjustment was a substantial part of the reform program which is known as "ERSAP", while the second time was the consolidation program, which is also a part of the economic reform imposed by the IMF in 2016 after

facing a large imbalances and deteriorations since the outbreak of the revolution in 2011.

2. Research problem:

Egypt is experiencing a high budget deficit and an accumulation of public debt, which may slow down its economic growth, and the economic variables that reflect economic performance, such as inflation, unemployment and GDP are in undesirable ratios, so a precise economic policy must be implemented to maintain economic stability and promote economic growth which is one of the main objectives of economic policies. Therefore, Egypt has to strengthen its fiscal position through implementing fiscal consolidation - taking into account its composition, size and its speed- as it may affect economic growth positively by increasing the confidence of private agents (consumers and investors) in the Egyptian economy.

In light of the above, the research problem can be summarized in that question; to what extent fiscal consolidation can have a positive impact on economic growth?

3. Hypothesis of the research:

The research is based on the hypothesis stating that “Fiscal consolidation has a positive impact on economic growth in Egypt”.

4. Methodology:

This research was based on the inductive approach in addition to the descriptive analytical method in presenting the basic concepts related to fiscal consolidation and measures which represent it, as well as the econometric technique to estimate and conclude the impact of fiscal consolidation on economic growth in Egypt using time series data from the WB,

MoF and IMF during the period 1989-2019, using ARDL and ECM model.

5. Objective of the research:

This research aims at analyzing and estimating the impact of fiscal consolidation on economic growth in Egypt, which induces to test the hypothesis of the research, and this, can be achieved through presenting main concepts related to fiscal consolidation, discussing different views about the impact of fiscal consolidation on economic growth, analyzing the fiscal consolidation that has been implemented in Egypt, and finally estimating the impact of fiscal consolidation on economic growth in Egypt.

6. Fiscal consolidation and economic growth in literature:

According to the traditional Keynesian view, fiscal consolidation represented by reducing government expenditures or tax hicks, has contractionary effects on private consumption, investment and therefore aggregate demand, so any change in fiscal policy will affect output by way of the well-known multiplier mechanism (J. Alworth and G. Arachi, 2012, p231).

On the other hand, Ricardian Equivalence states that a fiscal expansion pushes the expectation of future fiscal contractions. This view is different from Keynesian view in that the government multiplier is equal to zero, which means that any increase or decrease in fiscal policy will be offset by Precautionary behavior of private agents and, therefore, fiscal policy has no effect on aggregate demand (M. Briotti, 2005, p11). For example when government raises its spending financing by deficit, consumers will increase their savings as they expect higher future taxes to pay off debts, so the increase in private

saving will offset the decrease in government saving as a result of low taxes.

The new trend about the effect of fiscal policy on aggregate demand, which has been the focus of controversy among economic thinkers so far, is the expansionary effects of fiscal consolidation called “Non-Keynesian effects”; it assumes that current changes in fiscal policy are seen as a signal of future fiscal action. In other words, increasing government taxes or reducing expenditures as a percentage of GDP “contractionary fiscal policy”, may affect consumers’ expectations about lower taxes in the future which will lead to a higher future income, where there will be no debt to fear, so they will increase their current consumption and investment and thus aggregate demand will increase too, and that contrasts with the Keynesian effects of fiscal policy (D. Prammer, 2004, p36).

The beginning of the Non - Keynesian literature which argued the possibility of consolidation to be expansionary has been postulated by Feldstein (1982), he provided evidence -in favour of the non-Keynesian hypothesis of fiscal policy- for an expected positive impact of spending cuts and tax increases on economic output if they are seen as an indication of future tax cuts. Accordingly, fiscal consolidations must not necessarily hamper economic growth but may boost the economy (M. Kleis and M. Moessinger, 2016, P2).

The literatures concerned with Non-Keynesian effects of fiscal policy identify some channels through which the expansionary effects of fiscal consolidation could prevail (G. Kolev and J. Matthes, 2013, p17):

- Falling real interest rates due to lower government deficits can result in crowding in private investment, improving expectations about debt sustainability, and

enhancing credibility regarding government's ability and its willingness to reduce deficits and debts.

- Increasing confidence of economic agents in government which in turn enhancing their consumption and investment and thus economic growth.

The experience of Denmark and Ireland in 1980 has been first documented by F. Giavazzi and M. Pagano (1990) as a strong evidence for expansionary effects of fiscal consolidation. They found that average GDP growth rate after consolidation was higher than the average growth before consolidation in both countries, however, the composition of fiscal consolidation in both countries was different; Ireland applied a consolidation based on expenditure cuts, while, Denmark applied a consolidation based on a mix of expenditure cuts and tax rises.

S. Ardagna and A. Alesina (1998), found that fiscal consolidations are expansionary (means affecting economic growth positively) if they are expenditure-based rather than tax-based adjustments. So the effect of fiscal consolidation on economic growth depends on its composition.

Alesina and Perotti (1996) find that success of fiscal consolidations "representing by reducing public debt as a percentage of GDP, reducing budget deficit and achieving primary balance" contributes to increase growth rates, which means that successful consolidations tend to be expansionary rather than unsuccessful ones.

7. Empirical studies:

M. Krajišnik¹, et, al, (2019), used PMG-ARDL estimator, panel data is used for the period 2004-2016 to explore the impact of fiscal consolidation on economic growth in the Western Balkans countries; they used a set of control variables

in order to make the estimation reliable such as real effective exchange rate, foreign direct investment, inflation rate and some other variables in addition to cyclically-adjusted budget balance “CABP” which is their measure for fiscal consolidation. Analysis of the observed countries shown that fiscal consolidation was based on expenditure side in some countries and revenue side in other, and sometimes a mix of them. Their findings are a positive and significant impact cyclically-adjusted budget balance on economic growth in the long run and a successful fiscal consolidation for those countries which implemented fiscal consolidation largely by reducing expenditures.

I. Hussain, et, al, (2021), tested the effect of fiscal adjustment on short-run and long-run economic growth in Pakistan; they estimate the effect using ARDL model. The main variables that were used in the estimation are cyclically-adjusted primary balance, type of government, openness of the economy and exchange rate.

They found that fiscal adjustment has expansionary effect on long-run economic growth, while the effect was contractionary in short run. They also found that spending-based adjustment enhances the economic growth, while the tax-based adjustment would reduce the growth in the long run.

G. Giudice, et, al, (2003), examined the effect of fiscal consolidation on economic growth in the EU using QUEST model. They found that consolidations that based on tax increases are unlikely to increase growth, while consolidations that based on expenditure cuts may have expansionary effect in the short run or medium run.

They also found that consumption channel is important for offsetting standard Keynesian effects; also investment channel

can be very relevant for consolidations that based on cuts in government wage bill. They claim that the positive ‘non-Keynesian’ effects on private demand are not always strong enough to offset the negative impact of the fiscal consolidation on GDP.

E. Baldacci, et, al, (2003), used the general method of moments (GMM) estimator to address two-way causality, using pooled data from 1990 to 2001 covered 39 countries; they examined the impact of some fiscal variables including fiscal deficit and budget composition and other control variables including private investment, school enrollment and labor force participation.

8. The econometric model:

Using ARDL and ECM model, the research is concerned with estimating the impact of fiscal consolidation on economic growth in Egypt, depending on some fiscal variables which are (public debt and primary balance, in addition to government instruments including “current expenditure, public investment, direct tax, and indirect tax”) besides foreign direct investment to be all used as explanatory variables, and using GDP growth rate (the dependent variable) to represent economic growth of the model. Primary balance and public debt are used as measures of fiscal consolidation, while the government tools (current expenditures, public investment, direct taxes and indirect taxes) are used in order to estimate the impact of the composition of fiscal consolidation on economic growth. In this context, a time series data from 1989 till 2018 were used.

Variables explanation:

- **Real GDP growth rate:** is an annual percentage growth rate of GDP at market prices based on constant local

currency (WB). It is the variable of interest “dependent variable” of the study to represent the economic growth.

- **Foreign direct investment “FDI”:** Are the net inflows of investment to acquire a lasting management interest in an enterprise operating in an economy other than that of the investor (WB). It is one of the independent variables of the study and it is one of the determinants of economic growth and it is assumed to have a positive impact on economic growth.
- **Primary balance:** is the overall deficit subtracted from it interest payments (MoF); the study assumes that primary balance may have a positive impact on GDP growth rate, as it implies decreasing in public debt and freeing more fiscal space to spend in other productive areas which in turn is likely to affect economic growth positively.
- **Public debt:** is the sum of the accumulated debt due on the general budgetary authorities, national investment bank and social insurance funds after excluding debts and internal relations between the three sectors -which are represented in the borrowing of the general budgetary authorities from the national investment bank, bonds of ministry of finance with social insurance funds and national investment bank, bonds of social insurance funds and the borrowing of national investment bank from social insurance funds- and the government foreign debt (MoF); it is assumed to have a negative impact on GDP growth rate (the dependent variable) as it puts pressure on government fiscal stance, crowds out private investment and affects the future generations negatively. It is the measure of fiscal consolidation in the study beside the primary balance.

- **Direct taxes:** are taxes on income and profit paid directly from individuals to the government. It is assumed to have a negative impact on the dependent variable (GDP growth rate).
- **Indirect taxes:** are taxes on goods and services and paid indirectly to the government such as sales tax and custom duties; it is assumed to have a small negative or positive impact on economic growth.
- **Current expenditures:** they include wages and employees' compensations, purchasing of goods and services, subsidies and social grants, it is expected to have a negative impact on economic growth.
- **Public investment:** refers to purchasing non-financial assets; it is assumed to have a positive impact on GDP growth rate.

The ARDL regression equation is:

$$\Delta gdp_t = \alpha + \sum_{i=1}^n \beta_1 \Delta gdp_{t-i} + \sum_{i=1}^n \beta_2 \Delta X_{t-i} + \phi_1 gdp_{t-i} + \phi_2 X_{t-i} + \epsilon_t$$

Where,

gdp : refers to dependent variable.

X : refers to independent variables.

α : is the constant.

β_1 and β_2 : are short-run coefficients.

ϕ_1 and ϕ_2 : are long-run coefficients

ϵ_t : The disturbance term.

i : is lag orders.

7.1. Bounds test:

Null Hypothesis: no cointegration between variables.

F-statistic = 10.25656		
Critical values		Signif level
I(0)	I(1)	
1.92	2.89	10%
2.17	3.21	5%
2.43	3.51	2.5%
2.73	3.9	1%

Source: done by researcher using e-views.

According to the Bounds test, the calculated F-statistic is greater than the critical values of the upper bound at all levels of significance, so the alternative hypothesis is accepted and the null hypothesis is rejected, which means that there are long-run relationships between variables of the model, therefore the estimation of both short run and long run can be made using ARDL & ECM model.

7.2. The long-run estimation:

The long run equation is:

$$gdp_t = \alpha + \phi_1 gdp_{t-i} + \phi_2 X_{t-i} + \epsilon_t$$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI	0.701731	0.101811	6.892510	0.0000
C-EXP	-0.052516	0.109735	-0.478568	0.6380
D-T	-0.741816	0.545657	-1.359491	0.1908
IND-T	-0.261677	0.179123	-1.460884	0.1613
PB	0.221664	0.074353	2.981256	0.0080
PD	-0.033757	0.015035	-2.245319	0.0375
P-INV	0.206020	0.091809	2.244014	0.0376
C	13.73404	2.434413	5.641620	0.0000

R-squared	0.900185	Mean dependent var	4.428000
Adjusted R-squared	0.839187	S.D. dependent var	1.592301
S.E. of regression	0.638536	Akaike info criterion	2.229897
Sum squared resid	7.339110	Schwarz criterion	2.790376
Log likelihood	-21.44846	Hannan-Quinn criter.	2.409199
F-statistic	14.75764	Durbin-Watson stat	2.365668
Prob(F-statistic)	0.000001		

Source: done by researcher using e-views.

The results show the following:

1st: FDI has a positive and statistically significant impact on GDP growth rate in long run according to the t-statistic and probability. The coefficient indicates that if foreign direct investment changes by 1 percent, GDP growth rate will change by 0.70 in the same direction and that is matching with the economic theory and many empirical studies, as FDI creates jobs which contribute in reducing the unemployment which involves creating more income that enhances the standard of living and therefore flourishes the economic activity.

2nd: C-EXP has a negative impact on GDP growth rate in long run, the coefficient indicates that if Current expenditures change by 1 percent GDP growth rate will change by 0.052516 in the opposite direction, but this impact is statistically insignificant according to t-statistic and probability. According to empirical studies like Baldacci, et, al, (2003) which indicates that the increase in government current expenditures such as wages and salaries had a negative impact on growth, the result is consistent with them, even though the impact of current expenditures on GDP growth rate in Egypt is not significant. Therefore the fiscal adjustment that based on cutting in current expenditures in Egypt is not clear to have contractionary or expansionary effects on GDP growth rate.

3rd: D-T has a negative but statistically insignificant impact on GDP growth rate in long run. The coefficient indicates that if direct taxes change by 1 percent, GDP growth rate will change insignificantly by 0.741816 in the opposite direction, and this negative impact of direct taxes such as income taxes may be because it reduces the net return to human or physical capital and this result is consistent with some studies which found a contractionary impact of direct taxes on economic growth, however the negative impact of the coefficient is not significant.

4th: IND-T has a negative and statistically insignificant impact on GDP growth rate, which means if indirect taxes change by 1 percent, GDP growth rate will change insignificantly by 0.261677 in the opposite direction. According to empirical studies, indirect taxes are less harmful for economic growth than direct tax and the result of the study is consistence with those studies and that cleared up by the coefficient of both in spite of their insignificancy; the coefficient of direct tax is 0.74 while indirect taxes is 0.26, so the advice for policy makers when implementing tax-based fiscal consolidations to be based on indirect taxes increases rather than increase in direct taxes. While in Egypt the impact of indirect taxes on GDP growth rate is negative but it is insignificant.

5th: PB according to the t-statistic and probability, primary balance has a positive and statistically significant impact on long-run GDP growth rate. The coefficient indicates if primary balance changes by 1 percent, GDP will change by 0.221664 in the same direction, this result is consistent with the literature that call for Non-Keynesian (expansionary) effects of fiscal consolidations, so it is better for the government of Egypt

to achieve a primary surplus as a percentage of GDP, as it will enhance the GDP growth rate in the long run, because it means that the government manages its expenditure (excluding interest payments for debt which is out of its control) well and gains revenues that cover its expenditure with an excess, and that indicates the government's ability to meet its obligations instead of accumulating public debt. So it can be said that fiscal consolidation has a positive impact on GDP growth rate in Egypt in the long run, as primary balance is the measure of fiscal consolidation in this study.

6th: PD has a negative and statistically significant impact on GDP growth rate in the long run according to the t-statistic and probability. The coefficient indicates that for each percent change in public debt as a ratio of GDP, the GDP growth rate will change by 0.033757 in the opposite direction, and this result is consistent with empirical studies especially in developing countries. This result also gives the rise for reducing public debt as a percentage of GDP in Egypt as it depressed the economic activity, so the fiscal adjustments that have been adopted by the Egyptian government to reduce the public debt are successful and expansionary as the initial fiscal conditions (high public debt and primary deficit) contribute to make consolidations more successful and expansionary. The reduction in public debt gets back the credibility in the Egyptian economy, enhances the confidence of private agents "investors and consumers" in the performance of the government (as they will not be afraid of future taxes to pay for debts) which in turn will result in increasing their current spending, and creates more fiscal space to more productive expenditures.

The 5th and 6th results are consistent with each other, as long as the government achieves primary surplus, the public debt will decrease and hence no crowding-out effect for private investment and hence they will have a positive impact on the economic activity.

7th: P-INV has a statistically significant and positive impact on economic growth in the long run; the coefficient indicates that if public investment changes by 1 percent, GDP growth rate will change by 0.206020 in the same direction. This result is consistent with empirical literature such as E. Baldacci, B. Clements, and S. Gupta (2003) and M. Attinasi and A. Klemm (2014) that found that consolidations that based on reductions in government investment have negative impact on economic growth, as public investment enhances the human capital and infrastructure of the economy and therefore attracts more investments and hence stimulates the economic activity.

8th: The Goodness of fit test:

The value of R-squared is around 90% and this indicates that the change in explanatory variables of the model explains 90% of the change in the dependent variable (GDP growth rate) and only around 10% are explained by variables other than in the model and that is consistent with the value of F-statistic which is 14.75764 which indicates that the model is significant, has a good explanatory power and fits the data. The value of DW is 2.3 indicates that there is no autocorrelation problem.

7.3. The ARDL-ECM and short run dynamics:

The ECM dynamic equation:

$$\Delta gdp_t = \alpha + \sum_{i=1}^n \beta_1 \Delta gdp_{t-i} + \sum_{i=1}^n \beta_2 \Delta X_{t-i} + ECT_{t-1} + \epsilon_t$$

ECT_{t-1} : Is the error correction term, represents the speed of the adjustment towards long-run equilibrium.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDI)	0.189826	0.069051	2.749076	0.0132
D(D-TAX)	-0.179922	0.154895	-1.161571	0.2606
D(PB)	0.342848	0.038114	8.995372	0.0000
CointEq(-1)*	-0.949975	0.082270	-11.54709	0.0000
R-squared	0.903327	Mean dependent var	0.023333	
Adjusted R-squared	0.892173	S.D. dependent var	1.617971	
S.E. of regression	0.531294	Akaike info criterion	1.696564	
Sum squared resid	7.339110	Schwarz criterion	1.883390	
Log likelihood	-21.44846	Hannan-Quinn criter.	1.756331	
Durbin-Watson stat	2.365668			

Source: done by researcher using e-views.

The results show the following:

1st: CointEq(-1)* is the error correction term " ECT_{t-1} ", it is negative and statistically significant with the coefficient -0.949975, it indicates that the speed of the adjustment from the short run towards the long run equilibrium is 94% which is very high.

2nd: FDI has a short run positive and statistically significant impact on GDP growth rate according to the t-statistic and probability, if FDI changes by one percent, GDP growth rate will change by 0.189826 in the same direction.

3rd: the coefficient of direct tax is -0.179922, the t-statistic and probability indicates a negative and statistically insignificant impact on economic growth represented by (GDP growth rate). And that is consistent with literature and empirical

studies that found that consolidations based on increases in direct taxes have contractionary effects on economic growth. Despite of the negative sign of the coefficient, the effect is not significant and that may be because Egypt does not mainly depend on this type of tax.

4th: The primary balance has a positive and statistically significant impact on GDP growth rate in the short run, the coefficient is 0.342848 which means if primary balance as a ratio of GDP changes by one unit, GDP growth rate will change by 0.342848 in the same direction. And this result indicates a positive (expansionary) impact of fiscal consolidation on economic growth in short run, that may get back the confidence of private agents in the economic policy that the government manages its budget well, therefore, it will not impose taxes on the future or increase rate of interest -which crowd out private investments- to finance the deficit and pay for debts.

9. Conclusion:

The research concluded that the fiscal consolidation in Egypt is positively associated with economic growth and that is cleared by the negative impact of public debt on GDP growth rate and the positive impact of primary balance on GDP growth rate. So the fiscal adjustments in Egypt which aimed at reducing public debt and achieve primary surplus were not only successful but also did not hurt the economic growth, as they help in getting back the confidence in the Egyptian economy which is reflected by positive impact of them (fiscal adjustments) on GDP growth rate.

The results showed that the composition of fiscal consolidation each one individually seems to be not clear in terms of its impact on economic growth but all tools together seem to affect GDP growth rate positively (expansionary effect)

as it has been shown above by the coefficients of the measures of fiscal consolidation (public debt and primary balance).

The worth to be mentioned here is that consolidations that depend on policy mix without cutting in public investment expenditure are likely to have positive effect on economic growth even if the negative effect of increase in taxes is probably, they may be mitigated by increasing spending in productive areas, and that can be explained by the positive impact of public investment on GDP growth rate.

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