

Redistribution, Growth and Productivity Relationship in Fiscal Policy in Core and Peripheral Countries

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1. Introduction

Especially with the 2008 global crisis, stable growth and productivity issues have become more prominent in fiscal policy debates. Even more strikingly, crisis brought to new discussions in fiscal policy as an instrument for medium-term growth and productivity (WB, 2012). Most of the developed countries after the 2008 crisis reformed and restructured their government budgetary process to have strong and independent budgetary institutions for better macroeconomic management (IMF 2014).

In particular, the fiscal policies of developed countries have started to give priority to productivity as well as income inequality issues along with inclusive growth and lower efficiency debates. When the government budgets of many countries like Britain and France are looked in the recent period, it is seen that the aim is to increase the productivity in the medium term and to promote growth through reviewing public expenditure and tax programs (IMF, 2014, UK Budget 2018).

Theoretical and empirical studies suggest that the government budget has an impact on economic growth through promoting productivity and changing the factor markets. But some studies show that fiscal policy has a negative impact on the growth and labor productivity performance by distortionary taxation and low efficient public expenditure policies.

The main purpose of this study is to analyze the impact of fiscal policies on growth and productivity in selected countries. In this paper, the effects of the fiscal policy and income distribution on the growth and productivity in core and periphery countries are examined by dynamic panel data analysis. Paper focused on the impact of public expenditures and incomes under the fiscal policy with income distribution on countries' growth and productivity performance.

While the results of the study differed for the core and periphery countries, it was observed that the effect of public expenditures and public revenues had a different effect on growth and productivity in the examined period when they are tackled with income distribution. The key policy question here is whether public expenditures and revenues are a better recipe for the growth and/or productivity of the developed countries and less developed countries as well. In this context, it acknowledges that fiscal policy plays a more active role in the growth and productivity while income distribution is inconclusive.

In this paper, we use the August 2018 version of The Standardized World Income Inequality Database and April 2018 edition of IMF World Economic Outlook to analyze the comparative effect of fiscal policy and income distribution on economic growth and productivity in core and peripheral countries.

This study consists of two main sections. In the following section, fiscal policy and income distribution on the performance of growth and productivity, especially in the post-2000 period, are discussed based on the theoretical and empirical debates. In the third section, fiscal policy and income distribution are analyzed on the growth and productivity performance for selected two country groups.

2. Fiscal Policy and Income Distribution on the Basis of Growth and Productivity Debates

In economic policy, decisions are mainly determined by the market, while fiscal policy is up to the political decision-making process. That is the main difference in fiscal policy compared to other economic policy areas. Policy formulation and execution of fiscal policy means the realization of economic objectives within a political context. This involves the consideration of what is economically sound in relation to what is politically feasible (Herring, 1938). Effective functioning of the political process is critical to the success of the government budget in implementing fiscal policy.

It is the public budget that defines modern public financial management as a policy area. Public expenditures determined in the budget process, the economic, program and functional structure of this expenditure affect the efficiency of public activities (Schick, 1998: 11). Therefore, the effectiveness of the public decision-making process that sets the public expenditure and revenue program is also critical for the economic performance of the country.

While fiscal policy determines the increasing role of the state in the economy, the crises and developments experienced with the changes in the understanding of the state increased the debates on fiscal policy, especially after the recent 2008 global crises. According to OECD (2019) data, that the ratio of public expenditures and revenues to GDP is approaching 50% in many countries and the rapid increase in debt burden has brought about macro-stability and inequality, sustainable growth, and productivity debates.

There is an extensive literature in the theory on fiscal policy on the basis of growth and productivity relationship. Solow model dominated economists' view of growth, there was little role for fiscal policy to influence the long-term rate of growth, which depended on exogenous technical progress (Semmler et al, 2011;50). Neoclassical growth models of Solow (1956) and Swan (1956) argued and mainly explained no effect of the fiscal policy on the long-run growth. Lucas (1988) and Barro (1990) provided a rich contribution to the literature on endogenous growth theory with attempting to develop the fiscal policy implications for better understanding.

There are two main approaches that investigate the relationship between government intervention and growth. While the first of these approaches is against government intervention, the other supports it. There are two reasons behind the approach opposing state intervention. The first reason is that fiscal policy instruments that lead to dead weight loss. The second reason is that these instruments, which try to correct market failures, cause more distortion through rent-seeking behavior. Krueger (1974) and Bhagwati (1982) are important studies in this regard.

On the other hand, studies like Amsden (1989) support government intervention indicate that the state can discourage rent-seeking behaviors by applying carrot-stick policy. And also some of the government expenditures like investment in infrastructure have complementary effects on private investments.

Theoretical discussions provide a clearer framework, but empirical results reveal different results from theoretical discussions based on the methodology, sample size and coverage, data quality, and time period. Tanzi and Zee (1997) opened to discussion of public expenditure effect on the economic growth. They argued that despite the lack of robust results in the empirical literature, fiscal policy could play a fundamental role in affecting the long-run growth performance of countries. So, theory should deem important for enhancing growth, such as the adoption of policies to improve the neutrality of taxation, promote human capital accumulation, and lessen income inequality (Tanzi and Zee, 1997; 201).

Landau (1983 and 1986), questioned the effect of government consumption expenditure on growth for developed and less developed countries, and found a negative effect of public expenditure on growth of the real output. Hansson and Henrekson (1994) concluded that the level of total public expenditure, consumption and transfers invariably have a negative impact on the rate of growth of total factor productivity. Government investment is not found to have any effect on TFP-growth. On the contrary, Ram (1986), studied the relation between government expenditure and economic growth for a group of 115 countries between 1950-1980. The author used both cross section, time series data in his analysis, and found a positive effect of government expenditure on economic growth. Holmes and Hutton (1990) also found that public expenditure has a same effect on the national income growth.

The relation between tax revenues and growth is discussed within the framework of distortionary effects of tax systems. According to consumption tax proponents, taxes on income create bias against savings and working. Thus discourage incentive to work and capital

accumulation which reduces growth rate (Milesi-Feretti and Roubini, 1998:721). In order to enhance capital accumulation tax systems should be redesigned by substituting income taxes with consumption taxes. Turnovsky (1996) discusses trade-off between taxes on consumption and income. Evidence suggests that since endogenous growth models inherently include externalities, taxes on income can be used to internalize them.

Easterly and Rebello (1993) investigate the relation between fiscal policy and economic growth for 28 countries. Evidence suggests that choice of fiscal instruments matters. Findings indicate that there is a strong relation between fiscal structure of a country and its development stage. While developed countries rely on income taxes, underdeveloped countries rely on taxes on international trade. And also found that public investment on transportation and communication heavily correlated with the growth which supports endogenous growth theory. And fiscal policy of a country is affected by its population. Kneller et al.(1999) analyzed effect of fiscal policy in 22 OECD countries for 1970-1995 period. Findings suggests that productive government spending boosts growth while unproductive spending does not. Besides, increases in distortionary taxes shrink growth while increases in non-distortionary taxes do not.

Afonso and González Alegre (2008) using panel data for the 15 EU countries for 1971-2006 period showed that there was a negative impact of public consumption and social security contributions on selected countries economic growth.

In measuring the effect of fiscal policy on reducing inequalities, the change between market and secondary distribution on the basis of re-sharing of income among social groups and Gini coefficients are important indicators. In this sense, primary (market distribution) and secondary distribution (after tax and social programs) discussions come to the fore.

While the causes of inequality are discussed and tackled within the scope of economic theory, fiscal policy deals with the issue of how the primary distribution is corrected by secondary

distribution policies and maximizing social welfare. Following the market income distribution in the production process, this distribution can be changed through tax, subsidy and social programs by the state. The distribution resulting from this intervention is called the secondary income distribution. The most widely used instruments for this purpose are progressive tax tariffs, minimum living allowances, subsidies and social assistance programs.

There are studies in the literature that there is a trade-off between growth and income distribution, as well as studies that claim that both are independent of each other, in other words, economic growth is neutral to income distribution. (Ravallion, 1994; Bruno et al, 1996; Deininger and Squire, 1999; Dollar and Kraay, 2001; Ghura et al, 2002; Ravallion, 1997; Oğuş, 2011). In recent years, however, it is increasingly recognized that an increase in income and non-income inequality poses a significant threat to sustainable economic growth.

The effect of inequalities on growth is observed in studies conducted that long-term and short-term effects differ. Forbes (2000) reported that inequality had a positive effect on growth in the short term, while Halter et al. (2014) found that more inequality led to lower growth in the long term. In some studies, it is revealed that different starting levels and the differences in development levels between countries lead to differentiation of relationship between inequality and growth. (Shin, 2012; Delbianco et al., 2014; Amarente, 2014).

Delbianco et al. (2014) examined the relationship between income distribution inequality and economic growth in 20 Latin American and Caribbean countries in the 1980-2010 period. The study shows that the characteristics of this relationship depend on the income level. In general, although inequality is negative for economic growth, regarding the upper tail of the income distribution of richer countries suggests that high inequality promotes economic growth and makes the relationship positive. As a result, the findings of the study show that, contrary to economic policy proposals for rich countries, progressive redistribution policies in favor of the poorer strata of population support economic growth in low-income economies.

Amarante (2014) examined the relationship between economic growth and income inequality by using panel data for 22 Latin American countries in the 1960-2000 period. The results show that the level of inequality has different effects on the growth in the region, depending on the per capita income level. In the sample, the effect of inequality on growth in developing countries was negative in the poorer countries.

Ncube et al. (2014) looked at the inequality, growth and income inequality structure by using cross-sectional time series data of MENA countries for the period 1985-2009. Empirical results show that income inequality reduces economic growth in the region and increases poverty.

Herzer and Vollmer (2012) examined the long-term impact of income inequality on per capita income for 46 countries in the 1970-1995 period using heterogeneous panel cointegration techniques. Inequality has been found to have a negative impact on income, both as an example and for important subgroups within the sample (developed countries, developing countries, democracies and non-democracies).

Yang and Greaney (2017) studied the long-term and short-term relationship between inequality and growth in four countries (China, Japan, South Korea, and the United States) using the Engle-Granger two-stage ECM approach, in an inequality-growth-redistribution scheme. The estimation results supported the S-shaped hypothesis about GDP per capita for four economies with different starting points. They found a positive causal relationship for China, Japan, and the United States, indicating that increased income inequality promotes economic growth for the opposite relationship. Regarding redistribution, financial redistribution measures have reduced inequality in Japan, while in the other three countries it was seen that it didn't play a significant role. Regarding the per capita GDP-inequality relationship, the study showed that financial redistribution in all countries except China had a negative impact on per capita GDP.

With the increasing inequality in income distribution in the world, inclusive growth debates have entered into the field of public policy. OECD (2014) defines inclusive growth as the redistribution of growth and prosperity in a country to eliminate inequality among the social segments and the creation of equal opportunities. With the tax and expenditure policies and programs as the tools of fiscal policy the redistribution of economic growth among social groups and segments are provided. The use of means to achieve solvency in taxation leads us to discussions about the redistribution function of income attributed to the government. With the increasing tariff structure, people whose income increases as the income increases, they face a higher public obligation. Again, that not to take tax from the minimum income needed to maintain life with the application of the minimum living allowance, taxation with a lower level of labor incomes than capital incomes with the separation theory, certain segments and groups and tax issues exemption in the headings of tax exemption and tax exception have been used to ensure tax justice from the point of payment capacity. The main objective is to provide more equitable distribution of welfare in the economy by means of redistributing income and the means of tax payment capacity used to ensure inclusive growth.

In the study of Anand et al. (2013), it is said that the goal of policy interventions for inclusive growth should be inequality of opportunity due to differences in conditions beyond the control of individuals with growth. In other words, the center of inclusive growth is defined as the reduction of inequalities and absolute poverty. Macroeconomic fundamentals, particularly including macro stability and competitiveness, and structural change including globalization or increased integration into the global trade and financial system, have made debate on inclusive growth even more important. In this sense, macroeconomic stability, the quality of human capital and structural changes are seen as the basis for achieving inclusive growth.

In his study, Stephan Klasen (2010) reviews the current definitions of inclusive growth in the literature and defines inclusive growth as non-discriminatory and disadvantage decreasing

growth that focuses on both process and outcomes. It proposes indicators that can be used to monitor progress in inclusive growth. Klasen (2010), starting from the discussions in the literature, evaluates the increase in per capita income as well as the increase in income of the disadvantaged groups together with the indicators of increase in per capita income and welfare increase in order to that growth can be inclusive and makes recommendations in favor of disadvantaged groups.

Causa et al. (2014) examined the relationship between GDP growth and the increase in income inequality in OECD countries, and the long-term impact of structural reforms on GDP per capita and household income distribution. This study found evidences that different structural reforms have affected inequality in income distribution in some OECD countries during the period 1985-2010. According to the study, reforms that contribute to reducing inequality include competition, reducing regulatory barriers to trade and FDI and increasing job search assistance and training programs.

3. Comparative Analysis of Effects of Redistributive Fiscal Policy on Growth and Productivity

3.1 Method and Data

Income distribution criteria which were formed by using household income surveys were used in this study. Gross household income for a given year is sum of the income generated by all household members through employment or self-employment; income from savings and investments; the amount of private transfers such as gifts or alimony and public transfers such as pensions and social benefits received. Net or disposable income is calculated by deducting private transfers to households, income tax and social security contributions from this sum. This estimation can be expressed by following table. (Jenkins and Van Kern, 2011: 42).

Table 1: Redistribution and Income Inequality Accounting

Components of Income	Redistribution Effect and Income Inequality
Gross wages and salaries + Self-employment Income + Cash property income + Professional and Private Pension Income + Private Transfers + Other cash income = Primary Income	Income Inequality Before Taxes and Social Transfers
+ Social Security Cash Benefits	-/- Redistribution Effect of Social Transfers
= Gross Income	= Income Inequality Before Taxes
- / - Payroll Taxes or Social Security Contributions -/- Income Taxes	-/- Redistributive Effects of Taxes
= Disposable Income (Secondary Income)	= Inequality of Income after Social Transfers and Taxes (Secondary Income Distribution)

Source: Caminada et al. 2012: 5

The table above can be expressed in a shorter form with the following formula:

Redistribution with taxes and social transfers = Primary income inequality - Disposable income inequality

After calculating primary income and disposable income, a Lorenz curve is derived from a graph showing the cumulative income share versus cumulative population shares. Gini coefficients, which are defined as the ratio of the area between the Lorenz curve and the line of absolute equality to the entire area under the line of absolute equality, can be calculated.

These coefficients obtained for various countries were used as indicators of income distribution inequality in this study. The difference between the gini coefficient representing the primary income distribution and the gini coefficient representing the disposable income distribution is defined as absolute redistribution. The ratio of this difference to the gini coefficient of primary income distribution, is defined as the relative redistribution.

In the study, data of 20 high income countries in the context of core countries; and 16 middle-income countries in the context of periphery countries between 2003 and 2014, as shown in Table 2, are investigated. The classification of countries is based on IMF's GDP per capita

calculations. The countries with the data available we have explained below are included in the paper within the selected time period.

Table 2: Countries Covered and Data Used in the Research

		GDP Growth	Labor Productivity Growth	General Government Expenditures (Percentage of GDP)	General Government Revenues (Percentage of GDP)	Gini Coefficient (Primary Income)	Gini Coefficient (Disposable Income)
Core Countries	Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, New Zealand, South Korea, Spain, Sweden, Switzerland, United Kingdom, United States	Penn World Table 9.0	Penn World Table 9.0	IMF WEO	IMF WEO	SWIID	SWIID
Periphery Countries	Argentina, Brazil, Bulgaria, Chile, Colombia, Hungary, Indonesia, Malaysia, Mexico, Peru, Philippines, Poland, Romania, Russia, South Africa, Turkey	Penn World Table 9.0	Penn World Table 9.0	IMF WEO	IMF WEO	SWIID	SWIID

Gini coefficients related to primary and disposable income distribution used in the study were obtained from August 2018 version of The Standardized World Income Inequality Database (Solt, 2016). Data on public expenditures and revenues are obtained from the April 2018 edition of the IMF World Economic Outlook Database.

Data on growth rates were calculated by data obtained from Penn World Table 9.0 (Feenstra et al., 2015). Productivity growth data is also calculated as the percentage change of GDP per hour worked by using data obtained from Penn World Table 9.0. First, the total number of hours worked in a year is calculated by using the total number of employees and the average annual working hours in the table. Then, the total working hours are proportioned to the real GDP calculated for that year. It is assumed that the annual percentage change in GDP per hour worked calculated by this method gives us the change in labor productivity. Percentage change in labor productivity for South Africa for 2003 cannot be calculated by using Penn World Table 9.0

because of unavailable data in table. Instead, OECD's calculation for 2003 is used for South Africa.

TWH_t shows total working hour in year t, emp_t shows number of employees in year t, avh_t shows average annual hours worked by an employee in year t, GDP_t shows gross domestic product in year t. $GDPPHW_t$ shows GDP per hour worked in year t, $prod_t$ shows labor productivity growth. And it is calculated as follows;

$$TWH_t = emp_t \times avh_t \quad GDPPHW_t = \frac{GDP_t}{TWH_t}$$

$$prod_t = \frac{GDPPHW_t - GDPPHW_{t-1}}{GDPPHW_{t-1}}$$

Other fiscal policy variables such as tax revenues, public investment expenditures, public transfers and education expenditures, as a subcategory of government revenues and expenditures, could not be included due to data availability concerns specifically arising from the periphery countries.

3.2 Models and Findings

In this study, the level of effectiveness and efficiency of the fiscal policies and income distribution on the on GDP growth and labor productivity growth were analyzed using dynamic panel data analysis in the context of core and peripheral countries in a comparative framework. System Generalized Method of Moments is used as dynamic panel data technique. The GMM estimation is not only unbiased and consistent, but also an effective estimator. The method was first described by Holtz-Eakin et al. (1988) and later developed by Arellano and Bond (1991). System-GMM firstly suggested by Arellano and Bover (1995) and then developed by Blundell and Bond (1998) by eliminating the shortcomings of difference-GMM estimations. Blundell and Bond (1998) indicate that "In dynamic panel data models where the autoregressive parameter is moderately large and the number of time series observations is moderately small

(...) linear generalized method of moments (GMM) estimator obtained after first differencing has been found to have large finite sample bias and poor precision in simulation studies” (Blundell and Bond, 1998:115). This is due to the fact that lagged levels of the series are weak estimators for the first differences. (Blundell and Bond, 1998:116) System-GMM estimator augments difference-GMM estimator “by making an additional assumption that first differences of instrument variables are uncorrelated with the fixed effects” (Roodman, 2009a:86). This approach lets using more instruments and enables more efficient estimation.

According to Roodman (2009a:86) GMM estimation is designed for the following situations;

- “Small T, large N” panels, meaning few time periods and many individuals
- A linear functional relationship with a dependent variable that is dynamic, depending on its own past realizations
- Independent variables that are not strictly exogenous
- Fixed individual effects; and
- Heteroskedasticity and autocorrelation within individuals but not across them

In the dynamic panel data models “dynamic relationships are characterized by the presence of a lagged dependent variable among the regressors” (Baltagi, 2003:135) Within the scope of the study, this relationship was tested using the following equations for both core and periphery countries. The results of the analysis were evaluated in the context of fiscal policy.

$$g_{it} = \alpha + \beta_1 g_{it-1} + \beta_2 \text{expn}_{it} + \beta_3 \text{rev}_{it} + \beta_4 \text{gini_mkt}_{it} + \beta_4 \text{gini_disp}_{it} + u_{it}$$

(1)

$$g_{it} = \alpha + \beta_1 g_{it-1} + \beta_2 \text{expn}_{it} + \beta_3 \text{rev}_{it} + \beta_4 \text{rel_red}_{it} + u_{it}$$

(2)

$$\text{prod}_{it} = \alpha + \beta_1 \text{prod}_{it-1} + \beta_2 \text{expn}_{it} + \beta_3 \text{rev}_{it} + \beta_4 \text{gini_mkt}_{it} + \beta_4 \text{gini_disp}_{it} + u_{it}$$

(3)

$$prod_{it} = \alpha + \beta_1 prod_{it-1} + \beta_2 expn_{it} + \beta_3 rev_{it} + \beta_4 rel_red_{it} + u_{it}$$

(4)

g_{it} denotes the GDP growth rate, $prod_{it}$ shows the labor productivity growth. $expn_{it}$ is general government expenditures as a percentage of GDP. rev_{it} is general government revenues as a percentage of GDP, $gini_mkt_{it}$ is gini coefficient of primary income distribution. $gini_disp_{it}$ is gini coefficient of disposable income distribution. And rel_red_{it} is relative redistribution as the percentage change between gini coefficient of primary income distribution and gini coefficient of disposable income distribution.

Model (1) and Model (3) investigate the effects of the general government expenditures as a percentage of GDP, the general government revenues as a percentage of GDP, gini coefficient of primary income distribution, and gini coefficient of disposable income distribution on GDP growth and labor productivity for core and periphery countries. Model (2) and Model (4) examine the effects of the general government expenditures as a percentage of GDP, the general government revenues as a percentage of GDP, and relative redistribution on GDP growth and labor productivity for core and periphery countries.

Consistency of GMM estimators depend on the two assumptions. One of the assumptions is that the selected instrumental variables are external. If the estimation is fully identified, it will be impossible to detect invalid instrumental variables. “But if the model is overidentified, a test statistic for the joint validity of the moment conditions (identifying restrictions) falls naturally out of the GMM framework” (Roodman, 2009a:97). Instrumental variables selected in the system GMM method are related to the dependent variable. But there should not be any relation between the error term and dependent variable. There are two tests that can be used to test this assumption. (Sargan, 1958) and (Hansen, 1982) J tests are two alternative tests that examine whether the instrumental variables in the model are external variables or not. The null

hypothesis is the same for both. The null hypothesis for the externality of instrument variables should be accepted for a valid model.

Sargan test produces biased results in the presence of heteroscedasticity and autocorrelation. Hansen J test, although it is heteroscedasticity and autocorrelation consistent, produces biased results if the number of instrumental variables increases. When the number of instrumental variables approaches the number of observations, the Hansen J test statistic weakens and the probability value tends to deviate towards one. (Roodman, 2009a:98) For our models Hansen J test seems to be more suitable, because models are questionable in terms of autocorrelation and heteroscedasticity.

Another assumption is that the error terms in the first difference equation do not have a second or higher order of autocorrelation. The presence of autocorrelation indicates that the lagged values of the dependent variable are internal or the instrumental variables are not external. Arellano and Bond (1991) produced a test to examine the presence of autocorrelation in GMM estimation. The test applies an autocorrelation test to the error terms of the primary difference equation. Due to the structure of the dynamic panel and GMM estimator, first order autocorrelation is expected in the model. Since the GMM estimator contains information of first order autocorrelation, it does not cause any problems in terms of reliability of results. However, there should not be second order autocorrelation in the model.

In the estimation, numbers of instrumental variables are reduced by using collapsed matrices and “only certain lags instead of all available lags for instruments” (Roodman, 2009b:148). Year dummies are used for growth related models for core countries to prevent second order autocorrelation. Results are presented below.

Table 3: Results of Growth Models

	First Model		Second Model	
	Core	Periphery	Core	Periphery
L1.growth	0.1349534	0.1661055	0.1393524	0.1666819

	(0.1051403)	(0.1691848)	(0.1115382)	(0.1663124)
expn	-0.1347701** (0.0554675)	-0.7003659** (0.2963533)	-0.126287** (0.0627756)	-0.7085713** (0.2989466)
rev	0.0559221 (0.0706474)	0.668067*** (0.2458981)	0.0582172 (0.0715281)	0.6546313*** (0.2355467)
gini_disp	-0.0015913 (0.03789)	-0.06071 (0.1858873)		
gini_mkt	0.0060476 (0.0295798)	0.0685152 (0.1655825)		
rel_red			0.001989 (0.0091591)	0.0423623 (0.0985355)
cons	0.0494608 (0.0593085)	0.0470109 (0.0520789)	0.0270826 (0.0485831)	0.0554239 (0.0372085)
Year Dummies	Yes	No	Yes	No
Number of Observations	220	176	220	176
Number of Groups	20	16	20	16
Number of Instruments	22	15	21	14
AR (1) Arrellano-Bond Autocorrelation Test	-3.71	-2.08	-3.72	-2.08
	0.000	0.038	0.000	0.037
AR (2) Arrellano-Bond Autocorrelation Test	-1.25	-1.30	-1.18	-1.30
	0.212	0.194	0.238	0.195
Sargan Test of Overidentification	3.55	13.62	3.47	13.71
	0.470	0.136	0.483	0.133
Hansen Test of Overidentification	4.19	12.99	4.66	12.71
	0.381	0.163	0.324	0.176

*** Significant at 0.01 level; ** Significant at 0.05 level; * Significant at 0.10 level

As shown in Table 3 above AR (2) Arrellano-Bond autocorrelation test results for GDP growth related models suggest that there are not second order autocorrelation in models. Results of Hansen test of overidentification for all growth related models suggest that null hypothesis cannot be rejected, overidentification restrictions are valid and instruments are appropriate.

P values of government expenditures in first model for both country groups are statistically significant at .05 level. And p value of government revenues in the first model for periphery countries is statistically significant at .01 level. Ceteris paribus, for a 1% increase in government expenditure as a share of GDP, GDP growth rate decreases 0,13% in core countries; 0,70% in periphery countries. For a 1% increase in government revenues as a share of GDP, GDP growth rate increases 0,66% in periphery countries; holding all other variables constant. And variables that are related with income distribution are not statistically significant.

The results confirm the crowding-out effect of government expenditures for both country groups. In the periphery countries this effect significantly higher than core countries. But a prudent policy mix that does not increase the budget deficit can significantly eliminate this effect in the periphery countries. If government expenditures rise at the same rate as government revenues, the crowding-out effect will be 94% less for periphery countries.

P values of government expenditures in second model for both country groups are statistically significant at .05 level as well. And p value of government revenues in the second model for periphery countries is statistically significant at .01 level. And variables that are related with income distribution are not statistically significant for both country groups. Ceteris paribus, for a 1% increase in government expenditures as a share of GDP, GDP growth rate decreases %0,12 in core countries; %0,70 in periphery countries. For a 1% increase in government revenues as a share of GDP, GDP growth rate increases 0,65% in periphery countries; holding all other variables constant.

The results confirm the crowding-out effect of government expenditures for both country groups. In the periphery countries this effect significantly higher than core countries. But a policy mix that does not increase the budget deficit can significantly eliminate this effect. If government expenditures rise at the same rate as government revenues, the crowding-out effect will be %92,8 less for periphery countries. Results of two growth models are consistent for both country groups.

Table 4: Results of Productivity Models

	Third Model		Fourth Model	
	Core	Periphery	Core	Periphery
L1.prod	0.0752828 (0.0790974)	0.0822504 (0.2056875)	0.0760726 (0.0785488)	0.0780882 (0.2107206)
Expn	0.1161303** (0.0458375)	-0.5094911*** (0.1484185)	0.0939254* (0.056592)	-0.4954192*** (0.1502047)
Rev	-0.0128381 (0.1037396)	0.3825086* (0.2057577)	-0.0434131 (0.0853194)	0.3583042* (0.2093595)
gini_disp	0.0888511 (0.0923129)	-0.2369274 (0.1598597)		
gini_mkt	0.0253767 (0.0454565)	0.1391293 (0.1317125)		

rel_red			-0.0111182 (0.0154616)	0.1186654 (0.0872544)
cons	-0.0749839 (0.0857477)	0.0998519** (0.0510331)	-0.0101812 (0.0491385)	0.0547327 (0.0392958)
Year Dummies	No	No	No	No
Number of Observations	220	176	220	176
Number of Groups	20	16	20	16
Number of Instruments	15	15	17	14
AR (1) Arrellano-Bond Autocorrelation Test	-3.02	-1.91	-3.00	-1.87
	0.003	0.057	0.003	0.062
AR (2) Arrellano-Bond Autocorrelation Test	-1.75	-0.16	-1.81	-0.17
	0.080	0.876	0.070	0.864
Sargan Test of Overidentification	31.01	7.55	37.05	7.84
	0.000	0.580	0.000	0.551
Hansen Test of Overidentification	13.39	8.29	13.82	7.87
	0.146	0.506	0.312	0.547

*** Significant at 0.01 level; ** Significant at 0.05 level; * Significant at 0.10 level

As it seen in Table 4 above AR (2) Arrellano-Bond autocorrelation test results for productivity related models suggest that there are not second order autocorrelation in models. Results of Hansen test of overidentification for all productivity related models suggest that null hypothesis cannot be rejected, overidentification restrictions are valid and instruments are appropriate.

For core countries, p value of government expenditures in the third model is statistically significant at .05 level. For periphery countries it is statistically significant at .01 level. And p value of government revenues in the third model for periphery countries is statistically significant at .10 level. And variables which are related with income distribution are not statistically significant for both country groups.

Ceteris paribus, for a %1 increase in government expenditure as a share of GDP, labor productivity growth rate increases %0,12 in core countries; and decreases %0,50 in periphery countries. For a %1 increase in government revenues as a share of GDP, labor productivity growth rate increases %0,38 in periphery countries; holding all other variables constant.

The results confirm the productivity reducing effect of government expenditures for periphery countries. But if government expenditures rise at the same rate as government revenues, the effect will be %76 less for periphery countries. But for core countries, the effect of government expenditures on the productivity growth is in contradiction with periphery countries.

For core countries, p value of government expenditures in fourth model is statistically significant at .10 level. For periphery countries it is statistically significant at .01 level. And p value of government revenues in the fourth model for periphery countries is statistically significant at .10 level. And variables that are related with income distribution are not statistically significant.

Ceteris paribus, for a %1 increase in government expenditure as a share of GDP, labor productivity growth rate increases %0,09 in core countries; decreases %0,49 in periphery countries. For a %1 increase in government revenues as a share of GDP, labor productivity growth rate increases %0,35 in periphery countries; holding all other variables constant.

The results confirm the productivity reducing effect of government expenditures for periphery countries. But if government expenditures rise at the same rate as government revenues, the effect will be %71 less for periphery countries. For core countries, the effect of government expenditures on the productivity growth is in contradiction with periphery countries.

Following table 5 shows summary of the significant and non-significant results of the models.

Table 5: Summary Table of the Results

	Core Countries					Periphery Countries				
	Exp	Rev	Gdis	Gmrk	Relred	Exp	Rev	Gdis	Gmrk	Relred
1 st Model	(-)**	ns	ns	ns		(-)**	(+)***	ns	ns	
2 nd Model	(-)**	ns			ns	(-)**	(+)***			ns
3 rd Model	(+)**	ns	ns	ns		(-)***	(+)*	ns	ns	
4 th Model	(+)*	ns			ns	(-)***	(+)*			ns

*** p<0.01, ** p<0.05, *p<0.1

When we evaluate the model results as follows:

- It is seen that the effect of public expenditures and revenues on growth differ between two groups of countries.
 - For core countries, negative effect of public expenditures on GDP growth significantly smaller than periphery countries that indicates the responsiveness of

public policies is relatively higher in the second group. It also shows that the budget balance is more pronounced and significant in the periphery countries comparing to the core countries.

- For core countries, there is not any statistically significant effect of public revenues on GDP growth, but for periphery countries effect of public revenues on GDP growth is significant and positive.
- The effects of public expenditures and revenues on labor productivity are in contradiction significantly for two groups of countries.
 - While the effect of public expenditures on labor productivity is positive for core countries, it is negative for periphery countries. It shows that role of public spending more productivity-friendly in core countries.
 - For core countries there is not any statistically significant effect of public revenues on labor productivity, but for periphery countries effect of public revenues on labor productivity is significant and positive.
 - In the periphery countries, the effect of spending and revenues on growth and productivity is similar between two models in which there is differentiation with core countries.
 - Responsiveness of public expenditure policies is higher while budget balance is more pronounced and significant in the periphery countries.
- Variables that are related to the distribution or redistribution of income (gini coefficients and relative redistribution) do not have statistically significant effect on GDP growth and labor productivity in two models. The change in income inequality does not have a significant impact on GDP for both groups of countries as well.

4. Conclusion

This study examines the effect of income inequality, government expenditure and revenues on growth performance and labor productivity for both periphery and core countries to see any statistically significant relationship.

The first conclusion is that the impact of inequality on growth and productivity is not found statistically significant in periphery and core countries. In particular, measuring income inequality both the data quality and standardization over time and the degree of reliability among countries could require developing static models instead of dynamic models with more variables in this regard.

The higher negative impact of public spending on growth in periphery countries might be considered a problem in the functioning of the policy formulation process which affects the quality and effectiveness of the public expenditure programs with weak accountability mechanisms and corruption issues. Results show that any improvement in the effectiveness and quality of the public expenditure programs through a better and more accountable government budgetary system positively affects the growth performance.

When the study found the negative effects of public expenditures on growth, it is considered that government budget policies should be improved on the basis of a more responsive and inclusive way to create positive results on growth performance. In this sense, it is important to formulate public policies implemented within the government budget in line with sound medium term plans and programs. In the case of core countries, the budget policies need to be reviewed considering low growth performance of the public expenditure programs resulting from demographic and social issues such as aging, increasing health expenditures, expanding social programs.

It is found that the revenues are statistically significant and positive in the periphery countries in both models, because the revenues in these countries may be more sensitive to the economic performance of the market.

The effect of government expenditures on labor productivity differs by country groups. In the core countries increasing government expenditures supports labor productivity while it does not in the periphery countries. In contrast, there is a negative relation between productivity and government expenditures in the periphery countries. It shows that well-designed expenditure programs and budgetary mechanisms in core countries lead to productivity improvements.

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