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The Impact of Fiscal Consolidation on Inequality: The Case of V4 Countries*

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Abstract

The aim of this paper is to provide the first empirical evidence of the impact of fiscal consolidation on income inequality in V4 countries. Although the literature on income inequality and its various determinants is wide, there are still some areas in this topic, where the research is lacking.

Different specifications of models imply that fiscal consolidation in V4 countries leads to an increase in income inequality. Results of our analysis suggest, that fiscal consolidation larger than 2 % of GDP has negative impact on equality in V4 countries, while this effect is stronger than the effects of our control variables – GDP growth, change in total factor productivity (TFP), change in trade openness, mean years of schooling and unemployment. Change in structural balance seems to have no effect on income inequality in the given countries. However, structural balance have surprisingly negative effect. We believe it is due to the structure of our data set, which contains only three observations with positive structural balance.

Keywords: income inequality, fiscal consolidation, V4 countries

JEL-codes: C23, D63, H30, I38

1 Introduction and literature review

Growing disparities between the rich and the poor in the world belong among the biggest problems of the current time. The inequality is growing not just between the countries but also within them. It has huge political, economic and social influence on every country. Nowadays, there are many discussions about the causes and solutions of income inequality. The questions arise whether it is enough if we would concentrate only on the causes of inequality or we should rather look in more detail at the solutions of inequality.

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Based on paper from Roser and Cuaresma (2016) the main drivers of income inequality are technological change, international trade, political institutions and political conditions. The income inequality was higher during the transition from an agricultural to an industrialized economy, since there was a higher demand for high-skilled labor force. This caused increased investments in education that later lowered the resulting gap between the rich and the poor.

The second big impact on the income inequality is the international trade. Based on the Heckscher-Ohlin theorem, which says that the country will export products made from factors that are available in abundance in the economy. It means, that country which is labor abundant will export labor-intensive products and import capital-intensive products. On the other hand, capital abundant country will export capital-intensive products. Since capital-intensive products require more high-skilled labor and labor-intensive products low-skilled labor, international trade deepen the inequality between the countries. The reason is, that the capital abundant countries will outsource the labor-intensive production to the labor abundant countries where there are usually lower wages, so they can concentrate on the production required high-skilled labor force.

According to the authors, the last core driver of the income inequality are the political conditions, institutions and labor market in the countries that have huge effects on the distribution of incomes. The influence of the political forces on labor market structures is remarkable, but unfortunately it is still hard to measure these impacts because of lack of appropriate data.

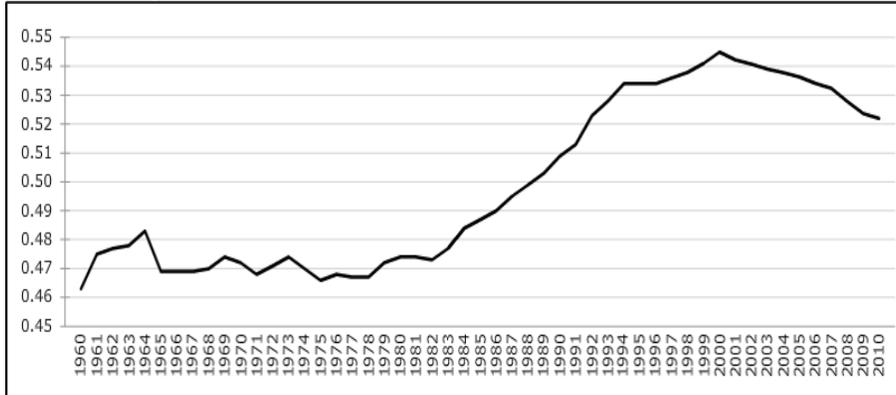
Atkinson (2016) had a similar view about the causes of inequalities. He listed to the main drivers of income inequality also globalization, growth of financial services also changing pay norms. Income inequality may lead to many socioeconomic problems in the countries. For example, it may cause economic instability, crises, may increase debt and also inflation. The more unequal the countries, the higher is the rate of different health and social problems. For example, life expectancy, imprisonments, infant mortality, teenage births and the number of people with mental illness may be higher, while there is lower rate of social mobility and literacy.

In order to find a solution to the problem of income inequality, it is important to find a measure for it. There are a number of methods that allow us to measure income inequality (Atkinson's inequality measure, decile dispersion ration, Theil's index etc.). One of the most popular is the Gini coefficient that is based on the Lorenz curve. The value 1 of the Gini coefficient means complete inequality while 0 perfect equality (Bank (2005)).

Table 1 represents the world inequality from 1960 until 2010. The axe y represents the rate of the Gini coefficient. The inequality between the countries sharply rose from the 1960s until 2000s. Although there is a decline from the year 2000, the inequality between the countries in the world is still enormous with comparison of 1960s.

The higher rate of the Gini coefficient is explained by market forces (increased demand for high-skilled demand etc.) and institutional forces, like different national policies, deregulation or minimum wage rate stagnation (The Conference Board of Canada).

Figure 1: Evolution of World Inequality – Gini coefficient



Source: The Conference Board of Canada, online:

<https://www.conferenceboard.ca/hcp/hot-topics/worldinequality.aspx>.

As it was already mentioned above, inequality may cause debt, whether personal or public. Higher income inequality and also higher public debt are the job of the fiscal policy. Fiscal policy is one of the most powerful weapon of the government in order to decrease the public debt. Fiscal policy plays an important role in the government’s redistributive goals. Using fiscal policy, the policymakers can lower the negative effects of some tax and expenditures policies. It can happen with monetary payments or provision of in-kind benefits (Benedict Clements (2015)).

The impact of the fiscal policy on the income inequality is quite large that led to an increasing interest of researchers in this topic. There are many research papers which are dealing with the effects of fiscal austerity on income inequality.

Mulas-Granados et al. (2005) focused on the short-term economic impact of alternative fiscal adjustments strategies on economic growth and income distribution. Ball et al. (2013) analyzes 17 OECD countries between 1978 and 2009 and examined the distributional effects of fiscal consolidation. The conclusion of his paper is that fiscal consolidation led to a significant and persistent increase in inequality, long-term unemployment and decline in wage income and wage share of income. It is important from the governments to pay attention on the effects of the fiscal consolidation. The potential benefits of the fiscal consolidation must be balanced against his distributional effects.

The results from Woo et al. (2013) show that on average, the fiscal consolidation of one percentage point of GDP is connected with about 0.4 – 0.7 percent increase in the disposable income Gini coefficient over the first two years. They also stated that the unemployment is an important channel through which fiscal consolidation increases inequality. Based on this paper, trade openness tends to relate to lower inequality while education and skill-biased technological progress are related with lower and greater inequality.

Another paper that states that during the fiscal consolidation income inequality is higher is from Agnello and Sousa (2014). They used panel of 18 industrialized economies in the time period 1978-2009. They presented that the income inequality is higher when the fiscal consolidation plans represent only a small share of GDP.

Schaltegger and Weder (2014) analyzed the effects of budget consolidation on income inequality and found out that its impact does not depend on the political power, but on the type of the government. On the other hand, ADB et al. (2016) on the sample of 17 OECD countries found out that the fiscal consolidation cause increased income inequality in the short and medium term.

Most recent analysis provided Heimberger (2018) who analyzed the dynamic effects of fiscal consolidation on income inequality in the short and medium run. He covered 17 OECD countries from 1978 until 2013. His results show that in the short run the Gini coefficient of disposable income increases approximately by 0.4 percentage points and in the medium-run by 0.6 percentage points.

2 Data and methodology

2.1 Econometric model

In this paper, we build our econometric model on existing literature on income inequality. According to existing research papers, there are several determinants of cross-country variations in income inequality. We include these determinants into our model. More on these determinants is found in next subsection.

Our specification of model follows model specified by Woo et al. (2013),

$$\Delta G_{it} = \beta_0 + X'_{it}\delta + \gamma Z_{it} + \eta_t + \psi_i + \epsilon_{it} \quad (1)$$

where ΔG_{it} denotes the change in disposable income-based Gini coefficient in country i and year t , X_{it} is a vector of economic control variables, η_t denotes period fixed effects, ψ_i country specific fixed effect and Z_{it} is the measure of fiscal consolidation. See next subsection for discussion on used variables.

By using interactions, denoted as $Z_{it} * X_{it}$, we also test whether the impact of the fiscal consolidation on income inequality depends on the levels of our control variables.

$$\Delta G_{it} = \beta_0 + X'_{it}\beta + \gamma Z_{it} + \alpha Z_{it} * X_{it} + \eta_t + \psi_i + \epsilon_{it} \quad (2)$$

Several econometric methods were used to estimate the panel regression to control for robustness of results. As our main model we used panel-corrected standard error estimator (PCSE). This approach allows the variance-covariance matrix of the estimates to be consistent when the error terms are heteroskedastic and/or contemporaneously correlated across panels or auto-correlated within panel. (Woo et al. (2013); Beck and Katz (1995))

In addition, we used simple ordinary least squares (OLS) and fixed-effect (FE) panel regression, where we assume different effects on country level. Results of these models are broadly similar.

2.2 Data

Our sample includes data for V4 countries - Slovakia, Czech Republic, Poland and Hungary for time period 1995 - 2015. Since Slovakia and Czech Republic were separated in 1993, it is not possible to cover longer time period separately. This gives us 80 observations in our panel.

Control variables

The vector of control variables X_{it} includes determinants of income inequality consistent with existing literature (mainly by Heimberger (2018)). **Average years of schooling** is considered as one of the key factors influencing income inequality (Woo et al. (2013)). Based on the assumption that trade globalization affects wages for low-skilled labor, we include change in **Trade openness**, measured as change in trade-to-GDP ratio in order to capture the effects of international trade on inequality. We also control for change in **Total Factor Productivity**, as a proxy for effects of technological change on income inequality.

Change in unemployment rate is considered to be related to changes in inequality. A greater share of unemployed workers in OECD countries is in the bottom of income quintile (Martínez et al. (2001)). Therefore increase in unemployment would lead to an increase in income inequality.

We also include **GDP growth**, because decrease in economic activity (which leads to increase in primary balance or debt to GDP ratio) would mean higher chance of fiscal consolidation. Furthermore, change in economic activity also influences population income. Prevailing effect of GDP growth will depend on structure of economy and which income group will benefit from increase in inequality: high-income or low-income employees.

Measures of fiscal consolidation

There are two main approaches in the existing literature for estimating impact of fiscal consolidation on inequalities (Heimberger (2018); Yang et al. (2015)). *Conventional approach* is based on calculating and looking at changes in cyclically-adjusted fiscal data. Second approach, named as *narrative*, assumes that fiscal consolidation episodes are identified from budget documents or policy papers.

Problem with the conventional approach is, that changes in cyclically-adjusted fiscal data might not only reflect the policymakers desire to cut the fiscal deficit. Carnot and De Castro (2015) claims, that persistent but non-permanent variations in asset prices or changes in the composition of growth can generate shifts in revenues that are incorrectly identified as structural developments. This can lead into misleading computation of structural balance.

Consolidation episodes defined from budget documents (narrative approach) may not be always accurate proxy for estimating impacts on inequality. Implementing of fiscal policy could be different than one claimed in approved budget (different motivation ex-post and ex-ante). Another (or sometimes related) challenge is information sufficiency in budget documents.

Based on Open Budget Index, developed by International Budget Partnership, V4 countries do not belong between countries with exhaustive information. Another fact is, that these countries in given period performed relatively non-binding medium-term budgetary framework. It means, that their plans may vary year-on-year and even during the year.

We used three different variables as proxy for fiscal consolidation measure to capture different possible effects on inequality. In our first specification of model, we assume that fiscal consolidation starts only if there is change in structural balance equal or greater than 2 % of GDP. **Dummy variable, where 1 indicate year where decrease in primary balance is larger than 2 % of GDP** and 0 otherwise. We assume, that such improvement in structural balance should reflect the start of fiscal consolidation in given country. Lower improvements could be assigned to fluctuations in economic cycle and have only small effects on inequality. There is wide range of criteria of the change in the improvement of structural balance in existing literature (see Yang et al. (2015) for list of studies and definitions). Alesina and Perotti (1995) and Alesina and Ardagna (2010) considered the change is at least 1.5 %p of GDP in 1 year, while in Alesina and Ardagna (1998) the change is at least 2 %p of GDP in 1 year or at least 1.5 %p of GDP in both 2 consecutive years. In our dataset there are not 2 consecutive years where the change is at least 1.5 %p of GDP, therefore we applied 2 %p change criterion.

Second measure is **structural balance**, to capture overall effects of fiscal policy on income inequality. Third measure is **change in structural balance**. These measures enable us to control not just the impact of fiscal consolidation, but also overall effects of the fiscal policy.

For summary of relevant possible approaches of the analysis on the link between fiscal consolidation and income inequality see Heimberger (2018).

3 Empirical results

3.1 Income inequalities in V4 countries

V4 countries experienced frequent and significant fluctuations during 1995-2015, both in income inequality (measured as disposable Gini index) and in structural balances as a share of GDP. We plot evolution of disposable Gini index and change in structural balances for each country in Figure 2. Improvement in primary balance greater than 2 %p of GDP is in yellow colour.

We used disposable Gini coefficients, since we are interested in changes in income inequality after taxes and transfers (disposable income). Also SWIID database ensures that data across countries are harmonized.

Gini coefficients lay between 0 - total equality, where everybody receives the same share of income, and 100 - total inequality, where one individual receives all the income. The average Gini is 27.6 in V4 countries between 1995 and 2015. The lowest rate of the Gini coefficient was in Slovakia in 1995. The Gini was 22.9. On the other hand, the highest Gini coefficient was in Poland - 32.9 - and

it was in 2005.

Slovakia experienced increase in disposable Gini index from level below 23 (the lowest level from V4 countries) to almost 28 in 2003. From that year, there was a decrease in inequality until 2008 - probably thanks to robust economic growth. After that we can see the impact of recession that started in 2009. Gini declined to 24.8 in 2015, which is still the lowest between V4.

In **Czech Republic** we can see similar evolution as in Slovakia - increase in the income inequality after 1995, but not as dramatic. Also deviations in primary balance were not so large. The largest income inequality was recorded between 2004 and 2005, with Gini 25.9.

There were relatively stable situation in the **Hungary** - without significant fluctuations in inequalities until 2003. In the next period, Hungary experienced decrease and again an increase in income inequality with recession in 2009. Together with Slovakia, we can observe the most frequent fiscal consolidations during observed period from V4 countries (5).

Poland performed only one fiscal consolidation episode in the given period. Despite of that, we can observe that Poland experienced several fluctuations in disposable Gini index. Poland both started and ended selected period (1995-2015) with the highest Gini index among V4 countries - 31.6 and 30.2 respectively.

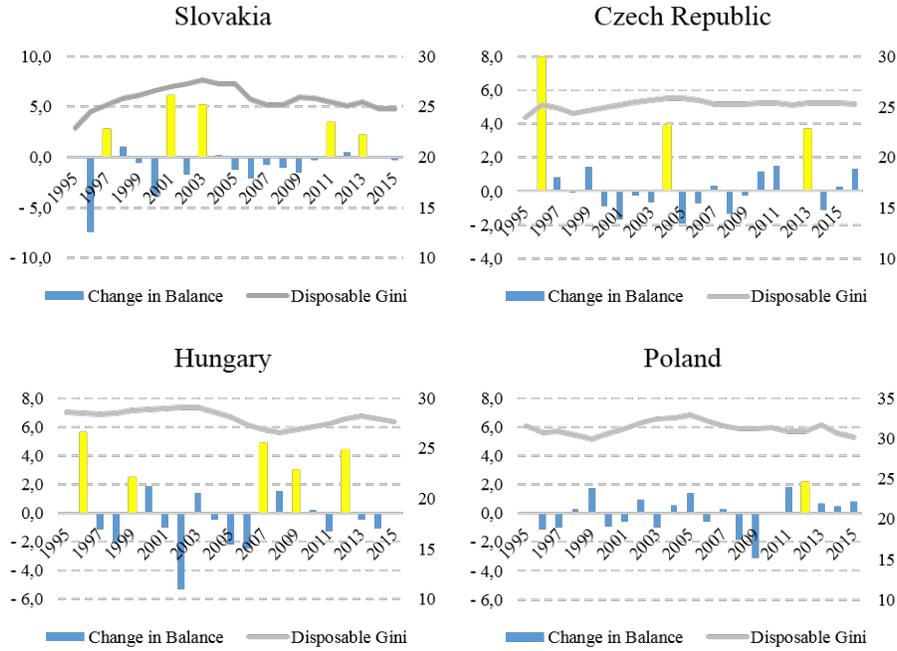
Simple descriptive statistics imply, that fiscal consolidation (measured as change in structural balance larger than 2 pp.) can have different distributional effects in countries. For example, Slovakia and Hungary experienced 5 fiscal consolidation episodes, but had fewer changes in disposable Gini than Poland, where performed only 1 consolidation episode but recorded more changes in inequality. Fiscal consolidation can have different effects on inequality during different levels of unemployment (or trade openness, or education etc.). We will test this with model with interaction terms. Another explanation could be that in some countries also small change in structural balance could have relatively significant impact.

3.2 Impact of fiscal consolidation

Results of all specifications of models, but mainly PCSE and FEM, are relatively similar. They provide similar direction (sign) and volume of fiscal consolidation effect on income inequality. They differ mainly on significance, however PCSE seems to provide the best results.

Results from general models (without fiscal consolidation measures) are reported in Table 1. Only change in trade openness and unemployment rate have significant effect on income inequality. Increase in unemployment leads to increase in inequality, as expected. Negative, significant but relatively small effect has in V4 countries also the change in trade openness. In model 3, GDP growth has significant, but surprisingly positive effect on income inequality. This results suggest that high-income inhabitants benefit more from increase in economic ac-

Figure 2: Gini index and change in primary balance in V4 countries



Source: SWIID database and Eurostat

tivity. Increase in economic activity thus results into higher inequality in given countries.

Total Factor Productivity and Mean years of schooling have insignificant impact on income inequality in V4 countries. It seems, that all effects is taken by period fixed effect. Before including this variable, variables for TFP and schooling were significant.

Results from panel-corrected standard error estimator (PCSE), which we consider as our main model, are reported in the Table 2. Models 4 and 5 include dummy for year where change in structural balance was equal or greater than 2 %p of GDP. Models 5 and 6 include Structural balance, and 8 and 9 Change in structural balance.

As expected, the results suggest that fiscal consolidation larger than 2 %p of GDP has negative impact on inequality in V4 countries. Moreover, this effect is stronger than the effects of our control variables, where fiscal consolidation increases inequality by 0,17 percent. However, consolidation has impact only in the given year. After one year of improving balance by more than 2 %p of GDP has no significant influence on income inequality (model 5 with lag in consolidation).

Models 6 and 7 include Structural balance to measure an overall impact of fiscal policy on inequality. The results suggest that positive structural balance

Table 1: General models without fiscal consolidation measures

VARIABLES	(1) FEM	(2) OLS	(3) PCSE
GDP growth rate	0.0763 (0.0473)	0.00155 (0.0402)	0.0730* (0.0399)
Change in TFP	-0.0853 (0.0596)	-0.0269 (0.0563)	-0.0824 (0.0502)
Mean years of schooling	0.162 (0.133)	0.204** (0.0960)	0.165 (0.108)
Change in Trade Openness	-0.0165** (0.00678)	-0.0128* (0.00689)	-0.0178*** (0.00544)
Unemployment rate	0.0567*** (0.0201)	0.0139 (0.00944)	0.0555*** (0.0193)
Constant	-1.669 (1.265)	-2.637** (1.206)	
Observations	80	80	80
R-squared	0.678		0.693

Standard errors in parentheses

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

lead to decrease in income inequality. It means, that decrease in government expenditures can lead to decrease in income inequality in V4 countries. Same applies for decrease in revenues - for example due to lower taxes. These channels could have different effects on income inequality in our countries and could be interesting to investigate in the future. This negative effect of structural balance on income inequality is stronger and more significant with one year delay. However, there were only 3 observations with positive structural balance during observed period. Slovakia, for example, never experienced balanced budget. It could be an explanation to negative effect of structural balance on income inequality.

In our specification of the model, change in structural balance (models 8) seems to have no impact on change in income inequality, even with one year lag (model 9).

3.3 Different impact of fiscal consolidation for different economic conditions in V4 countries

Except for studying of impact of fiscal consolidation on inequalities, we would also like to examine impact of fiscal consolidation for different levels of economic conditions. The idea is that fiscal consolidation could have different impact on inequality when there is already high unemployment in economy. Or if there is

decrease in economic activity and therefore decrease in GDP growth. Therefore we included interaction terms, which assumes that effect of independent variable on dependent variable depend on other independent variable. Models with interaction between consolidation measure and control variables are reported in Table 3 (models 10-14).

In our specification of model, increase in GDP growth during fiscal consolidation leads to higher increase in inequality, since interaction term is in same direction than direct effect of GDP growth. Therefore with higher GDP growth during consolidation V4 countries will experience increase in inequality. (model 10) Change in TFP has positive direct but negative interaction effect. (model 11). Therefore effect of the change in TFP on income inequality will be canceled out by consolidation.

Interactions for mean years of schooling in model 12 is in opposite direction than direct effect of consolidation. Negative effect of interaction would prevail in this case. The higher the mean years of schooling during consolidation, the lower impact of fiscal consolidation.

Change in trade openness has relatively very low and insignificant effect in interaction term. Direct negative effect would prevail during consolidation period. Therefore increase in trade openness will decrease income inequality during consolidation. Model 13 captures this effect.

Unemployment rate seems to have neutral effect on income inequality during fiscal consolidation. Positive direct effect is canceled by negative interaction term. (model 14)

4 Conclusion

Aim of this paper was to extend existing literature on impact of fiscal consolidation on income inequality in V4 countries - Slovakia, Czech Republic, Hungary and Poland. Until now, this effects were not studied in these countries. We followed existing methodology and examine this impact in V4 countries. The goal of this paper was to open the discussion about the income inequality in V4 countries. We believe, that this paper represents the first attempt to shed a light on this topic. The research paper may be a solid starting point for the next research and next papers would be able to build on our findings.

Different specifications of models imply that fiscal consolidation in V4 countries lead to increase in income inequality. Results of our analysis suggest, that fiscal consolidation larger than 2 %p of GDP has negative impact on inequality in V4 countries, while this effect is stronger than effect of our control variables – GDP growth, change in TFP, change in trade openness, mean years of schooling and unemployment.

Change in structural balance seems to have no effect on income inequality in given countries. However, structural balance have surprisingly negative effect. It would mean, that positive structural balance (that country would spend less than it collects) would lead into decrease in income inequality. These results are counter-intuitive, but we believe it is due to structure of our data set, which

contains only three observations with positive structural balance.

Fiscal consolidation may have different impact on the inequality in the countries with high rate of unemployment. The situation is the same when there is a decrease in economic activity and therefore decrease in GDP growth. This is the reason, why we included interaction terms, which assume that effect of independent variable on dependent variable depend on other independent variable. However, results from these models are ambiguous. Interaction effect is canceled out by direct effect in models with change in TFP and unemployment rate. Higher GDP growth during consolidation leads to higher inequality. On the other hand, the higher levels of mean years of schooling and trade openness could decrease impact of fiscal consolidation on income inequality.

In our paper we used simply and straightforward measure of fiscal consolidation. We assume that fiscal consolidation is in place, if structural balance improved by 2 pp or more. For the future research, it would be interesting to have a closer look at other different effects of the fiscal consolidation on the income inequality.

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Appendix A

Table 2: Impact of fiscal consolidation on disposable income Gini coefficient

VARIABLES	(4)	(5)	(6)	(7)	(8)	(9)
GDP growth rate	0.06 (0.04)	0.07* (0.04)	0.09** (0.04)	0.09** (0.04)	0.07* (0.04)	0.05 (0.04)
Change in TFP	-0.06 (0.05)	-0.08* (0.05)	-0.09* (0.05)	-0.07 (0.05)	-0.07 (0.05)	-0.08 (0.05)
Mean years of schooling	0.16 (0.10)	0.16 (0.11)	0.15 (0.11)	0.16 (0.10)	0.17 (0.11)	0.3*** (0.12)
Change in Trade Openness	-0.02*** (0.01)	-0.02*** (0.01)	-0.02*** (0.01)	-0.02*** (0.01)	-0.02*** (0.01)	-0.01** (0.01)
Unemployment rate	0.05*** (0.02)	0.06*** (0.02)	0.07*** (0.02)	0.07*** (0.02)	0.05*** (0.02)	0.05*** (0.02)
Dummy consolidation	0.17* (0.10)					
Dummy consolidation (t-1)		0.04 (0.09)				
Structural balance			-0.03* (0.02)			
Structural balance (t-1)				-0.04** (0.02)		
Change in balance					0.02 (0.02)	
Change in (t-1)						-0.02 (0.02)
Observations	80	80	80	80	80	78
R-squared	0.70	0.70	0.70	0.72	0.69	0.75

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Appendix B

Table 3: Impact of fiscal consolidation on income inequality with interactions

VARIABLES	(10)	(11)	(12)	(13)	(14)	(15)
GDP growth rate	0.05 (0.04)	0.06* (0.04)	0.03 (0.04)	0.06 (0.04)	0.07* (0.04)	-0.10** (0.04)
Change in TFP	-0.06 (0.05)	-0.07 (0.05)	-0.03 (0.05)	-0.06 (0.05)	-0.06 (0.05)	0.08 (0.06)
Mean years of schooling	0.19* (0.10)	0.16 (0.11)	0.22** (0.10)	0.15 (0.11)	0.14 (0.11)	-0.02 (0.06)
Change in Trade Openness	-0.02*** (0.01)	-0.02*** (0.01)	-0.02*** (0.01)	-0.021*** (0.01)	-0.02*** (0.01)	-0.02*** (0.01)
Unemployment rate	0.06*** (0.02)	0.06*** (0.02)	0.05*** (0.02)	0.06*** (0.02)	0.06*** (0.02)	0.05*** (0.02)
Dummy consolidation	0.05 (0.10)	0.18* (0.10)	3.54** (1.42)	0.16 (0.10)	0.71*** (0.26)	0.36 (1.46)
GDP growth*Dummy	0.08*** (0.03)					0.16 (0.12)
Change in TFP*Dummy		0.07** (0.03)				-0.02 (0.13)
Mean y. of school.*Dummy			-0.29** (0.12)			-0.01 (0.12)
Trade openness*Dummy				0.002 (0.01)		-0.03* (0.02)
Unemployment*Dummy					-0.05** (0.02)	-0.02 (0.03)
Constant						-0.13 (0.75)
Observations	80	80	80	80	80	80
R-squared	0.74	0.72	0.73	0.70	0.73	0.53

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1