Fiscal Consolidation and the Distribution of Income: Does the Currency Regime Matter?

Amery Johannes Gülker #761

A Project carried out on the Master in Economics Program, under the supervision of

José A. Tavares

22.05.2016

Abstract

This paper studies whether there are differences in fiscal consolidation's effect on the distribution of income, depending on a countrys currency regime. I find that countries under a fixed currency regime experience lower inequality measured by the Gini coefficient in times of fiscal consolidation when compared to countries with free floating currencies. Limiting the sample to fixed countries, consolidation still tends to lower inequality. The effect is only apparent for small consolidation episodes, larger ones - $> 1\%$ of GDP - show disequalizing effects. Spending cuts and tax hikes both increase the Gini in floating countries and have equalizing effects in fixed countries. Their size matters for fixed countries.

Keywords: Income Inequality, Fiscal Consolidation, Currency Regime, Gini Coefficient

1 Introduction

As the recent financial crisis unfolded, governments' standard response to prevent further dire straits was to increase public spending and thereby stabilize the economy. Expectedly, these spending sprees increased national debt in the majority of crisis struck countries. Shortly after the most toxic part of the crises was endured, public belief - fueled by social contracts such as the 'Maastricht Criteria' and endorsed by academia[1] - was that debt levels had to be lowered; rather sooner than later.

For a government to lower its debt there are two clear cut alternatives: Either lower spending or increase taxes. While these measures of fiscal consolidation have implications on growth and how a country economically recovers, thereby determining the 'economic success' - and a large strand of the literature discusses these dynamics in detail - the aftermath of the crisis also brought about the question of 'cui bono', who benefits and who looses income wise in relative and absolute terms. While the literature seems to have reached consensus that fiscal consolidation, ceteris paribus, increases income inequality, it is time to get deeper into the discussion and unveil how different macroeconomic variables interact with fiscal consolidation, thereby giving policy makers more clear cut advice on how to handle fiscally constrained times.

This paper looks at the interplay of exchange rate regimes and fiscal consolidation onto the distribution of income. Are there observable differences for a country under a fixed exchange rate regime vis vis a country with a

[1] see e.g. the Reinhart-Rogoff Controversy

free floating currency? Does the possibility of devaluing a countries' currency prior to or during times of fiscal consolidation affect the distribution of income differently? Applying this to the recent consolidation phases following the economic crisis, are there differences to the distributional consequences in, say, the Eurozone compared to the US?

Employing a unique dataset on fiscal consolidation episodes in 17 OECD countries ranging from 1978 to 2009 assembled by Devries et al. (2011), this paper attempts to shed further light on the issue. It is organized as follows. Section 2 gives a brief overview on the literature and theoretical aspects when fiscal policy, exchange rates and the distribution of income interact. Section 3 outlines the data, gives summary statistics for a general overview and introduces the applied model. Section 4 presents the regressional results and section 5 concludes.

2 Literature & Theory

Literature on fiscal consolidation and its effect on income inequality, even if growing in recent years, still remains scarce. Most of the empirical and theoretical work on income inequality has focused on income inequality and its interplay with growth. Literature on exchange rates and income inequality, to my knowledge, is close to non-existent, the only contributions trying to assess exchange rates' effect on between-country - not within-country - inequality. This paper will therefore attempt to, for the first time, find empirical connections between these two. As fiscal consolidation is an instrument of fiscal policy, I will very briefly outline theoretical and empirical discussions on fis-

cal policy and its interaction with exchange rates and income inequality. I will then also briefly outline specific work that focuses on the instrument of consolidation.

Fiscal Policy and Exchange Rates: For theoretical considerations on the interplay of fiscal policy and exchange rate regimes a look into your everyday economics textbook can already prove to be worthwhile: The Mundell-Fleming Model, amended by the balance of payments - then better known as the IS-LM-BoP Model[2] - gives some theoretical insight. The model predicts fiscal contractions to be more severe in terms of output for a fixed country, the rationale being the following: Contractionary fiscal policy decreases interest rates due to the decrease in aggregate demand. In a flexible exchange rate regime, the subsequent outflow of capital leads to a depreciation of the currency, thereby slowing down the contractionary effects (assuming the Marshall-Lerner condition[3] to hold, theory predicts the contractionary effect to completely vanish). In a fixed exchange rate regime however, the currency does not depreciated due to the contraction. Monetary policy prevents the interest rate to fall, thereby a new equilibrium with lower output is reached while interest rates remain on the same level. As the model only predicts the notions of GDP (decrease for fixed, stable for floating), interest rates (decrease for floating, stable for fixed) and exchange rates (decrease for floating, stable for fixed), the distributional consequences remain in question.

While Karras (2011) finds evidence that fiscal policy is effective under

[2]Investment - Saving; Liquidity Preference - Money Supply, Balance of Payments

[3]The Marshall-Lernen Condition states that following a devaluation, an economy's balance of payment will only improve if the absolute sum of elasticities of long-term export and import is larger than one

both currency regimes and that fiscal policy in fixed exchange rate regimes tends to be more beneficial - the long run fiscal multiplier being almost a third larger - the distributional consequences in differing currency regimes have not been consider by the literature so far. This paper is an attempt to fill this void and provide some empirical evidence on the distributional effects of consolidation measures in differing currency regimes.

Exchange rate policies and fiscal consolidation together have been discussed by Lambertini and Tavares (2003) in the context of finding determinants for the success of fiscal adjustment. They find that successful fiscal adjustments - defined as the fiscal deficit being zero or negative in the two years following the adjustment - are typically preceded by large nominal exchange rate depreciations.

Fiscal Policy and Income Inequality: Fiscal Policy as a means to influence income inequality has been investigated by the literature for long. Especially advanced countries such as the ones I study with the panel at hand have utilized progressive taxation and redistributive policies to achieve a more equal distribution of income. Woo et al. (2013) and Heshmati and Kim (2014) offer surveys on authors studying the general effects of fiscal policy on income inequality. They all find evidence for an equalizing role of fiscal policy, where changes in taxation tend to have larger distributive effects than altering spending patterns.

Discussion on fiscal consolidation's effect on income inequality has emerged only recently and is still just a small side branch in the increasingly growing literature that covers income inequality and its determinants. With the same panel at hand that I use, Woo et al. (2013), Agnello and Sousa (2014) as

well as Ball et al. (2013) investigate fiscal consolidation's effect on income inequality. They all find income inequality to increase during and after fiscal consolidation. Woo et al. (2013) and Agnello and Sousa (2014) additionally find that tax hikes tend to have equalizing effects while spending cuts increase income inequality. In the analysis of Ball et al. (2013), both variables increase income inequality.

3 Data & Methodology

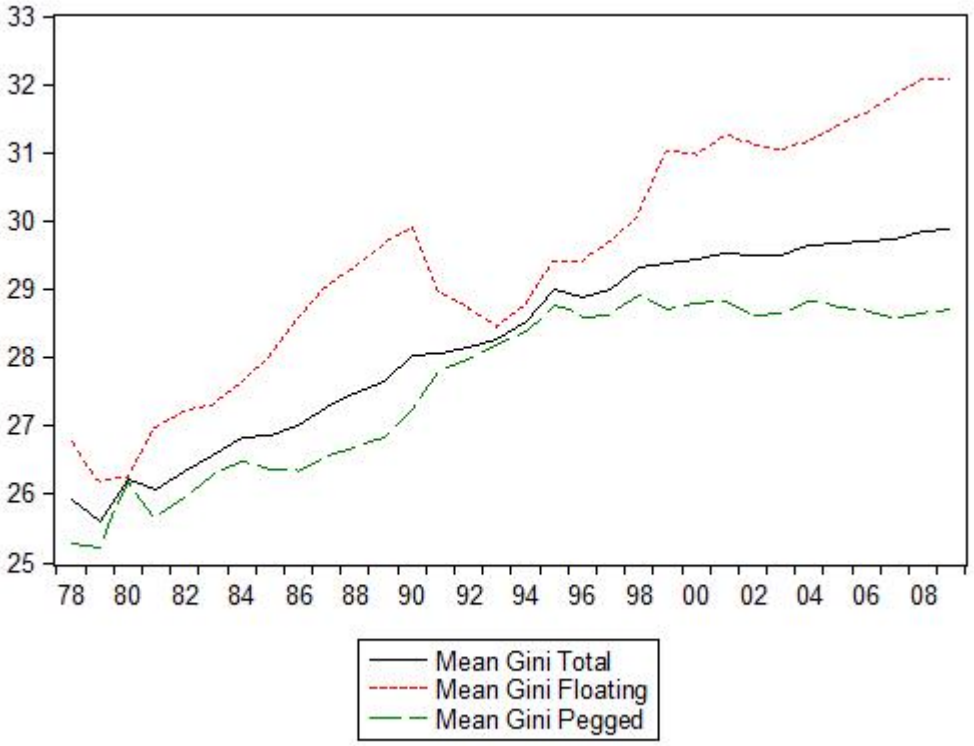
For the empirical analysis, I focus on using control variables that have already been discussed in the income inequality literature. I use annual data for a total of 17 countries [4] over the sample period of 1978 - 2009 which equip my baseline model with a total of 526 observations that construct an unbalanced panel.

Dependent Variable: As my income distribution variable I employ the Gini Coefficient. As a measure of dispersion within an entity/group ranging from 0 to 1- 0 displaying an equal distribution whereas 1 postulates maximal inequality, the Gini coefficient is the most comprehensive index for income inequality and data availability remains highest when compared to other measures. Further, it is common practice in the empirical literture to employ the Gini coefficient in inequality analysis.

The data for the Gini was obtained from the Standardized World Income Inequality Database assembled by Solt (2014). He offers disposable- and market income inequality data, which I both make use of, as I will elaborate

[4] Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Great Britain, Italy, Ireland, Japan, Netherlands, Portugal, Spain, Sweden and the United States

Figure 1: Gin Means over sample period



when laying out my methodological approach below. The Gini enters my regression in logs.

Figure 1 shows the evolution of the mean of the Gini coefficient in the panel at hand, split up into just the fixed countries, the countries with a free floating currency as well as the mean of the complete sample[5]. With the exception of a few decreasing episodes, a clear increasing trend is visible for the sub-samples and the full sample.

The sample mean starts at 25.9 in 1978 and ends up at 29.9 in 2009. On

[5]My classification of a free floating and a fixed country can be found below in the subsection 'Independent Variables'

average, the countries with a fixed currency show a lower Gini coefficient than the countries with a free floating currency throughout the sample period. For the fixed countries the mean throughout the sample period is at 27.74 with a total of 361 observations, for the free floating countries the mean is at 29.07 with a total of 175 observations. Starting off around the samle level in the beginning of the 1980s, the Gini means diverged with the fixed country Gini being lower throughout the sample period. Therefore a negative sign on the Fixed Dummy can be expected. The appendix further shows mean and standard deviation of each group as well as the sample.

Independent Variables For control variables, I use a number of macroeconomic indicators that have been associated with income inequality. I closely follow Woo et al. (2013) in their choice of variables to allow comparability:

GDP per capita and its squared term: To control for income's effect on income inequality and also test for the much discussed Kuznets hypothesis[6], I add GDP per capita as well as its squared term.

Openness: I include an openness variable, measured as Imports + Exports as a share of GDP, to control for globalization's impact on inequality. Most authors studying inequality have used this or an equivalent measure as a proxy of globalization's impact on inequality. Santos-Paulino (2012) offers a thorough survey on evidence how trade may affect income inequality and poverty. Data for this variable is taken from the OECD.

Education: As earlier papers have found education to be highly associ-

[6]In his seminal paper, Kuznets (1955) argues that income inequality and per capita GDP follow an inverse U relationship

ated with the evolution of inequality, I follow Barro's (2000) seminal work as well as Woo et al. (2013), applying the average number of years of secondary schooling as my education variable.

The Barro and Lee (2013) dataset offers the most comprehensive source of educational data, yet they provide figures in 5-year intervals. To be able to include education as a control variable without loosing too many observations, I regressed education onto a time variable and a squared term of the time variable and then took the fitted values as my education variable. This allows for yearly observations while holding the errors to a minimum. The average fit over all countries within the panel is at $R^2 = 0.975$.

General government debt as a share of GDP: Since Consolidation measures become apparent once a country runs too high a level of debt, I add government debt as a share of GDP as a control variable. Data is taken from the OECD.

Currency Regime: To identify a country as being either pegged or free floating, I made use of the database assembled by Ilzetzki, Reinhart and Rogoff (2010), who offer an extensive overview over currency regimes. In their coarse database they sort a total of 201 countries over a time span of up to 70 years into one of five categories. [7] Categorizing the countries ended in a total of 369 episodes with pegs and 175[8] episodes without pegs. In this

[7]The categories used by Ilzetzki, Reinhart and Rogoff are: No separate legal tender, crawling peg, crawling band that is within '+/- 2% and +/- 5%', free floating, and free falling. To construct my dummy variable that takes the value 1 when a country is pegged and 0 otherwise, I classified no separate legal tender, crawaling peg and crawling band that is within +/- 2% and +/- 5% as a peg, and free floating and free falling as no peg.

[8]Countries that remain free floating throughout the observation period are Great Britain, Japan, the United States and Sweden. Australia remains free floating for 17 years

paper I am referring to countries that fall under my 'pegged' definition as either pegged or fixed countries, while the second group I refer to as floating or unpegged countries.

Consolidation Episodes: I use the action-based dataset assembled by Devries et al. (2011) to identify episodes of fiscal consolidation. Unlike prior studies on fiscal consolidation that for identification of consolidation episodes looked at increases of the cyclically-adjusted primary budget balance (CAPB), Devries et al. (2011) use a historical approach. According to the authors, the CAPB approach runs the risk of (i) "capturing measurement errors that are likely to be correlated with economic development" and, (ii) changes in fiscal policy "can be motivated by a desire to respond to cyclical fluctuations, raising reverse causality concerns". Therefore, Devries et al. (2011) analyzed policy documents such as central bank reports, budget reports or budget speeches to get a grip on policy makers' intentions. Based on these sources the authors set up a database covering the above-mentioned 17 countries over the time span of 1978 to 2009 with a total of 173 annual consolidation episodes, split into tax hikes and spending cuts. The initial database offers the size as a share of GDP of each consolidation episode.

Consolidaton/Currency Interaction Term: To get a closer look on consolidation periods in differing currency regimes, I construct an interaction term of the currency regime dummy and consolidation dummy which takes the value 1 when consolidation occurred and 0 otherwise. This interaction term will allow to see whether there are differences in the Gini of consolidating and fixed countries, compared to the complete sample. The pairing of Consolidation and the Fixed Dummy results in a total of 120 interaction

Table 1: Control Mean

Statistic	1978-1989	1990-1999	2000-2009
GDP per capita Pegged	21591	28790	35852
GDP per capita Floating	22240	31596	37972
Education Pegged	2.46	3.40	4.16
Education Floating	2.94	4.32	4.81
Opennes Pegged	58.12	72.25	87.60
Openness Floating	36.47	38.10	48.60
Central Government Debt/GDP Pegged	51.93	72.88	68.82
Central Government Debt/GDP Floating	45.40	60.37	57.88

term dummies.

Table 1 presents means of the control variables split into floating currency regime countries or episodes, and for their pegged counterparts for the periods 1978-1989, 1990-1999 and 2000-2009. On average, countries with free floating currencies experience a higher GDP per capita, higher government debt in relation to GDP and more years of secondary schooling throughout the sample period. Interestingly however, countries with pegged currencies seem to be more prone to trade.

Gini Pre and Post Consolidation Levels: As a first step in my analysis I merely look at the development of the Gini prior to and following a consolidation phase in both pegged and free floating countries. To identify periods of consolidation more clearly and to see actual changes within the Gini, I did not take the mean of each consolidation year in the sample, I rather identified periods of consolidation and then observed what happened prior and following these periods. Perotti (2011) discusses how analysis can

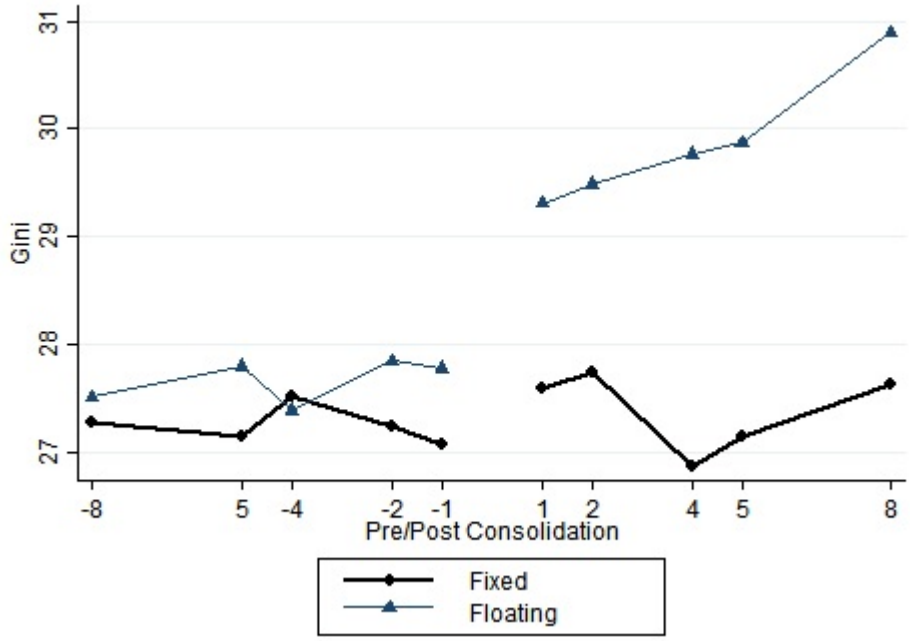
differ depending on how such a period is defined. I define a consolidation period to end if there are two consecutive year without a tax hike or spending cut following the last consolidation year.

This leaves me with a total of 36 observations. Figure 1 displays the mean of the according Gini for both pegged and floating countries 1, 2, 4, 5 and 8 years before and after. For the case of the floating countries, a general increasing trend can be observed which may be due to the general increase seen in the Gini coefficient as discussed above. Still, there is a clear increase of the coefficient from a year before to a year after the consolidation phase, namely from 27.78 to 29.31. The Gini then remains at this level and continues growing which could point to persistence in the increase following the consolidation period. Another line of reasoning in this could be my choice of consolidation episodes, as I look at Gini coefficients before and after the consolidation: According to this definition, consolidation episodes last up to 14 years in the sample at hand. Therefore, my calculation method could capture some of the general increase in the Gini.

In the case of the pegged countries, the increase right after the consolidation period is visible, yet much smaller in size, from 27.08 to 27.60. Here the jump in the coefficient does not seem as persistent, 4 years following the consolidation period the coefficient falls even below pre-consolidation levels.

As an additional comparison, Figure 2 displays the cumulative Gini coefficient of 4 years before and 4 years after the consolidation period, once again split up in fixed and floating countries and showing the complete sample. While in the countries with a floating currency an increase by about 1.48 from an average of 27.87 to 29.35 is observable, fixed countries show

Figure 2: Gin Pre/Post Consolidation split into Fixed And Floating

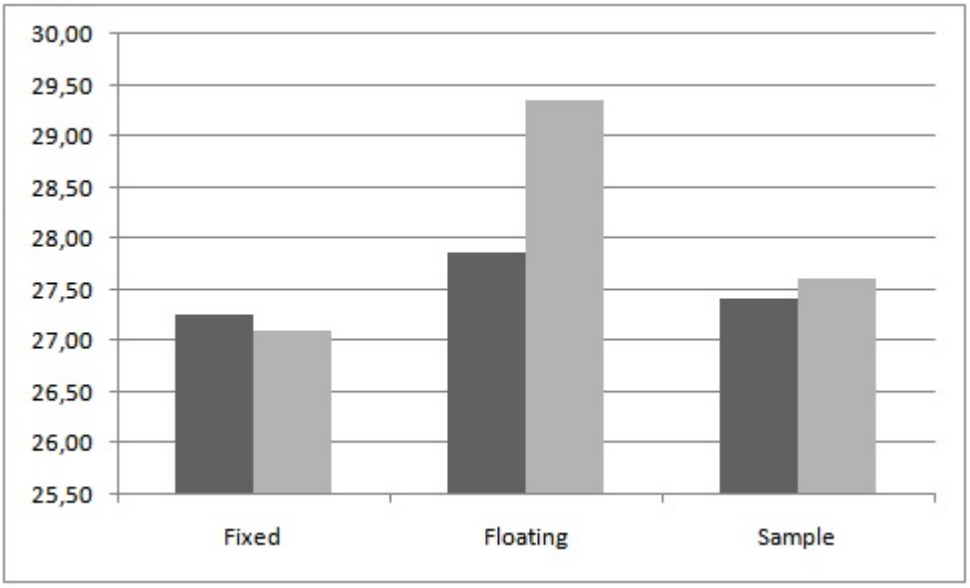


a different behavior. The average Gini here declines by about 0.16 from 27.26 to 26.10. This could already point to differing signs of the consolidation*pegged dummies in the regression below. The complete sample, driven by the floating countries, increases by 0.20 from 27.41 to 27.61.

Simple summary statistics therefore show an increase of Ginis in the year following consolidation episodes in both sub-samples, yet when summing up the previous and following 4 years of consolidation episodes, the picture differs for fixed and flexible countries. As these findings include all sorts of effects, I will employ an econometric model to attempt to disentangle them and get a clearer picture on what happens to the income distribution due to fiscal consolidations in countries with different currency regimes.

Econometric Model: For my econometric analysis I will make use of

Figure 3: Cumulative Gini 4 years Pre/Post Consolidation



two models. First I will run a two-way fixed-effects (FE) regression[9] with standard errors with up to 3 lags introduced by Driscoll and Kraay (1998). Panel data may show patterns of herd behavior and neighborhood effects, which in my panel with rich and well-connected OECD countries may be apparent. The Driscoll and Kraay standard errors account for this and show robustness to general forms of temporal and cross-sectional dependance. The FE model allows for an unobserved, time-invariant country specific variable. In my case, this could be interpreted as cultural preference towards income inequality, which may differ on a cross-country level. The employment of a fixed effect model will control for this effect so I don't run into an omitted variable bias. Since the panel at hand is a rather homogeneous group of countries, I additionally include a time-specific effect to capture factors displaying the 'zeitgeist' on a more global level. Formally, the model is:

[9]with p=0.0001, the Hausman test pointed to the use of FE

$$G_{it} = \beta_0 X_{i,t-1} + \beta_1 D_{i,t} + \alpha_i + \theta_t + \gamma_{it} \tag{1}$$

where G denotes the Gini coefficient, $X_{i,t-1}$ is the set of control variables discussed above, α_i denotes the country-specific fixed effect, θ_t the year-specific effect, D is the set of dummy variables I want to look at more closely and γ_{it} denotes the error terms. I assume the variables to take a year until they affect the Gini coefficient, therefore they enter the equation with a one-period lag.

Since Solt (2014) does not only offer Gini coefficients on disposable income but also on market income, I additionally run a seemingly unrelated regression (SUR) introduced by Zellner (1962) and expanded by Biorn (2004) into the context of unbalanced panel sets to verify the results from the FE model. The SUR estimates a system of equations, in this case one equation for the disposable income inequality and one for market income inequality that could otherwise be estimated independently. The SUR however allows the error terms of the regressions to be correlated, thereby increasing efficiency of the regressors. As the seemingly unrelated regression will have no gain in efficiency over OLS if both equations contain the exact same regressors, I assume the consolidation variable to have no effect on the market Gini. The timing of the variables remains as in the FE specification described above. I equip the SUR model with time-fixed and country-fixed effects.

The formal representation remains similar to (1) yet G now is a vector with $G = (G^{gross}, G^{net})'$ as the variables for income inequality. The control variables will become $X = (X^{gross}, X^{net})'$. D remains the set of dummy

variables and only enters the net regression for the reasons stated above.

4 Regression Results

Columns 1-3 of Table 2 shows the regression results of the two-way FE regression. Columns 6 and 7 show the outputs for the SUR regression. The outcome for the market Gini regression of the SUR is in the appendix.

While the magnitudes and significance levels of the control variables differ between the two employed models[10] they mostly remain the same size when changing the dummies. The SUR generally confirms the findings of the FE model. The signs of control variables and dummies are similar throughout both models. GDP per capita is highly significantly associated with a general increase of the Gini coefficient, yet, as the squared term shows, only to a certain extent. Hence, my results confirm the presence of the above mentioned Kuznets-Relationship[11]. Education is associated with a lower Gini coefficient in both models. Globalization comes up as significantly associated with a lower Gini coefficient.

The consolidation dummy itself comes up positive. Consolidation to increase the Gini coefficient is in line with the authors mentioned above. Expectedly due to the lower mean, a fixed country is associated with a lower Gini coefficient, yet the coefficient remains insignificant. Interestingly, the consolidation/fixed currency country interaction dummy comes up with a negative sign in both models, and even significant to a 5% level in the SUR. This negative sign remains even when the sample is limited to just pegged

[10] while highly significant in the SUR, education comes up insignificant in the FE

[11] According to the output, the decreasing effect starts around 37.000 $ per capita.

countries or just consolidation phases. The negative sign also remains when the model is estimated with both, the dummy controlling for fixed countries and the consolidation dummy to rule out the generally lower Gini coefficient of the pegged countries to oversize the consolidation effect[12]. The results therefore show that countries that are pegged and consolidate are associated with a lower Gini coefficient compared to (i) the complete panel at hand, (ii) countries that are consolidating and (iii) pegged countries in general. Countries with free floating currencies experience the exact opposite. Even if statistically insignificant, consolidation phases increase the Gini coefficient. The regression output is relatively robust to the inclusion of additional control variables such as unemployment, inflation or GDP growth. While the magnitudes and significances slightly differ, the signs remain the same. Outputs of the robustness checks are in the appendix. Even without explicitly implying causality, these results point to a difference in the distributional consequences of consolidation measures in pegged and free floating countries. One interpretation for this occurrence could be that the ability to devalue the currency puts pressure on wages earned in the exporting sector. The additional increase in prices for imports may increase pressure on lower incomes if a large share of basic consumption goods are imported. For the economy as a whole, that may be beneficial as Lambertini and Tavares (2003) have showed, yet in distributional terms this may result in higher inequality.

[12]regression output for the limited sample and the regression with both peg and consolidation dummy can be found in the appendix

Table 2: Gini, Fiscal Consolidation, Exchange Rate Regime

	(1) FE	(2) FE	(3) FE	(4) FE	(5) FE	(6) SUR	(7) SUR
$LogGDP_{t-1}$	3.317***	3.388***	3.351***	3.266***	3.278***	3.589***	3.754***
	(6.39)	(6.32)	(6.40)	(6.43)	(6.44)	(5.53)	(5.76)
$LogGDP2_{t-1}$	-0.184***	-0.187***	-0.186***	-0.181***	-0.182***	-0.193***	-0.202***
	(-6.48)	(-6.40)	(-6.50)	(-6.51)	(-6.58)	(-5.74)	(-5.96)
$Education_{t-1}$	-0.00965	-0.00949	-0.00960	-0.0112	-0.0117	-0.0652***	-0.0671***
	(-0.91)	(-0.89)	(-0.90)	(-1.04)	(-1.08)	(-8.15)	(-8.25)
$Openness_{t-1}$	-0.00269***	-0.00263***	-0.00273***	-0.00266***	-0.00267***	-0.00151***	-0.00149***
	(-6.96)	(-7.73)	(-6.96)	(-7.26)	(-7.61)	(-7.92)	(-7.83)
$Debt/GDP_{t-1}$	-0.0000917	-0.0000713	-0.0000816	-0.0000741	-0.0000664	-0.000302	-0.000315
	(-0.62)	(-0.49)	(-0.55)	(-0.51)	(-0.46)	(-1.48)	(-1.54)
$Consolidation_{t-1}$	0.00138						
	(0.15)						
Peg_{t-1}		-0.00975					
		(-1.18)					
$Cons * Peg_{t-1}$			-0.00457			-0.0233*	
			(-0.36)			(-1.70)	
$Consolidation < 1\%_{t-1}$				0.0142			
				(1.50)			
$Consolidation >= 1\%_{t-1}$				0.0105			
				(0.93)			
$Consolidation < 1\% * Peg_{t-1}$					-0.0194		-0.0156
					(-1.49)		(-0.99)
$Consolidation >= 1\% * Peg_{t-1}$					0.0102		0.0539*
					(0.59)		(2.53)
N	526	526	526	526	526	526	526

t statistics in parentheses, Dependent Variable is the Log of Gini, Market output of SUR in appendix
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Gini, Tax Hikes & Spending Cuts, Exchange Rate Regime

	(1) FE	(2) FE	(3) FE	(4) SUR	(5) SUR	(6) SUR
$LogGDP_{t-1}$	3.293***	3.348***	3.314***	3.380***	3.617***	3.602***
	(6.40)	(6.87)	(6.43)	(6.55)	(5.16)	(5.13)
$LogGDP2_{t-1}$	-0.183***	-0.185***	-0.184***	-0.187***	-0.195***	-0.194***
	(-6.50)	(-6.93)	(-6.52)	(-6.64)	(-5.33)	(-5.30)
$Education_{t-1}$	-0.0110	-0.00951	-0.0108	-0.00900	-0.0656***	-0.0661***
	(-1.04)	(-0.91)	(-1.02)	(-0.84)	(-8.04)	(-8.16)
$Openness_{t-1}$	-0.00267***	-0.00271***	-0.00269***	-0.00272***	-0.00156***	-0.00156***
	(-7.10)	(-7.62)	(-7.11)	(-7.80)	(-7.94)	(-7.93)
$Debt/GDP_{t-1}$	-0.000102	-0.0000842	-0.000101	-0.0000660	-0.000395	-0.000389
	(-0.70)	(-0.55)	(-0.69)	(-0.47)	(-1.83)	(-1.80)
$TaxDummy_{t-1}$	0.00654					
	(0.82)					
$TaxDummy * Peg_{t-1}$		-0.00474			-0.0189	
		(-0.37)			(-1.22)	
$SpendDummy_{t-1}$			0.00157			
			(0.17)			
$SpendDummy * Peg_{t-1}$				-0.00990		-0.00945
				(-0.81)		(-0.60)
N	525	526	525	526	515	515

t statistics in parentheses, Dependent Variable is the Log of Gini, Market output of SUR in appendix
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Therefore, as the summary statistics showed how countries with currency pegs are more prone to trade, the peg may be a good 'defense' mechanism for distributional issues. There could be merit in examining countries just prior to consolidation phases and look at the distributional consequences in case of a devaluation, appreciation or if monetary policy takes no action while controlling for price effects on basic living goods that are imported. A closer examination of the consolidation measures taken by each country group could be of interest as well. Spending cuts social security transfers have different distributional implications as cuts in, say, expenditures for cultural events. The same holds for tax hikes, where value added taxes tend to hurt lower incomes to a higher degree than property taxes.

Agnello and Sousa (2014) additionally find that the size of the consolidation episode measured as the share of GDP which the spending cut or

Table 4: Spending Cuts and Tax Hikes split into small and large

	(1) FE	(2) FE	(3) SUR	(4) SUR
$LogGDP_{t-1}$	3.208***	3.230***	3.424***	3.616***
	(6.28)	(6.25)	(5.24)	(5.52)
$LogGDP2_{t-1}$	-0.178***	-0.180***	-0.185***	-0.195***
	(-6.35)	(-6.35)	(-5.44)	(-5.73)
$Education_{t-1}$	-0.0118	-0.0120	-0.0661***	-0.0675***
	(-1.10)	(-1.10)	(-8.10)	(-8.37)
$Openness_{t-1}$	-0.00266***	-0.00270***	-0.00153***	-0.00152***
	(-7.57)	(-7.71)	(-7.97)	(-7.97)
$Debt/GDP_{t-1}$	-0.0000736	-0.0000690	-0.000274	-0.000273
	(-0.52)	(-0.50)	(-1.34)	(-1.33)
$TaxDummy < 1\%_{t-1}$	0.0125		0.0198	
	(0.82)		(0.67)	
$TaxDummy >= 1\%_{t-1}$	0.0232		0.0131	
	(1.93)		(0.38)	
$SpendDummy < 1\%_{t-1}$	0.0219		0.00656	
	(-1.29)		(0.23)	
$SpendDummy >= 1\%_{t-1}$	0.000585		0.00111	
	(-0.05)		(0.04)	
$TaxDummy < 1\% * Peg_{t-1}$		-0.0161		-0.0254
		(-0.85)		(-0.79)
$TaxDummy >= 1\% * Peg_{t-1}$		0.0172		0.0163
		(0.79)		(0.32)
$SpendDummy < 1\% * Peg_{t-1}$		-0.0337		-0.00797
		(-1.53)		(-0.25)
$SpendDummy >= 1\% * Peg_{t-1}$		0.000817		0.0272
		(0.04)		(0.57)
N	525	525	525	525

t statistics in parentheses, Dependent Variable is the Log of Gini
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

tax hike amounts to, has differing effects on inequality. In their analysis, consolidations that excel 1% of GDP are less detrimental for the distribution of incomes than those lower than 1%, yet both remain inequality increasing. Columns 4 and 5 of Table 2 show the result for these additionally dummies. Average consolidation within the panel is 0.25 % of GDP, for pegged countries it is 0.22% and for floating countries it is at 0.31%. Rather unsurprisingly, dummies for 'small' and 'large' consolidation episodes both come up positive. Unlike in Agnello and Sousa's (2014) analysis their size does not differ dramatically - yet 'small' consolidation episodes are associated with larger increases than 'large' episodes. Both interaction terms show a

different pattern. The 'small' consolidation episodes in interaction with the peg dummy are associated with lower inequality, while the 'large' episode have inequality increasing effects. When constructing a dummy for the non-pegged countries and pairing it with a dummy controlling for small or large consolidation episodes, both come up positive.

As the dataset assembled by Devries et al. (2011) differs between spending cuts and tax hikes, this allows for differentiation between these two consolidation measures as well as their different effects in different currency regimes.

Table 3 displays the output of the regression with this differentiation. The control variables remain in a similar magnitude with similar significances and signs compared to the previous regression. Both, the tax hike and the spending cut dummy, come up with a positive sign in the FE regression. The tax dummy is about 4 times as large in magnitude however, yet both dummies are insignificant.

The interaction term of both dummies comes up negative in both the FE and the SUR model. While the FE regression finds the spending dummy to have almost twice the size of the tax dummy, the size barely differs in the SUR regression[13]. Table 4 splits the tax and spending dummy into 'large' and 'small' consolidation phases and pairs it with the fixed dummy once more. Both models come up with the same signs yet differing sizes and significances again. While both sizes of tax hikes are inequality increasing in

[13]The negative sign of both interaction terms prevails if the sample is limited to include just currency-fixed countries or controlling for fixed countries when the sample is limited to just consolidation episodes. Limiting the sample to just countries with free floating currencies, both spending hikes and taxes cuts increase inequality, tax hikes even with a 10 % significance in the FE model. Outputs can be found in the appendix.

the complete sample (large tax cuts having almost twice the effect), small tax hikes have equalizing effects for the pegged countries. The same pattern holds for spending cuts: Both have disequalizing effects in the complete sample and an equalizing effect for small cuts in the pegged countries.

5 Conclusion

My analysis mostly confirms the findings of previous authors that episodes of fiscal consolidation increase income inequality, all of the employed dummy variables controlling for these phases come up insignificant however. When differing between spending cuts and tax hikes, the disequalizing effect for both variables remains, the effect of tax cuts is almost six times as large however. Extending this work, I find that there is a difference when comparing countries under a fixed and a floating currency regime. Countries under a fixed currency regime tend to be able to lower their income inequality measured by the Gini coefficient in times of fiscal consolidation when compared to (i) the complete sample, (ii) pegged countries, and (iii) consolidating countries. Countries with free floating currencies however tend to be associated with an increase in inequality due to consolidation when compared to either group. The difference in both groups remains when splitting between tax hikes and spending cuts. While both consolidation measures have an equalizing effect for fixed countries, they show a disequalizing effect for floating countries.The size of the consolidation seems to matter as well. For consolidation packages larger than 1% of GDP, even fixed countries experience an increase in income inequality. Consolidation measures below 1% remain an

equalizing effect. The composition of the consolidation has differing effects as well. 'Small' tax hikes and spending cuts have equalizing effects in fixed countries, while 'large' ones have disequalizing effects. For floating countries both show disequalizing patterns. There could be merit in closer exploring the dynamics within floating countries. While the peg may work as a sort of defense mechanism for the distribution of incomes, a closer look at the effects of appreciation or depreciation prior to or during times of fiscal consolidation - while having an eye on a country's exposure to international trade and the consumption of imported goods - and their effects on the income distribution could be worthwhile and help to understand what kind of changes to the exchange rate are beneficial or detrimental for the distribution of incomes. A closer look at the dataset made available by Devries et al. (2011) could be of interest as well. Understanding which exact spending cuts or tax hikes have what implications on the distribution, and which composition may be beneficial for both growth and the distribution of income could further help understand the dynamics.

References

[1] Agnello. L. and R. M. Sousa, 2014. "How Does Fiscal Consolidation Impact on Income Inequality?," *Review of Income and Wealth*, International Association for Research in Income and Wealth, vol. 60(4), pages 702-726

[2] Ball, L., D. Furceri, D. Leigh, and P. Loungani 2013, "'The Distributional Effects of Fiscal Austerity,"' IMF Working Papers 13/151, International Monetary Fund.

[3] Barro, R.J. 2000 "'Inequality and Growth in a Panel of Countries", *Journal of Economic Growth*, Vol. 5, No.1, pp.5–32

[4] Barro, R. and J.-W. Lee, "A New Data Set of Educational Attainment in the World, 1950-2010" forthcoming, *Journal of Development Economics*

[5] Biorn, E. 2004 "Regression system for unbalanced panel data: a stepwise maximum likelihood procedure" *Journal of Econometrics* Vol. 122: 281-91.

[6] Devries, P., J. Guajardo, D. Leigh, and A. Pescatori, 2011, "'An Action-based Analysis of Fiscal Consolidation in OECD Countries,"' *IMF Working Paper* No. 11/128 (Washington: International Monetary Fund).

[7] Driscoll, J.C., and A.C. Kraay 1998, "Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data," *Review of Economics and Statistics*, 80, 549-560.

[8] Heshmati, A. and K. Jungsuk, 2014. "A Survey of the Role of Fiscal Policy in Addressing Income Inequality, Poverty Reduction and Inclusive Growth," IZA Discussion Papers 8119, Institute for the Study of Labor (IZA).

[9] Ilzetzki, E., C. M. Reinhart and K. S. Rogoff 2010 "Exchange Rate Arrangements Entering the 21st Century: Which Anchor Will Hold?"

[10] Karras, G., 2011. "Exchange-Rate Regimes and the Effectiveness of Fiscal Policy," *Journal of Economic Integration*, Center for Economic Integration, Sejong University, vol. 26, pages 29-44.

[11] Kuznets, S., 1955 "Economic Growth and Income Inequality", *American Economic Review*, Vol.45, pp. 1-28

[12] Lambertini L. and J. Tavares, 2003. "Exchange Rates and Fiscal Adjustments: Evidence from the OECD and Implications for EMU," Boston College Working Papers in Economics 576, Boston College Department of Economics.

[13] Mulas-Granados C. 2005 "Fiscal Adjustments and the Short-term Trade-off between Economic Growth and Inequality," *Revista de Economa Publica* Vol. 172, No. 1, pp. 6192.

[14] OECD (2016), Gross domestic product (GDP) (indicator). doi: 10.1787/dc2f7aec-en , Trade in goods and services (indicator). doi: 10.1787/0fe445d9-en, General government debt (indicator). doi: 10.1787/a0528cc2-en (all accessed on 15 March 2016)

[15] Perrotti, R. 2011, "The 'Austerity Myth': Gain Without Pain?" in A. Alesina and F. Giavazzi (eds.), Fiscal Policy after the Financial Crisis (Chicago: University of Chicago Press).

[16] Santos-Paulino, A. U., 2012. "Trade, Income Distribution And Poverty In Developing Countries: A Survey," UNCTAD Discussion Papers 207, United Nations Conference on Trade and Development.

[17] Solt, F., 2014 "The Standardized World Income Inequality Database" Working Paper SWIID Vol. 90, pp. 231-242 SWIID Version 5.0, October 2014

[18] Woo, J., E. Bova, , T. Kinda, and S. Zhang, 2013, "Distributional Consequences of Fiscal Consolidation and the Role of Fiscal Policy: What do the Data Say?" IMF Working Papers 13/195, International Monetary Fund.

[19] The World Bank 2014 World Bank Development Indicators - WDI online database

[20] Zellner, A. 1962. "An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias." *Journal of the American Statistical Association* 57: 348-368.