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FISCAL CONSOLIDATIONS AND THEIR EFFECTS ON INCOME
INEQUALITY

An empirical analysis of the distributional effects of austerity, using
a novel approach to identify consolidation compositions

Master's Thesis

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Declaration of Authorship

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Abstract

This thesis investigates the effects of fiscal consolidations on income inequality. Although fiscal consolidations have become a popular economic research topic, their effects on income inequality, which itself has gained broad popularity lately, are relatively unexplored. Therefore, this thesis econometrically assesses the development of Gini coefficients during and after austerity measures. The paper applies regression analysis with panel data techniques using a sample of 17 high-income countries during the period of 1978 – 2009. It finds that a consolidation, measured by a deliberate improvement of the primary budget balance significantly increases income inequality of the referring country. In detail, an improvement of the primary budget balance about one percent of GDP is associated with an increase in market income inequality of 0.6% and a smaller increase in net income inequality in the year after. Moreover, this thesis explores the discretionary effect of different consolidation compositions. To do so, it introduces a novel approach to differentiate between consolidations that are either exclusively undertaken through spending cuts, tax increases or a combination of both. Thereby, it is found that especially tax-only consolidations tend to be equality-friendly but also rather small in size while the opposite is true for spending-only and mixed ones. These findings point to a more pronounced trade-off between different consolidation policy goals than is currently believed.

Keywords

Fiscal consolidation, Fiscal Adjustment, Austerity, Income inequality, Cross-country analysis, Panel data technique

Abstrakt

Tato diplomová práce zkoumá dopady fiskální konsolidace na příjmové nerovnosti. Ačkoliv fiskální konsolidace se staly populárním tématem ekonomického výzkumu, jejich vliv na příjmovou nerovnost, která sama získala v poslední době širokou popularitu, jsou poměrně neprozkoumané. Proto tato práce ekonometricky hodnotí vývoj Giniho koeficientu během a po úsporném opatření. Práce aplikuje regresní analýzu s metodou panel dat na vzorku 17 zemí s vysokými příjmy v období 1978 - 2009. Je zjištěno, že konsolidace (záměrného zlepšení primárního salda rozpočtu) výrazně zvyšuje příjmovou nerovnost v dotyčné zemi. Konkrétně se ukázalo, že zlepšení o primárního rozpočtového salda o jedno procento HDP je spojeno se zvýšením příjmové nerovnosti na trhu o 0,6% v roce následujícím. Tato práce navíc zkoumá diskreční účinek různých konsolidačních kompozic. Zavádí proto nový přístup rozlišující mezi konsolidacemi, které jsou buď výhradně prováděné prostřednictvím škrtnů ve výdajích, prostřednictvím zvýšení daní nebo kombinací obojího. Přitom bylo zjištěno, že zejména čistě daňové konsolidace mají tendenci mít přívětivý vliv na rovnost a také jsou poměrně malé, zatímco pro konsolidace zaměřené na čisté škrty a smíšené platí opak. Tato zjištění poukazují na výraznější kompromis mezi různými cíli konsolidace, než je v současné době předpokládáno.

Klíčová slova

Fiskální konsolidace, Fiskální korekce, Přísnost, Příjmová nerovnost, Transverzální analýza, Analýza panelových dat

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1 Introduction

The 2007/2008 financial crisis and the subsequent Great Recession imposed devastating effects on the financial sector and the real economy. In turn, many governments saw themselves forced to spend large amounts of money to rescue banks and provide fiscal stimulus to restore economic momentum. As a result, public debt, especially in advanced economies, climbed to all-time highs, cutting their fiscal space significantly. More precisely, the government debt in the OECD area exceeded their annual output in 2010, meaning that the government debt to GDP ratio climbed to above 100% (OECD, 2011b). The fiscal deficit in the OECD area peaked unprecedentedly at almost 8% of GDP in 2009, with only minor improvements in the following three years (OECD, 2014).

Under the light of ageing populations and the high future public costs related to this fact, these deficits are seen as unsustainable for many countries. In some countries, like Greece and Ireland, the disastrous fiscal situation even manifested in significant interest rate hikes on sovereign bonds and downgrading by rating agencies that made it hard for these states to finance themselves under reasonable conditions (European Commission, 2014). Thus, the need to stabilise public debt and overhaul public budgets has forced and is still urging many governments to undertake severe fiscal consolidations. These programmes are mostly associated with a higher burden for the poor as illustrated by an increase in the Gini coefficient. Many of these countries already entered the crisis with historically high levels of income inequality (OECD, 2011a). However, the economic and social repercussions from the Great Recession and the consequent downfall of employment have resulted in even higher levels of income inequality. Thus, it appears that fiscal consolidations and resulting rises in inequality are at least to some extent interconnected.

The aim of this paper, therefore, is to discuss the general effect of fiscal consolidations on inequality and to differentiate between the discretionary impacts that different compositions have on inequality indicators. This article also focuses on the question, which composition of fiscal consolidation is best to cushion inequality effects. It is assumed that there is a trade-off between compositions, which are most suitable for debt reduction and GDP growth, and reduction of income inequality. Ultimately, this thesis seeks to find new evidence for the discretionary compositional effects, by using a novel approach to identify consolidations, which either only based on tax rises, spending cuts or through a combination of both.

These questions are particularly interesting since economic inequality has recently received higher academic and public attention. This might also be sparked by the long-term trend of

increased inequality throughout developed countries. Between 1990 and 2012 the Gini coefficient of market income increased more than five percentage points in OECD countries. In addition, disposable income emerged more unequal, so that the referring Gini coefficient increased three percentage points at the same time (OECD, 2015a; FES, 2015). Today, the income gaps between the poor and the rich are at their highest level in the past 30 years for most OECD countries. On average the richest 10% of the population today earn 9.5 times the income of the poorest 10% while in the 80s the ratio stood at 7:1 (OECD, 2015a). The renewed dimension of inequality in the public discourse is best epitomized by the “Occupy Wall street” movement, which impressively demonstrated how relevant distributional questions can be also for a broader public (Freeman, 2011). The sphere of politics did pick up this topic as well since e.g. U.S. president Obama called widening income inequality the “defining challenge of our time” (IMF, 2015) or to put it in the words of the former Italian prime minister Mario Monti: “The key test for market economies (...) will be whether they master the growing inequality” (Monti, 2009).

Turning to the world of academia, it is widely acknowledged that income inequality is to some extent a necessary precondition for a functioning market economy. Whatsoever, the question is rather how much inequality is needed for that and from what point on, inequality is distorting for the functioning of market economies (Freeman, 2011; Stiglitz, 2012; Piketty, 2014; Krugman, 2015). Inequality is supposed to harm long-term growth through an array of different channels (see e.g. Easterly, 2007; Berg et al., 2011; Stiglitz, 2012). It is seen to curb social mobility as well as social cohesion. In environments with long term high inequality, it is increasingly difficult for high-skilled young people to climb the social ladder. Furthermore, physical and mental health across the society is seen to drastically decline under such circumstances (Wilkinson & Pickett, 2009, OECD, 2011a; Piketty, 2014). Thus, inequality is widely acknowledged to act as a double-edged sword, which is aptly summarised by Piketty (2014): “You need some inequality to grow. But extreme inequality is not only useless but can be harmful to growth because it reduces mobility and can lead to political capture of our democratic institutions”. Some scholars even went so far as to argue that high-income inequality even accounted for direct or indirect causes of the crisis, at least in some countries, such as the United States (Rajan, 2010; Stiglitz, 2012; Fitoussi & Saraceno, 2010). In the light of renewed attention to this topic, the International Monetary Fund (IMF) saw itself forced to re-establish some of its positions specifically concerned with fiscal consolidation. While equality targets were not yet part of their considerations, within their 2010 “Ten Commandments for Fiscal Adjustment in Advanced Economies” they explicitly stated the role of inequality (Blanchard

& Cotarelli, 2010). They acknowledge that an evaluation of any fiscal consolidation policy should not only consider the impact it has on output, employment, and the fiscal balance, but also on the income distribution. Therefore, the question arises how fiscal consolidations can be designed in a way that they can cushion the blow for the most vulnerable ones.

This question was often discussed in the context of the recent large consolidation programmes in many European countries. However, it might be too early to judge their long-term inequality effect, since these programmes act rather in the longer run through various channels and inequality data for most countries are only available up to 2010. However, it can already be seen that they threaten social cohesion and economic convergence in Europe in the aftermath of the Great Recession (OECD, 2015a). Inequality immediately rose in countries, which experienced sharp increases in unemployment (e.g. Ireland, Spain) during the crises and in the aftermath of it. Especially in countries of the Euro Area periphery, drastic cuts in social spending and severe demolition of the social state led to a massive increase of poverty among big parts of the society (OECD, 2013). As could be seen in the affected countries, the consequences included increasing suicide rates, social unrests, political instability and a general decline in trust in institutions and democracy (Altindag & Mocan, 2010; Dao & Loungani, 2010; Jenkins et al., 2011). The dimensions of social unrest and political instability caused by economic downturn and raised inequality are not yet foreseeable. However, the recent populist backlash throughout Europe and the United States - both on the right and the left – against trade, globalisation, and migration might be also associated to some of these mechanisms (Roubini, 2016).

To examine income inequality effects associated to fiscal consolidations, this paper builds upon a narrow body of literature that quantitatively assesses these mechanisms. Namely, Woo et al. (2013) and Agnello & Sousa (2012) act as the main inspirations for the deployed regression analyses. In line with these scholars, this paper will apply econometric analyses to assess the impact of different consolidations on the income inequality measurements as illustrated by rises in the Gini coefficients. It is found that consolidation programmes usually lead to increased market and net income inequality in the year of the implementation and even more pronounced one year later. This effect is especially severe when the consolidation consists of cuts in public spending. With the help of a novel approach to identify tax- and spending-only consolidations, the thesis finds more pronounced evidence for these effects and highlights importance of studying consolidation compositions and their accompanying features.

The remainder of this thesis is structured as follows. First, a literature overview discussing the effects of fiscal consolidations on different policy goals will be undertaken. More specifically, the second chapter examines the empirical literature on the determinants of growth, government debt, and equality friendly fiscal consolidations and points out different trade-offs between these policy goals. The third chapter is dedicated to study the development of inequality measures over time in different countries and to focus on changes that appeared after fiscal adjustments. Following, Chapter 4 defines the deployed data and discusses different methodologies, used to gauge inequality effects of different policies. Chapter 5 presents and discusses the findings obtained from several regression models. Afterwards, a sensitivity analysis will be undertaken to verify the robustness of the findings. Ultimately, conclusions will be drawn in Chapter 7.

2 Literature Review

This chapter will first present a review of academic research on the economics of fiscal consolidation, which developed into a fairly rich stream of literature. Afterwards, attention will be drawn to the literature focusing on the distributional impact of consolidations, which has inspired the econometric frameworks used in this article. To build upon existing econometric research, ultimately stylized facts of fiscal consolidation will be derived.

2.1 The economics of Fiscal Consolidation

'The bad consolidation is actually the easier one [...]. Raising taxes and cutting capital expenditure is much easier to do than cutting current expenditure. That's the easy way in a sense, but it's not a good way. It depresses potential growth. [...] A 'good' consolidation is one where taxes are lower and the lower government expenditure is on infrastructures and other investments.'

Mario Draghi, 2008

A fiscal consolidation can be defined as a concrete deliberate change of fiscal policy in order to reduce the budget deficit and debt accumulation (OECD, 2011b). Therefore, episodes of fiscal consolidation can be seen as a government's will to put public finances on sustainable grounds and to create conditions for a stable economic environment. In the last three decades, fiscal consolidations have gained lots of attention by economic scholars and by now build a distinct, rich and also controversial body of economic research.

The opening statement of the president of the European Central Bank epitomizes the dimensions scholars of fiscal consolidation will have to consider in a straightforward way. It stresses that consolidations act on both, the government's public deficit and debt level as well as the outlook for economic growth. While there is no question that every consolidation approach inherits different specifics and builds upon a variety of country and time relevant features, a relatively large body of literature has dealt with mainly two distinct questions: i) Can fiscal adjustments lead to expansionary effects? ii) How do consolidations have to be designed in order to sustainably bring down public debt and reduce the public deficit? Both questions are in fact somehow interrelated, since there seems to exist a causal link between debt and economic growth (Ball & Mankiw, 1995; Ostry et al., 2010; Cechetti et al., 2011; Jaramillo & Cottarelli, 2012; Pescatori et al., 2014). While many authors agree on the most relevant issues regarding the successful design of

consolidations, views are split regarding possible implications on growth. Therefore, this article starts with summarizing the main findings of the literature on both questions.

2.1.1 The effects of fiscal consolidation on growth

'The boom, not the slump, is the right time for austerity at the Treasury.'

John Maynard Keynes, 1937

'It is an error to think that fiscal austerity is a threat to growth and job creation.'

Jean-Claude Trichet, 2010

'Keynes Was Right [...]. We might actually end up taking Keynes's advice, which is every bit as valid now as it was 75 years ago. The alleged historical examples of "expansionary austerity" [...] had already been thoroughly debunked.'

Paul Krugman, 2012

After a renewal of Keynesian thinking in the aftermath of the Great Recession, the debate among economic scholars and policymakers heated up over the question of how fiscal consolidations affect economic performance. By proxy for the standpoint of many policymakers, the then president of the European Central Bank Jean-Claude Trichet expressed the anti-Keynesian conviction that fiscal consolidation policies could lead to positive impacts on GDP growth and job creation. On the other hand, with a shifting academic stance on this issue, the belief in "expansionary austerity" currently is put significantly under scrutiny, as illustrated by Paul Krugman's comment above.

Giavazzi and Pagano (1990) were the first authors who examined fiscal adjustments in a broader systematic way in their paper "Can Severe Fiscal Contractions Be Expansionary? Tales of Two Small European Countries". Focusing on European economies, they aimed to assess if several adjustments in the 1980s rather support the Keynesian view, which presumes shrinking demand after consolidation or the expectations view, which assumes higher private consumption in expectation of further consolidation efforts. Applying regression analyses they see the latter confirmed, especially when spending cuts were undertaken, as occurred in the examples of Denmark and Italy in the 1980s. Under these circumstances and if the adjustment was accompanied by sizeable currency devaluations their effects sometimes led to output increases.

Following this ground-breaking work, which introduced the concept of expansionary adjustments, the 1990s have witnessed a fairly burgeoning literature exploring the effects and success determinants of fiscal adjustment. Blanchard (1990) explains the mentioned

consequences by “crowding out” effects: high government expenditures would pose severe threats on private investment rates, which in turn hurt GDP growth. He thereby refers to the work of Ricardo (1820), who was the first to claim that high government expenditures would lead to raised government borrowing. Consequently, economic agents would discount future payments of higher taxes and lower their investments. This is also referred to as the “expectation” or “confidence” channel (Blanchard, 1990; Blanchard, 2008).

One of the most dedicated and highly influential scholars in that field is the Italian Economist Alberto Alesina, who set the standards of how to assess fiscal standards econometrically. One of his main contributions is the by now familiar notion of compositional adjustment characteristics. He differentiated two types of adjustments. So-called “expenditure based” adjustments rely primarily on expenditure cuts (e.g. through transfers, social security, government wages and employment) without raising taxes on households. On the other hand, “revenue based” adjustments are those based on tax increases, often with the largest part focused on household taxes and social security contributions (Alesina & Perotti, 1996). The authors claim, that the former tend to lead to more sustainable budget consolidations and are expansionary while the latter are likely to be reversed soon. In fact, such revenue based adjustments tackle government wages and welfare programs which are likely to automatically bring down the unit labour cost channels and therefore act as multipliers (Alesina & Perotti, 1996). Moreover, tax increases raise unit labour costs and therefore worsen the competitiveness of companies. They stress that adjustment measures may be able to kill two birds with one stone: If done in a good way, spending cuts can lead to both debt reduction and economic growth, which in turn is helpful for the former since it leads to growing denominator in debt/GDP equation. Thereby they coin the notion of “expansionary adjustment”, which refers to growth spells following severe budget consolidations, mainly on the spending side.

The 1990s and 2000s produced a boom of consecutive studies all discussing expansionary effects of consolidation efforts and their required ingredients. McDermott & Wescott (1996), Dubois et al. (1996), Perotti (1999), Giavazzi et al. (2000), Perotti (2011) all find possible expansionary effects, if consolidations are done on the spending side and accompanied by favourable macroeconomic conditions such as exchange rate devaluation or supportive macroeconomic policies. Tsibouris et al. (2006) observe that large fiscal consolidations, with budget improvements greater than 5% of GDP, are most supportive for growth. On the other hand, Ardagna (2005) notes that the composition of the adjustment matters much more for the growth effects than the actual size.

This understanding of consolidation implications not only gained high popularity among researchers, but also found its way to the offices of policymakers, which can be seen in the strategies to tackle the European debt crisis (Krugman, 2010; Schäuble, 2011; The Economist, 2016), as well as in the entry statements. However, with the event of double dip recessions in the European crisis countries, following severe consolidation measures to fix their finances, doubt was cast on the real growth impact of adjustments (Crafts, 2013; Canale et al., 2014). Criticisms of the concept included the non-applicability of strong supportive monetary policies with interest rates in zero lower bound environments (Krugman, 2010; Nuti, 2013), underestimation of fiscal multipliers during recessions (Afonso et al., 2011; Batini et al., 2012; Blanchard & Leigh, 2013) as well as serious methodological bias in the traditional method to identify periods of fiscal consolidation (Guarjardo et al., 2014, Jorda & Taylor, 2015).¹

Following these critiques, the ECB changed its position to some extent, acknowledging that under the light of higher fiscal multipliers during crisis periods fiscal consolidations implemented during these times initially cause adverse effects on growth and thereby also on the debt ratio (Warmedinger et al., 2015). However, the ECB still finds these effects to be reversed within a few years later and therefore argues to not overestimate short-term contractions for the sake of longer term improvements in both growth and public debt outlooks. Moreover, they see that especially for countries under severe fiscal stress painful consolidation measures would be necessary even in crisis times, in order to restore fiscal soundness and thereby avoiding abruptly negative market reactions (Warmedinger et al., 2015).

Although it might be too early to judge the success of these strategies in the perspective of the Euro crisis, several authors therefore conclude to deem the concept of expansionary austerity and its effect on policy making seriously flawed in the better case and disastrous in the worst case (De Grauwe & Ji, 2013; Krugman, 2013; Nuti, 2013; Stiglitz, 2014). Concluding, since it seems that expansionary adjustments are rather the exception than the rule, this paper will use the notion “growth-friendly” for fiscal adjustment instruments, that act less contractionary on GDP growth than others.

¹ A more detailed description on the methods how to identify periods of discretionary fiscal adjustments will be given in Section 2.3.

2.1.2 The effect of fiscal consolidation on government debt

'Restoring confidence in our ability to cut the deficit is a prerequisite for balanced and sustainable growth. [...] Without this confidence there can be no durable growth.'

Wolfgang Schäuble, 2010

In contrast to the studies on growth impacts, the literature on the effects of fiscal adjustment is rather conclusive. It is widely acknowledged, that in most of the cases, consolidations, if done in the right way, are an important tool to restore public finances in the short and medium run. Consolidations, which achieve this target, are defined as "successful". Hence, most of the literature aims to identify factors that lead to successful consolidations. Similarly like for growth, many scholars discuss the effect of the adjustment composition on the success.

The European Commission (2007) undertakes an intensive research on the triggers of fiscal adjustments, their composition as well success determinants. Their most relevant finding consists of the fact that the different effect of cold-shower and gradual adjustments on the success is narrowing the more current the data are. While until 2006 there were much more cold-shower than gradual consolidations among European Union member states, their effect is found to be nearly identical. Interestingly, they also find that for European countries the success is determined by the compositions of the adjustment. Especially those relying more on cuts of transfers and non-wage government consumption are leading to higher success rates. Furthermore, they also find a link between bad initial conditions, the undertaking of structural reforms during the consolidation and higher success rates. In a review of this study from 2014, using a different approach (see Section 2.3), they sharpen their conclusion to some extent: Especially if the consolidation targets compensation of employees and social benefits, they see a higher chance of success. While expenditure driven adjustments are still seen as the most successful, "in 3 out of 5 cases the strategy was mixed", ergo consisting of a combination of tax raises and spending cuts.

In this vein, also Campos et al. (2011) discovered that EMU countries used to undertake most adjustments on the revenue side shortly before the introduction of the Euro – most of them not persistent on debt and deficit reduction. This seems to be mainly caused by cyclical and interest rate conditions, which made it easier to comply with the Maastricht convergence criteria without the need to undertake painful expenditure cuts.

Wagschal & Wenzelsburger (2006) state, that lowering state expenses would be an especially important pillar of adjustments when they are combined with measures that

bring down unemployment. Countries that cut social transfers most severely are seen as the most promising consolidators. Molnar et al. (2012) dedicate an intense empirical analysis on conditions that affect both the start and the success of fiscal consolidations. They find that consolidations are most likely to start under the following circumstances: A large initial size of the budget deficit, an unfavourable high-interest rate environment, fiscal contractions in other countries, and newly elected, centred governments. To be successful, a fiscal adjustment is deemed to be mostly spending side based (which is also confirmed by Afonso et al., 2006). However, the authors stress that accompanying consolidations are crucial to enhancing the success probability, especially increasing GDP growth and declining interest rates. Furthermore, centred governments in office during a consolidation, as well as the existence of binding fiscal rules, are found to be favourable for the success.

The relevance of monetary conditions is e.g. observed by Ahrend et al. (2006), who focus their analysis on the start, length, size and debt reduction of adjustments. Epitomized in the changes in short-term interest rates, they analyse required accompanying monetary policies and find that easing monetary policy, especially in the beginning of the consolidation, will help to stabilize debt. However, since they state that most adjustments take place in times when the output gap is high (indicating a crisis situation) it is not surprising that under these circumstances monetary easing will be the case more often. Yet, they also state that the interest rate change in such a situation will not only be driven by the monetary policy but also by the quality investors assign to the referring fiscal tightening. Therefore, expenditure-based adjustments might also contribute to easing interest rate conditions and through this channel to higher cumulative debt reductions. Baldacci et al. (2013) find that in the medium run gradual adjustments with mixed compositional specifics that aim at preserving investment are most effective to reduce debt.

Another reason why expenditure-based adjustments are more successful might lie in their effect on financing conditions. As Schaltegger & Weder (2010) discuss, these kinds of consolidations, when sufficiently large, are able to bring down long-term interest rates, while revenue improvements do not. On the other hand, Ardagna (2004) finds that the size of the adjustment matters more for its success than the composition. Tsibouris et al. (2006) discover that very large consolidations, which include a budget improvement of at least 5%, have the best chances for success, especially when they target the government wage bill. They stress the importance of introducing them gradually, spread over several years. However, the occurrence of such large consolidations appears to be triggered by the combination of high debt, high inflation, and low growth performances.

Barrios et al. (2010) underline the special circumstances within the situation after 2008 in many European countries: With the dangerous mix of private deleveraging (mainly in banking) and resulting elevating public debt, the classical macro trade-off between consolidation and stabilization seems to be blurred. Therefore, they assign the solving of the banking sector weakness first priority, since stabilization can only take place once the credit channel is no longer impaired. They see this theory confirmed by the data, which indeed show a much higher success rate for consolidation undertaken after, than during a financial crisis. In this vein, they focus their work on the effect of high starting debt level on the success of fiscal consolidations. After considering several other determinants they control for sample selection bias caused by higher needs to consolidate when the debt level is high. However, it seems that the initial debt level just plays a secondary role for the success compared with all other determinants. Yet, they find that under the light of high interest rate GDP differentials and high initial debt cold-shower adjustments are much more relevant. If these conditions are not given, the data rather suggest the usage of gradual adjustments - departing from the main analyses above.

Von Hagen & Strauch (2001) examine the importance of the economic conditions under which adjustments take place. Among others, they find that being in a favourable cyclical position as well as a general negative fiscal stance of OECD countries are relevant for success while monetary policy rather plays a minor role. They explain the externalities with the spill-over effect that stems from other countries' need to consolidate.

The political factors seem to play an especially decisive role for the size of the fiscal adjustment. In particular, big and painful adjustments appear to be best timed shortly after an election when the public support for the government is still high. However, the political alignment of the government is found to be insignificant (Alesina, 1998). Others doubt the effect of fiscal rules such as the Stability and Growth pact on success. Testing for any discretionary effect of the SGP Ionnou & Stracca (2014) only find positive contributions in the time before the introduction of the Euro. It seems that many member states, which were exerting significant efforts to comply with the criteria, stopped this once the rules were perceived less binding in the beginning of the 2000s.

Summarizing, it seems that the literature is relatively conclusive about the determinants that lead to sustainable reductions in debt and deficit. While expenditure-based adjustments are mostly deemed to be more successful, some authors also stress the importance of a well-defined mixture of spending cuts and tax decreases, especially if the latter are focused on business harming taxes (Alesina & Perotti, 1995; Alesina & Ardagna, 2009). Evidence also suggests that favourable external economic environment is important

(von Hagen & Strauch, 2001; Tsibouris et al., 2006). Especially easing monetary conditions and an active exchange rate policy are seen as positive companions. Views are somewhat split on the effect of the initial size of the consolidation package. While some authors evaluate cold-shower adjustments as the optimal strategy (Alesina & Perotti, 1995; Tsibouris et al., 2006) other rather see a case for a more gradual approach (European Commission, 2007; Batini et al., 2012). Other influences, like the existence of fiscal rules, the fiscal strategy of others countries, governmental structure and election cycle have been examined a bit less prominently but seem to contribute at least moderately to the success. Based on the above-mentioned studies, Table 1 summarizes adjustment instruments based on their impact on government debt and GDP growth.

Table 1: Economic Effects of fiscal consolidations²

	Impact on	
	Growth*	Success
General features		
Spending cuts	-	++
Revenue increases	--	~
Significant size	--	+
Cold shower instead of gradual	-	~
Accompanying Macro conditions		
Currency devaluation	+	++
Interest rate decrease	+	++
GDP growth	X	++
Inflation	-	+
Initial debt ratio	-	+
Banking crisis occurrence	-	-

² +/-/~ denotes a positive/negative/ambiguous impact, two signs denote a particularly strong impact.

* In line with the above mentioned general negative consolidation impact on GDP growth one "-" here is to be interpreted as less contractionary.

Source: Author's own illustration, based on: European Commission (2007); Molnar et al. (2012)

2.2 The effect of fiscal consolidations on income inequality

'You shall be fair. To be sustainable over time, the fiscal adjustment should be equitable.'

Olivier Blanchard & Carlo Cotarelli, 2010

While there is a large body on the effects of fiscal consolidations on government-debt-ratios and GDP growth, a comparatively smaller research stream is focusing on the resulting distributional effects. On the other hand, the causes of income inequality have attracted considerable attention very recently. Most studies find that national income per capita, education, trade openness and technological change are main levers for differing inequality values across countries (Acemoglu, 2003; IMF, 2007; Barro, 2008). However, also fiscal policy is seen as one of the determinants of an income distribution within a society. Especially the design and progressivity of tax systems and spending policies are deemed decisive for income distributions (Bastagli et al., 2012; Chu et al., 2014). Although many studies focus on the reasons for elevating inequality, there is only a limited amount of research taking into account changes in the fiscal stance and in particular on adjustment efforts. The IMF attracted some attention to this topic with its "Ten commandments for fiscal adjustments in advanced economies". As commandment number 4, they stress the importance of "fair" (meaning equality-friendly) adjustments as a prerequisite to being sustainable (IMF, 2010). Therefore, this section presents a review of the existing literature related to the distributional character of fiscal consolidations and possible trade-offs with other policy goals.

2.2.1 The distributional effect of fiscal consolidations

Several studies point out that in general fiscal consolidations inherit negative effects on income distribution.³ Using a panel of 18 industrialized countries Agnello & Sousa (2012) present evidence that inequality generally increases during periods of fiscal consolidation. Ball et al. (2011) find that a consolidation of the primary balance about one percent of GDP leads to a reduction of inflation-adjusted income by 0.6%. Smeeding et al. (2000) observe that a fiscal consolidation normally leads to increased poverty and thereby rising income gaps. Woo et al. (2013) & the IMF (2012) find that large consolidations (greater than 1.5% of GDP) significantly increase inequality, while smaller ones do not. Moreover, they observe the cumulative inequality effect of consolidations peaking after five to six years and fading

³ Although it also has to be noted, that for example the World Bank once argued for the opposite. Tanzi et al. (1999) claimed that successful stabilizations lead to reduced inequality, as a "collateral effect" of the general economic stabilization.

just ten years after the start. The IMF (2014) acknowledges that “fiscal consolidation can affect income inequality through its impact on the distribution of both market and disposable income”. The main reasons are seen in the short-run reduction in output and employment, followed by declines in wage shares briefly after a consolidation. Especially when accompanying growth is weak, these effects may be long-lasting and particularly self-reinforcing. This thought is particularly interesting for this paper, since - if this vicious circle assumption holds - it supports the idea that consolidation packages should be both growth- and equity-friendly.

Especially the rise in unemployment, which usually follows a period of fiscal adjustments, is seen as the main trigger for widening income gaps (Leigh et al., 2010; Woo et al., 2013; IMF, 2012). More precisely, Ball et al. (2011) find that a reduction of the primary balance about one percent of GDP leads to an increase in unemployment of 0.5 percentage points in the course of two years. Since short-term unemployment is estimated to improve within another year, they interpret the rise in long-term unemployment as the main trigger, which also persists five years after a consolidation. The delicacy here consists mainly in the fact that the poorest parts of society - the long-term unemployed - are likely to be affected disproportionately much by consolidations. Data show, that the share of long-term unemployed in OECD countries either was already relatively high before the Great Recession (e.g. France, Germany, Italy, Japan) or increased significantly in others (e.g. Greece, Spain, Ireland) (OECD, 2016).

A rise in long-term unemployment adds to widening inequality through several mechanisms. First and foremost, job loss is generally associated with a permanent reduction of household income. Second, by being unemployed for a long time, employees' health, academic and professional performance is expected to be adversely affected the longer the unemployment spell persists. Psychological effects also play a role here: As Dao & Loungani (2010) argue, people out of a job tend to lose self-confidence and skills, which in turn affects potential employers' assessment and therefore reduces their chances on the job market. Thereby, not only the individual, but also their children's earnings potential is found to decrease. These effects contain the risk of detaching workers from the labour market and therefore build a structural problem for a society which is referred to as “unemployment hysteresis” (Blanchard & Summer, 1986), which ultimately leads to another problem. Namely - Third - the longer the unemployment period persists, the lower the chances are to be rehired. Blanchard & Summers (1986) for instance find that a person in the United States being unemployed longer than six months has a chance of being

rehired in the next month of 10% while the chances for short-term unemployed are roughly 30%.

The rise in inequality after a consolidation can also be explained by the different earning structures in society: While people in lower income clusters usually generate their income only from labour related wages, higher income classes traditionally generate further income streams from capital profits and rents. Especially households that are credit constrained or do not participate in capital markets are found to be more affected by consolidations (McManus, 2011). Now, while losses in profits and rents are perceived to be short-lived, wage losses persist over time via the unemployment channel. Proof for this hypothesis comes from Ball et al. (2011), who find that inflation-adjusted wages fall on average by 0.9% for every 1 percent of GDP, while inflation-adjusted rents and profits only fall by 0.3%. Ahrend et al. (2011) observe that fiscal consolidations reduce relative incomes in the lowest two income quintiles and worsen the relative labour market outcome for both youngsters and pensioners, thereby leading to higher poverty and more inequality.

These channels open some avenues for how to assess different adjustment strategies in terms of their distributional impact. Leigh et al. (2010) observe that spending cuts affect unemployment faster and stronger than tax hikes. Mulas-Granados (2005) finds evidence that spending-based adjustments generally come with the price of higher income inequality. Although he observes that inequality indexes rise after both types of fiscal adjustment, the increase is stronger after spending based ones. Agnello & Sousa (2012) find that consolidations mainly relying on spending cuts lead to a substantial widening of income gaps. This effect is found to be amplified if growth is low during the referring period and also with increasing sizes of adjustments. On the contrary, tax hikes are found to have an equalizing effect on income inequality. These results can be interpreted in the vein that low-income households suffer from cuts in social spending while higher taxes affect high-income-households the most as former experiences clearly demonstrate (Rawdanowicz et al., 2013; Ortiz & Cummins, 2013). This is also supported by the decrease in government consumption and the cut in government investment, which is usually included in consolidation programmes and result in a fall in public sector wages and a rise in unemployment (Agnello & Sousa, 2012).

Moreover, Agnello & Sousa (2012) observe that inequality does not significantly rise if fiscal consolidations are implemented during banking crises while on the other hand the effect is sufficiently large when the implementation is done in the aftermath of banking crises. In line with the work of Barro (2008) they refer to the nonlinear relationship that might exist between inequality and income. This theory grounds on the work of Kuznets (1955), who

points to an inverse U-style effect of societies' GDP levels on income inequality: While in the early stages of economic development only a small part of the population benefits, the contrary is true for societies that reached already high levels of development. Therefore, this relationship can be expressed as a positive impact of per capita income and a negative one of the referring square on inequality. Buyse (2015) argues against that belief and claims that GDP growth might add to rising inequality during fiscal consolidations. The more growth achieved during consolidation episodes the bigger the increase in inequality measures results might be.

Jenkins et al. (2011) find that countries with a relatively strong welfare state do experience a smaller adverse distributional impact in economic crises as a result of greater automatic fiscal stabilisers. Mulas-Granados (2005) confirms these findings analysing 53 adjustments in 15 EU countries over four decades. In addition, he points out that there might be room for an enhancement of social safety net and more progressive tax measures during spending cuts in order to offset negative distributional effects, since these are associated with narrowing inequality ratios (which is also confirmed by Martinez-Velazquez et al., 2012; Joumard et al., 2012).

The IMF (2014) states that raising regressive taxes and cutting progressive spending tend to increase income inequality considerably. They conclude that the key to equity-friendly adjustments lies in the progressive mix of different instruments. Yet, they acknowledge that consolidation packages, however progressively designed, may still lead to short-term inequality rises. In this vein, Woo et al. (2013) use the ratio of direct to indirect taxes as a proxy for tax progressivity and observe that higher values as well as higher social spending introduced in the context of general spending cuts are clearly associated with reducing inequality. They derive that adjustment packages should consider distributional effects to cushion the blow for the most vulnerable ones (which is also confirmed by Chu et al., 2000). The work of IMF (2012) acknowledges that both spending and revenue side measures have important implications for employment and inequality that are relevant in order to make the consolidation package sustainable. Therefore, they see the degree of tax progressivity and access to social benefits as keys to limit the negative effects of adjustment packages. Looking at twelve case studies of large consolidation episodes they find that their impact on the income distribution varies with the composition of the consolidation package, as well as the country's position in the business cycle and labour market conditions. They find that spending-based consolidations tend to be larger and longer and have a higher impact on income distribution than revenue based ones. Especially cuts in social benefits are found to be most painful measures on the spending side. Turning to tax hikes, they observe that

consolidations that rely more on indirect taxes tend to worsen inequality. The most equity-friendly consolidations are found to be the ones where indirect tax increases were combined with offsetting measures targeted at poor households.

Macroeconomic conditions also seem to matter for the decision on which consolidation instrument to use. Mulas-Granados (2005) observes that governments tend to undertake inequality-enhancing spending cuts, whenever the macroeconomic conditions worsen considerably. Especially GDP growth seems to be lower before expenditure cuts than before revenue increases. Moreover, the same applies to unemployment rates, government debt and deficit values and inflation rates. This could be interpreted as a higher willingness of the population to accept painful measures when times are perceived to be bad or the economic stability is under severe stress.

The choice on which of the targets to follow within consolidations is also found to be influenced by political factors, such as electoral outlooks as well fragmentation and political stance/ideology of the government in power (Mulas-Granados, 2002, 2003). Schaltegger & Weder (2014) find that especially consolidations implemented by coalition governments are related to lower levels of income inequality while the opposite is the case for single-party or minority governments. They interpret these results in the sense that coalition governments might be more dedicated to serve a broader set of interest groups and therefore be better suited to deal with distributional concerns and spreading the burden of consolidation throughout society.

Woo et al. (2013) stress the importance of avoiding significant worsening of income distribution during times of fiscal consolidation, since consolidations perceived as unfair might be difficult to maintain (also confirmed by McManus, 2014).

2.2.2 The trade-off between growth, debt, and equality friendly adjustments

It seems that many of the features of successful and growth-friendly adjustments stated in Section 2.1 are not particularly equality-friendly, meaning that they would support higher income inequality. Yet, there is also evidence that not all of these targets always have to be necessarily conflicting.⁴ As governments always face the choice between several goals, fiscal policy should serve, and can draw on a multitude of instruments to achieve these

⁴ E.g. Ostry et al. (2014) argue that redistribution in general might have two different effects on growth: While they see the general impact of redistribution to be growth distorting, they acknowledge that the resulting lowered inequality offsets this effect, since low inequality is associated with more durable growth. They conclude that in general redistribution might be more pro-growth, while meeting other policy targets (lower inequality) at the same time.

ends, it is worth looking at possible trade-offs between growth, debt and inequality targets within fiscal consolidations.

There are several explanations for the mechanics of potentially contrary effects of consolidation on income distribution and GDP growth. In line with previously mentioned scholars, Mulas-Granados (2005) observes possible expansionary consolidations as those, that focus on the spending side and there on the most rigid budget items, namely public wages and social transfers. However, he interprets reductions especially in these areas as income inequality increasing. This reasoning builds upon the work of Ayala et al. (1999) and Chu et al. (2000) who present empirical evidence that social spending is strongly attributed for reducing inequality. Notably, public health spending, pensioners and education spending are found to be most suitable to reduce inequality.

On the tax side there is evidence that proportionally high direct taxes are suited to distribute income from the high-earning household to the state and via the described channels to the worse-off (Mulas-Granados, 2005; IMF, 2012; McManus, 2014). However, these taxes are seen to be distortive for the efficiency and functioning of free markets and therefore harming private investment and productivity (Przeworski, 1986; Boix, 1996). Hence raising these taxes as an instrument of consolidation efforts might inherit a positive effect on reducing inequality, but rather a negative one for growth perspectives. Espinoza & Ruiz (2016) simulate different fiscal policy changes in France and evaluate them on their growth and inequality impact. They find that capital income tax cuts in the current situation of the country would be most suitable for employment and output targets, followed by income tax cuts. When focusing explicitly on inequality reduction they find that targeted labour tax wedge cuts and a higher provision of public goods would be appropriate tools to meet both policy targets. However, these instruments are seen as drag for the fiscal balance. Fiscal neutral policies, sufficing both targets would include labour tax reductions combined with cuts in public employment. The ECB notes that well-designed consolidation packages, such as targeted cuts in unproductive spending and revenue measures aimed at greater tax system efficiency and fairness are most suited to reach fiscal sustainability in line with other policy goals (Warmendinger et al., 2015).

Kaplanoglou et al. (2013) find that "fair" fiscal adjustment programmes lead to higher probabilities of success. They mainly focus on progressive taxation and social transfers and find evidence that adjustments that are accompanied by redistributive policies aiming for higher progressivity are more likely to succeed. In this vein, Rawdanowicz et al. (2013) analyse the distributional impacts of different fiscal adjustment instruments. Interestingly for this paper, they find that several consolidation instruments are consistent with both:

Reducing income inequality without harming growth. They define the progressivity of each instrument and its relative weight in the tax and transfer system as decisive elements for distributional effects. Both social spending and taxation of households are found to dampen income inequality in general, although in most OECD countries the former effect outweighs the latter. However, transfers might reduce incentives to work and therefore harm growth perspectives. Some household taxes on the other hand also are distortive to GDP growth. Based on this framework, they observe increases in the effective retirement age, raising efficiency in the education and health care systems, cutting certain tax expenditures, raising taxes on immovable property and broadly-based consumption taxes as suitable instruments to achieve both goals.

The OECD (2013) uses a similar approach to differentiate between consolidation instruments which are growth-supporting, equity-friendly or both at the same time. Based on that, they develop a hierarchical ranking of consolidation instruments. Cuts in subsidies and pensions as well as raising property taxes are ranked highest since they entail strong distributive power without hurting economic activity much, while the opposite is true for cuts on education, family and social security (similar results attained by Martinez-Vazquez et al., 2012). Moreover, they stress the importance of mixing both spending side and revenue side adjustments in order to design optimal growth and equity-friendly consolidation strategies. In the present situation, they see room for half of the OECD countries to achieve their short and medium consolidation needs with almost no adverse effects on growth and equality targets. Norris et al. (2015) stress that even in advanced economies, there is still potential for reinforced redistribution of fiscal policy, mainly by greater reliance on wealth and property taxes, more progressive income taxation and better targeted social benefits.

In this vein, Matsaganis & Leventi (2014), as well as Avram et al. (2013), find that several instruments used by European crisis countries during the Great Recession performed an equalizing effect on relative poverty and inequality. They observe changes in direct taxes and social insurance contributions to be most influential for this end. Furthermore, reductions in public sector payments are found to be inequality decreasing, since civil servants usually belong to the upper part of income clusters. Moreover, Norris et al. (2015) stress the importance of targeting all fiscal policies on improved skill development for all parts of society, as well as investment in infrastructure and innovative capabilities in order to suffice both growth and equality goals.

Summarizing these findings and combining the received wisdom of the economics of fiscal consolidations with their distributional effects, the following extension of Table 1 can be

done. Adding the equality effects of fiscal consolidation features as shown in Table 2 clearly demonstrates trade-offs between different policy targets. Furthermore, based on the mentioned literature, detailed effects of spending and revenue based consolidation instruments can be shown, which will be elaborated on more in detail in the following chapters of this paper.

Table 2: Economic & distributional effects of fiscal consolidations⁵

	Impact on		
	Growth*	Success	Income Equality
General features			
Spending cuts	-	++	--
Revenue increases	--	~	+
Significant size	--	+	--
Cold shower instead of gradual	-	~	--
Accompanying Macro conditions			
Currency devaluation	+	++	
Interest rate decrease	+	++	
GDP growth	X	++	+
Inflation	-	+	
Initial debt ratio	-	+	
Banking crisis occurrence	-	-	+
Spending cuts in			
<i>General Social spending</i>	-		-
Education	--		--
Health	--		-
Family	-		--
Pensions	+		~
Unemployment insurance	~		-
<i>General other spending</i>	-		+
Subsidies	+		++
Public investment	--		~
Gov consumption	-	++	+
Revenue increases in			
Personal income taxes	-		+
Social security contributions	-		-
Corporate income taxes	-	-	+
Environmental taxes	~	-	-
Consumption taxes	-	-	-
<i>General shift to direct taxes</i>	-		++

⁵ +/-/~ denotes a positive/negative/ambiguous impact, two signs denote a particularly strong impact, empty fields denote no clear direct relationships.

* In line with the above mentioned general negative consolidation impact on GDP growth one "-" here is to be interpreted as less contractionary.

Source: Author's own illustration, based on: European Commission (2007); Molnar et al. (2012); Cournede et al. (2013); OECD (2013); Rawdanowicz et al. (2013)

2.3 Stylized Facts of fiscal consolidation

In order to be able to properly assess which impact fiscal consolidations have on income inequality one first has to consider at least three different elements: i) An identification criterion for fiscal consolidation, ii) a reference period and iii) an indicator to measure levels and changes in inequality. Therefore, the following section will discuss different ways to achieve these challenges as used by the literature.

2.3.1 Defining episodes of fiscal consolidation

The existing literature provides a variety of measures to identify consolidation episodes. The first papers to discuss consolidations used the primary budget balance as the referring indicator (Giavazzi & Paggano, 1990; Alesina & Perotti, 1996). Especially Alesina & Perotti's (1996) definition of a period of "tight" fiscal policy was often used as the reference point. This definition considers episodes, in which the primary budget balance falls by more than 1.5% of GDP in one year or at least 1.25 % of GDP per year in both of two consecutive years. However, one of the problems with this approach consists in the adequate measurement for the primary budget. Uncorrected budget balances are heavily influenced by forces policymakers cannot influence directly (e.g. through inflation and real interest rate fluctuations). Therefore, the *discretionary* change in the primary balance would be the most suitable measure. It can be defined as the change in the balance that would have occurred if the policymakers had done nothing (Alesina & Perotti, 1996). To account for this part of the budget, the cyclically adjusted budget (CAPB) became the main reference measure. It is calculated by subtracting estimated effects of business cycle fluctuations on the fiscal account from actual primary balance. Interest expenditure is excluded from this indicator as well since it is not considered discretionary (Guarjardo et al., 2014).

However, it is well-known that using changes in this artificial indicator inherits several shortcomings. The CAPB is known to be distorted by "windfall gains, one-off factors or and asset price fluctuations" (Girouard & Price, 2004) – for example booms in the stock market, which also improves the CAPB, without necessary policy action. Moreover, it omits periods during which consolidations were followed by adverse shocks and offsetting discretionary measures (Guarjardo et al., 2014). As Devries et al. (2011) note, the approach suffers from measurement errors that are correlated with the business cycle and therefore might be underestimating contractionary effect. It often identifies fiscal consolidation in economic upswings where actually no consolidation is implemented.

Based on these limitations, Devries et al. (2011) develop a new, more reliable way to identify discretionary fiscal consolidation policies. Their so-called “narrative” approach builds on policymakers’ intentions and reviews official publications on changes in the fiscal stance, published by institutions such as the IMF, the OECD or national treasuries. Therefore, consolidation episodes identified by this approach refer to periods, in which changes in fiscal policies were motivated by the intention to reduce public deficits. Another advantage of this approach is that by looking at policymakers’ decisions, this procedure eliminates endogeneity problems, consisting of fiscal policy responses to the economy.

2.3.2 Defining a reference period

Usually, full fiscal years are taken as the uniform unit of a reference period (European Commission, 2007). However, as already pointed out, a consolidation can take place either in only one year or over a longer time horizon. In general, the changes in the budget balance within one year and referring other indicators used are observed, although also the cumulative changes over the whole period might be interesting. Therefore, Section 3.2 will present a sample overview of all used consolidation episodes and years.

2.3.3 Measuring distributional impacts

Defining a single indicator that captures the many aspects of economic inequality is challenging if not impossible. There are several ways of how to approach and explore economic inequality, e.g. by focusing on wealth, income, consumption or opportunities (The Economist, 2014). The most common way to address inequality issues in academic literature consists of focusing on income inequality, since there is a relatively high degree of data availability and reliability on it. The most popular approach to measure income inequality is the well-known Gini coefficient, established already in the early 20th century (Hoeller et al., 2012; Keeley, 2015). It uses values between 0 and 1, which would represent a society in which everyone has the same income (no income inequality) and one person that has all the income (perfect inequality), respectively. It therefore characterizes the distribution of income in one economy at a certain point in time. To measure changes in inequality one simply has to observe the trajectory of Gini values from one year to another, where positive values would be associated with a rise in income inequality. In line with other authors (e.g. Agnello & Sousa, 2012; Woo et al., 2013) increases in Gini coefficients will be interpreted as percentage rise in inequality, e.g. an increase of Gini coefficient from 0.3 to 0.4 will be referred to as a 10 % rise in income inequality.

To account for redistributive policies and their effect on inequality, the literature mostly focuses on two different versions of the Gini coefficient: Gini coefficients gross and net of taxes. While the former refers to income distribution before state interventions through taxation, the latter is constructed after deducting them. The difference between these two values therefore represents the absolute redistributive power of a state. More developed economies with fully fledged welfare state systems use higher social spending and taxation to redistribute income, which should be reflected in a higher difference between the two Gini coefficients. Again, and in line with measuring changes in inequality, redistributive developments over time can be measured by comparing the gap between the coefficients, where a growing gap represents greater redistribution of income done by the state.

3 Recent developments in income inequality and fiscal consolidations

'By some estimates, income and wealth inequality are near their highest levels in the past hundred years, much higher than the average during that time span and probably higher than for much of American history before then.'

Janet L. Yellen, 2014

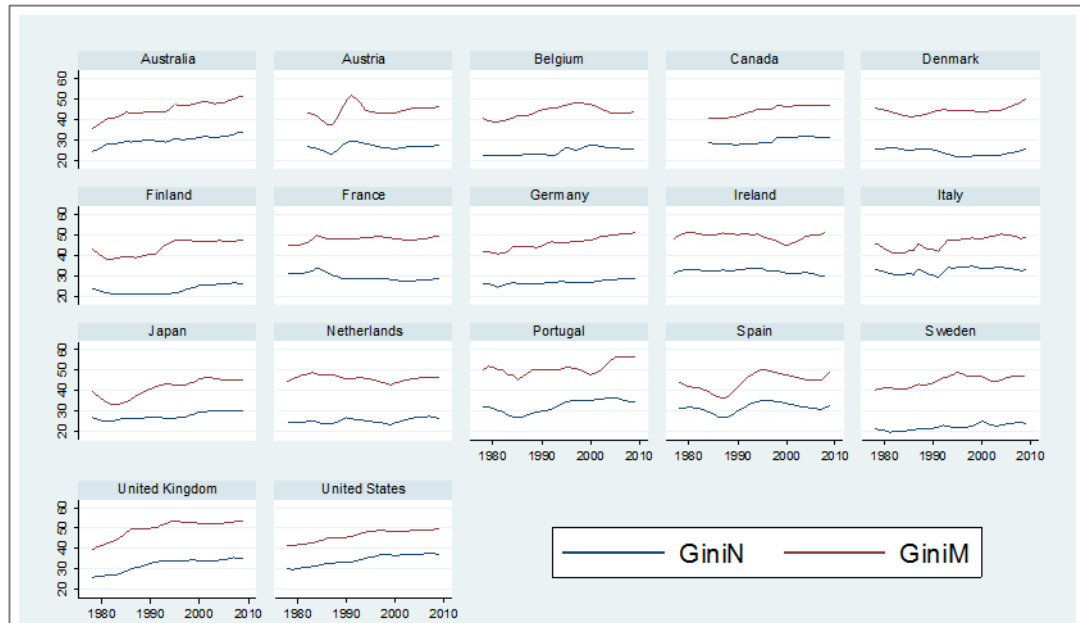
Just as the opening statement by the chair of the U.S. Federal Reserve indicates, income inequality has been on the rise during the last decades. The trend she describes is not only valid for the United States, but also for many other industrialized countries. Hence, in order to be able to understand the effects that contributed to income inequality and therein especially the role of fiscal policy, it might be helpful to have a look at the pattern of inequality evolution over the past decades. This chapter therefore first presents a brief overview of the recent trends in income inequality and dedicates some space to the structural causes, which are generally believed to contribute to the trends discussed here. Afterwards, the turn to specific changes in income inequality during and after episodes of fiscal consolidations should point to some of the specific influences of fiscal policy.

3.1 Recent trends in income inequality

As it can be seen in Figure 1, income inequality has increased over the last decades in most advanced countries that are included in this paper. While in most European countries the Gini coefficients before taxation and social spending stood at levels between 38 and 45 in the 1970s, they increased up to values of around 50. A similar pattern can be seen for the Gini coefficients of net disposable income, which stood below 30 in the 1970s for most European countries. Today the referring values are mostly considerably higher, with the UK being the most unequal European country in the sample (36). The European trends are particularly interesting since these countries are supposed to be among the most equal ones in the world. But also in looking at other regions, one can observe the trend of general rises in inequality. For example, in the world's largest economy – the USA – the Gini net coefficient rose from 31 in 1970 to 37 in 2010, reflecting an even more pronounced trend than in Europe. The focus on a broader sample, given by the average OECD Gini coefficients, confirms this trend. The average net Gini coefficient stood at 29 throughout the OECD countries in the mid-80s and increased to 32 until 2010. It rose in 17 of 22 OECD

countries (OECD, 2011a). Between 1990 and 2012 the Gini coefficient of market income increased on average by more than five percentage points throughout the OECD countries. Also, disposable incomes emerged more unequal so that the referring Gini coefficient increased three percentage points at the same time (OECD, 2011a; FES, 2012).

Figure 1: Evolution of Inequality in the sample⁶



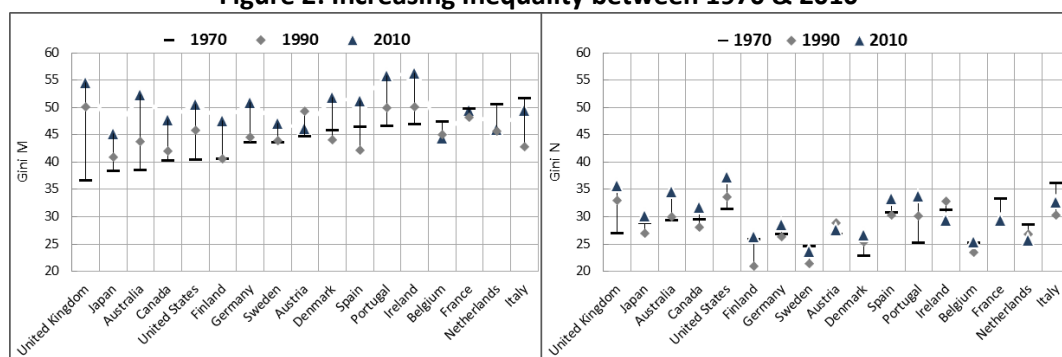
In advanced economies traditionally redistributive fiscal policy played an important role in reducing inequality in market income through progressive taxation, which levies upper-income households disproportionately higher tax rates and by social transfers targeted at the opposite lower income groups. That is the reason why net income inequality is much lower than market income inequality. As can be seen in the gap between the two Gini coefficients, redistribution through taxation and social spending reduces inequality in all countries, on average by 15.8 Gini points in 1970 and 19.7 points in 2009. Surprisingly the overall redistribution through the sample increased until today. The redistributive power of the state in the sample is strongest in Denmark and Sweden (25 & 23 Gini points respectively), who also score the lowest net income inequality and is weakest in the United States and Japan (13 & 15 respectively).

Interestingly, income inequality followed a very different pattern throughout the sample. It first started to increase in the late 70s in the USA and the United Kingdom. Then in the 1980s, it became more widespread and lasted to increase until now. On the other hand,

⁶ Own illustration, based on SWIID data. Note: Gini N refers to the net income Gini coefficient, Gini M to the market income Gini coefficient.

some countries managed to maintain their inequality levels or even improved them. The Netherlands, for example, started from a relatively high gross inequality level of 50.7 and lowered this indicator to 46 in 1990, from where it remained relatively stable until today. Turning to the very recent trends, it is evident that the Great Recession led to a more pronounced increase in inequality in most countries. Although this paper focuses only on data available up to 2010, e.g. the OECD (2015) observes that market income inequality increased on by 1.5 percentage points between 2007 and 2011 throughout all OECD countries, whereby the rise was particularly strong in Greece, Ireland, and Spain – all countries with severe consolidation programmes.

Figure 2: Increasing Inequality between 1970 & 2010⁷



3.2 Causes of increased inequality

Among the structural causes of income inequality, globalization is seen as one of the most decisive ones. International business expansion has led to increases in market capitalizations of large enterprises with resulting higher compensations for top managers and higher dividends for the shareholders. Also technical progress, especially in the information technology and communication sector, contributed to higher skill premiums that increased the wages of top earners. On the other hand, it led to the elimination of many jobs with low skill requirement through automation. Consequently, this skill-biased technological change led to widened income gaps as can be seen by the increasing market Gini values (IMF, 2015). Therefore, wage dispersion (the gap between wages of high and low-income workers) is one of the reasons for rising income inequality indicators. Tax rates for high incomes (e.g. top marginal income tax rates) are observed to have decreased over time. Furthermore, capital gains are often taxed at lower rates than other incomes or in

⁷ Own illustration, based on SWIID data. Note: 1970 Data for Belgium & Portugal are for 1972 & 1973 respectively.

some countries not even taxed at all (OECD, 2015a). Also, the benefits of economic growth seem to have served smaller segments of society. In the USA, roughly 47% of total growth in the pre-tax incomes between 1975 and 2012 was generated by the highest percent of the income distribution (only 20% in Australia and the United Kingdom) (Keeley, 2015). The average disposable income in that time rose only by 1.7% per year, thereby widening the income gaps. A big portion of this increase in income inequality in the OECD, therefore, is ascribed to the income development of the highest 1 percent or even more rarified groups (Alvaredo, 2011).⁸ In the very recent years, inequality received new tailwind, mainly caused by an increase in unemployment and spending cuts introduced as part of the consolidation packages. Thereby, the cushioning effect of redistribution has become weaker, which is observable in the recent slight divergence of the two Gini coefficients in some European countries (OECD, 2015a). Especially the last point highlights the importance of examining fiscal consolidations as a driver of income inequality.

3.3 Income inequality changes during and after fiscal consolidation periods

Analysing the dataset of Devries et al. (2011), one can observe that in the sample of 17 industrialized countries 51 episodes of fiscal consolidations took place between 1978 and 2009. Hereby, an episode may consist of several years (as described in Section 2.3) if the consolidation efforts were ongoing. Applying this approach leads to a total of 165 years, in which consolidations were undertaken, resulting in an episode averaging to 3.24 years. Table 3 shows that the average consolidation size amounts to 3.4 percent of GDP throughout the whole sample. By comparing the cumulative changes in the inequality indexes during these episodes, one can already derive some intuition on the general distributional consequences of fiscal consolidation. As can be seen, fiscal consolidations typically lead to substantial variation in income inequality measures. The market income inequality increases on average 0.92 Gini points during a consolidation episode. Disposable income inequality just increases by 0.33 Gini points, indicating that redistribution might, in general, be cushioning the distributional effect of fiscal consolidations.

⁸ As described in the last section, this paper uses the Gini because it is much more widely available. However, the Gini is relatively insensitive to movements at the tail of the income distribution, so that it fails to accurately capture these developments. One of the reasons is that the richest households tend to be underrepresented in the household surveys used to measure it (Alvaredo, 2011).

Table 3: Overview of all consolidation episodes and their inequality effects⁹

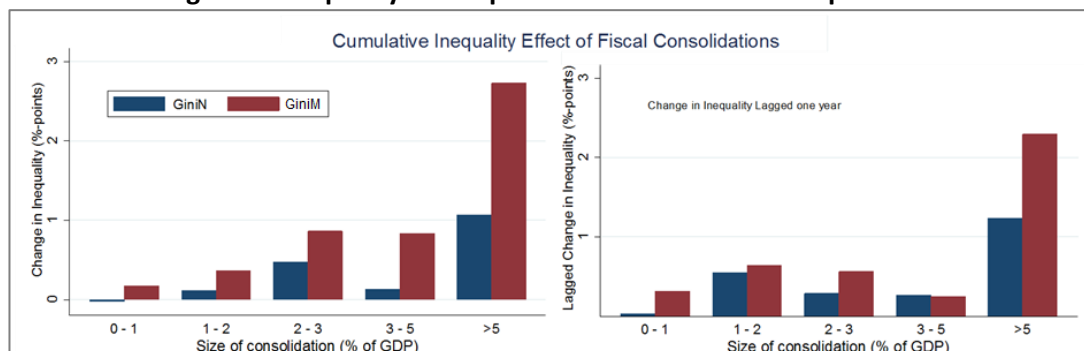
	Period	Δ Cons	Δ GiniM	Δ GiniM, t+1	Δ GiniN	Δ GiniN, t+1		Period	Δ Cons	Δ GiniM	Δ GiniM, t+1	Δ GiniN	Δ GiniN, t+1
Australia	1985-1988	2.47	1.01	0.00	0.82	1.00	Italy	1991-1998	19.23	5.72	6.54	4.59	4.88
	1994-1999	2.47	4.02	3.04	1.82	1.57		2004-2007	4.72	-0.74	-2.20	-0.90	-1.60
Austria	1980-1981	2.36					Japan	1979-1983	1.89	-6.33	-4.21	-1.10	0.07
	1984	2.04	-0.94	-2.16	-0.38	-0.88		1997-1998	1.90	1.18	2.01	1.14	1.32
	1996-1997	3.97	-0.91	-0.44	-1.10	-0.80		2003-2007	2.27	-1.63	-0.68	0.10	0.26
	2001-2002	1.57	1.53	1.40	0.78	0.57	Netherlands	1981-1988	12.98	0.41	-1.28	0.16	0.82
Belgium	1982-1985	5.75	2.91	2.65	-0.01	0.10		1991-1993	1.73	1.00	0.18	-0.90	-0.83
	1987	2.80	0.32	0.16	0.17	0.12	Portugal	2004-2005	2.20	0.51	0.24	0.71	0.41
	1990	0.60	1.08	0.37	0.02	-0.44		1983	2.30	-2.46	0.47	-1.31	-1.04
	1992-1994	3.86	1.12	1.60	1.61	4.40		2000	0.50	-1.12	0.62	-0.10	0.23
	1996-1997	1.91	1.00	0.36	-1.60	0.35		2002	1.60	1.22	2.74	0.32	0.45
Canada	1984-1997	7.93	5.01	6.74	0.49	2.53		2005-2007	3.65	2.13	-0.05	-1.16	-1.68
Denmark	1983-1985	6.69	-1.79	-1.11	-0.88	-0.55	Spain	1983-1984	3.02	-1.81	-2.24	-1.67	-1.93
	1995	0.30	-0.18	0.07	-0.76	0.23		1989	1.22	2.31	2.84	1.43	1.95
Finland	1992-1997	11.43	6.51	4.11	2.02	2.74		1992-1997	6.64	5.26	2.30	3.73	1.93
France	1979	0.85	0.10	0.22	-0.18	-0.12	Sweden	1984	0.90	0.20	0.36	0.25	0.25
	1987	0.26	-0.31	0.15	-1.28	-0.80		1993-1998	10.59	0.67	-0.04	-0.33	1.18
	1991	0.25	0.00	0.04	-0.02	0.04	United Kingdom	1979-1982	2.46	4.04	3.41	0.81	0.71
	1995-1997	2.11	0.64	0.03	-0.28	-0.27		1994-1999	2.61	0.56	-0.90	0.65	0.32
Germany	1982-1984	2.23	3.40	2.59	2.10	0.98	United States	1978	0.14	0.05	0.04	-0.34	-0.48
	1991-1995	3.67	1.66	0.36	0.76	0.38		1980-1981	0.29	0.41	0.52	0.75	0.66
	1997	1.60	0.21	0.16	-0.13	-0.13		1985-1986	0.31	1.50	0.89	1.26	0.71
	1999-2000	1.00	0.54	1.09	0.01	0.43		1988	0.85	0.20	0.21	0.12	0.10
	2003-2004	1.14	0.82	0.66	0.39	0.41		1990-1998	3.92	3.45	2.98	3.73	3.47
	2006-2007	1.40	0.74	0.44	0.78	0.34							
Ireland	1981-1987	10.05	-0.14	-0.55	-0.18	-0.41	Average	3.24	3.40	0.92	0.76	0.33	0.47
	2008	4.74	1.74	2.01	-0.20	-0.12	Σ episodes/years	51/165					

Since the full distributional effects of policy changes are considered to take some time until they fully unfold, the same analysis is repeated with a lag of one year in the inequality measures. Hereby, the market income inequality is surprisingly observed to increase on average slightly less (0.78 Gini points), while net inequality grows stronger than during the consolidation episode (0.45). The reason for this development could lie in the better employment situation that usually starts to improve whenever fiscal policy relaxes (IMF, 2015). In general, it is quite evident that inequality rises after consolidations, although there are also some exceptions. For example Ireland's long lasting consolidation in the 1980s was followed by slight decreases in all inequality measures, while for example a bigger decrease in inequality took place after Japan's fiscal contraction from 1979 onwards. In Figure 3 the total size of consolidation is plotted on the horizontal axis against the cumulative inequality changes on the vertical axis. Hereby, the consolidation sizes are grouped into the most frequent ranges that are also roughly equally distributed. The right part of the chart repeats the same exercise with one year lagged change in the inequality measures. It can be seen that the size of the consolidation seems to matter for the resulting income inequality changes. In particular, larger consolidations are followed by widening income gaps. This indicates that these consolidations affect households at the bottom of the income distribution disproportionately much. When the consolidation represents a small share of GDP the impact on market inequality during the consolidation and one year after is also relatively small. For disposable income inequality, the effect is even neglectable when

⁹ Own illustration, based on SWIID & Devries et al. (2011) data

the consolidation is below 1% of GDP. One reason could be that larger adjustments might include deeper spending cuts that hit poor households more.

Figure 3: Inequality development after consolidation episodes¹⁰



The OECD (2015) argues that with greater progressivity in place, greater inequality always leads to more redistribution. Referring to the Great Recession, they observe that higher tax-benefit redistribution was able to cushion the sharp rise in market income inequality. Part of this cushioning effect happens “automatically”, even if no policy action is undertaken - mainly due to the effects of automatic stabilizers. The main rise in both inequality measures during this time is seen to be grounded in increasing unemployment, which in turn exerted considerable downward pressure on real wage growth and thereby acted as self-reinforcing effect.

However, these analyses neither account for any features related to the nature of each consolidation (e.g. composition) nor for their accompanying macroeconomic conditions, so it will be important to address these points in the next chapters.

¹⁰ Own illustration, based on SWIID & Devries et al. (2011) data

4 Methodology & Data

The following chapter is dedicated to the formulation of the applied econometric model to test the theoretical and empirical findings from the literature. Therefore, it is necessary to lay out a reliable baseline model, which is robust to changes of variables and data. Since changes in inequality can only be studied in using longer time horizons and across different countries, a broad dataset will be needed to obtain meaningful conclusions. When working with such diverse data, usually problems of unobserved heterogeneity and omitted variable bias are likely to arise and to threaten the model to be biased. Careful modeling strategies can help alleviate and perhaps even avoid these problems. Therefore, this chapter will first give a brief description of the methodologies used to test the relationship between the variables and then turn to the dataset and the derived variables

4.1 Methodology

In order to test the relationship between fiscal adjustment measures and resulting changes in inequality this paper applies panel data technique, to consider both cross-sectional and time dimensions. This paper thereby based on similar research of IMF (2012), Woo et al. (2013) and Agnello & Sousa (2014), who all - among other methods - use panel techniques. This method is especially suitable for this purpose since - as opposed to pooled regression techniques - it allows to control for individual heterogeneity. If individual heterogeneity would not be accounted for (as would be the case in pooled regression techniques) the estimates are likely to be biased, since they would e.g. not consider country-specific and time-invariant features (Agnello & Sousa, 2014). Hereby, the error terms are assumed to have a zero mean, constant variance and moreover no correlation with the regressors. When applying panel technique, one has to consider the structure of the error term: It could either be fixed or random. The referring structure depends on whether a correlation between individual not observed heterogeneity and the regressor exists (in case of fixed effects) or not (random effects). In the case of high correlation the random effects models then would yield to biased results. To test this relationship a Hausman test will be used to compare both models by testing the null hypothesis of no correlation between regressors and error term. The null hypothesis hereby states that the unique errors are correlated with the regressors, which would lead to the usage of random effects while the alternative hypothesis states that they are not and fixed effects would have to be used.

Following on which of the hypotheses hold, the referring model will either be constructed with fixed or random effects.

Another precondition for the proper use of panel data models is the non-stationarity of the dependent variable (Im et al., 2003). There are many different ways to test the non-stationarity of a panel, however only a few are suitable for unbalanced panels. Hence, an Im-Pesaran-Shin test for unbalanced panels will be applied in order to verify if the panel is non-stationary. This test is also undertaken by Schaltegger & Weder (2014), so that the results here can be compared.

Although panel technique already solves for the problem of unobserved heterogeneity, one still has to care about certain specifics of the residuals of the regression, in order to be able to derive meaningful results. First, the specified model assumes the residuals to be roughly normally and independently distributed with a mean of zero and constant variance. If the assumption of normal distribution would be hurt, the test statistics would likely be biased and in extreme cases, the model would be inadequate (Jarque & Bera, 1987). In order to test the normality of residuals, several visual tests, such as kernel densities as well as formal tests, such as an augmented Jarque–Bera test will be undertaken. Moreover, the model assumes the variance of the error terms to be constant, which is referred to as homoscedasticity. The errors variance hereby might increase with increasing values of independent variables, so that heteroscedasticity could occur. In such a case the standard errors and the test statistics of the model would be severely biased and a usage of robust standard errors would be needed (Hayes & Cai, 2007). Hence, again visual tests such as residual plots as well as a formal test such as the Breusch-Pagan test will be undertaken to detect heteroscedasticity.

4.2 Econometric Model

This paper builds upon the existing regression benchmark as described in the literature review. The most promising models hereby consist of the work done by IMF (2012), Woo et al. (2013) and Agnello & Sousa (2014). As a starting point for this analysis, the model of Agnello & Sousa (2014) is used. In their standard regression the following equation is applied:

$$Y_{it} = X_{it} \beta + \alpha_i + U_{it}$$

Where $Y_{it} = (Y_{it}^{\text{market}}, Y_{it}^{\text{net}})$, represents the market and the net income Gini index respectively. The regressor matrix is denoted by $X_{it} = (X_1^{\text{market}}, X_2^{\text{net}})$, where $\beta = (\beta_1^{\text{market}}, \beta_2^{\text{net}})$ are the associated coefficients. In line with Section 3.1, α_i and U_{it} are the error terms, assumed to have zero means and mutually uncorrelated with X_{it} . Their main regressor matrix consists of the log of per-capita GDP and its squared form, trade openness, and variables, capturing fiscal consolidation occurrences. Different than Agnello & Sousa (2014), Woo et al. (2012) propose to use lagged independent variables, meaning one year shifted values in each independent variable. Applying time lags seems convincing, since - as described earlier - the effects of fiscal consolidations need some time to fully unfold. Especially their effects on income inequality are expected to occur with some time lag since they work through different channels. Therefore, this feature will also be applied here in order to account for delayed effects. Another interesting proposal of Woo et al. (2012) consists in the consideration of inflation as another control variable, which will be also used here. These augmentations lead to the following baseline model:

$$\text{Gini}^{\text{market}}_{it} = \text{cons.} + \beta_1 \log_GDP_{t-1} + \beta_2 \log_GDP^2_{t-1} + \beta_3 \text{inflation}_{t-1} + \beta_4 \text{tradeopenness}_{t-1} + \beta_5 \text{fiscal consolidation}_{t-1} + \alpha_i + U_{it}.$$

This paper will start with using the market income Gini coefficient as dependent variable first, since the literature suggests, that this variable is more directly influenced by the most of the independent variables. Later on, it will be replaced by the net income Gini coefficients as stated above. Fiscal consolidation hereby will first be proxied by the dummy variable capturing the occurrence of a consolidation period, before being replaced by the actual value of the primary balance improvement in per cent of GDP. Afterwards, the baseline model will be augmented in different ways, in order to test the mentioned effects. Table 4 presents the adaptations in the baseline model undertaken in the following two chapters.

Table 4: Model overview

#	Title	Dependent var.	Independent var.
1	Effects of fiscal consolidations on market income inequality (<i>baseline model</i>)	Gini_M	<i>GDP per capita, log; GDP per capita sqrd, log; Trade Openness; Inflation; Consolidation (all lagged)</i>
2	Effects of fiscal consolidations on net income inequality	Gini_N	Same as above
3	Distributional effects of tax- and spending-based consolidations (Conventional approach)	Gini_M & Gini_N	Instead of <i>Consolidation</i> : <i>Tax Consolidation & Spending Consolidation (Occurrence dummies & % of GDP)</i> ; (all lagged)
4	Distributional effects of tax-only, spending-only and mixed consolidations (Augmented approach)	Gini_M & Gini_N	Instead of <i>Tax Consolidation & Spending Consolidation</i> : <i>Tax Only; Spending Only; Mixed (Occurrence dummies & % of GDP)</i> ; (all lagged)
5	Effects of fiscal consolidations on income inequality in the year of occurrence (<i>Sensitivity 1</i>)	Gini_M & Gini_N	As is baseline, but without lags
6	Distributional effects of tax-only, spending-only and mixed consolidations in the year of occurrence (augmented approach) (<i>Sensitivity 2</i>)	Gini_M & Gini_N	As in conventional & augmented composition approaches, but without lags
7	Specific effects in European countries (<i>Sensitivity 3</i>)	Gini_M	As in baseline & augmented composition approach
8	Effects in both samples halves (<i>Sensitivity 4</i>)	Gini_M	As in baseline & augmented composition approach

4.3 Data

As described above, the IMF's narrative approach depicts the most appropriate way to identify periods of fiscal consolidation. Hence, data availability dictates the use of the sample and the time frame. This paper, therefore, bases its econometric findings on all of the data included in this dataset, resulting in a sample of 17 countries (Devries et al., 2011).¹¹ Another advantage of this dataset in terms of statistical analysis consists of the selection of countries. All included countries are classified as high-income countries, which makes it a relatively homogenous sample group. Hence, possible variability in the results stemming from very different country development patterns can be avoided. The sample period spans from 1978 – 2009. Using this approach is seen as the most precise and state-of-the-art way of studying fiscal consolidation and inequality in academic literature, as the works of IMF (2012), Woo et al. (2013) and Agnello & Sousa (2014) suggest. Incorporating

¹¹ More precisely the countries used are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Portugal, Spain, Sweden, the United Kingdom & the United States of America.

this approach leads to a potential amount of 544 observations across countries and years. Based on this, the following variables can be used to econometrically test the studied relationships in the sample.¹²

4.3.1 Dependent variables

Gini index (Market & Net income Gini): In line with the overall inequality literature the Gini index is used to account for income inequality and referring changes over time as well as comparisons across countries. Focusing on two different variables of interest by differentiating two income definitions (gross and net of taxes and social spending by governments), helps to account for redistribution, which is the difference between the two values. This might be particularly important for the advanced economies included in the sample, which use greater redistributive power in order to dampen income inequality. Gross inequality is often used synonymous for market income inequality, although this paper will only use the latter name. Similarly, net income inequality is sometimes referred to as disposable income inequality. Data for the Gini indexes are taken from the Standardized World Income Inequality Database (SWIID), version 4.1. This database depicts the most comprehensive inequality database at the moment and harmonises results of different studies and therefore generates greater comparability (Solt, 2014). In line with most empirical work on income inequality and based on the SWIID data, the original Gini index scale, ranging from 0 to 1 is slightly adapted and multiplied by 100 for better data comparability. Hence, the sample data for the indexes range from 33.1 to 56.6 for market income inequality and from 19.7 to 37.8 for net income inequality (see Appendix 2). Moreover, a rise of the Gini coefficient about 1 point is then referred to as an increase in income inequality about 1%. Apart from that, no changes in the raw data are undertaken, to keep the data comparable with other research papers. Also, a possible logarithmic transformation of the Gini data as suggested by Woo et al. (2014) will be abstained from, since the data point to a relatively normal distribution, as can be seen in Appendix 4.

4.3.2 Independent variables

In order to thoroughly examine the distributional effects of fiscal consolidations, one has not only to incorporate meaningful explanatory variables but also adequate control variables, able to explain large parts of the variation in the income inequality measures.

¹² An overview of all variables and their descriptive statistics can also be found in Appendix 1 & 2.

Therefore, the following variables capturing consolidation features and additional controls will be used. It should be noted, that according to the above-described time lag in the effects, all independent variables will be lagged one year.

Fiscal consolidation: Capturing episodes of fiscal consolidation can easily be done by the data given in Devries et al's. (2011) narrative approach database. As can be seen in Appendix 3, out of the 544 observations, 165 are identified as fiscal consolidation years. Looking at the scatter plot of fiscal consolidation and market income inequality, as done in Appendix 5 or at the analyses in Section 3.3, shows that both variables vary together to some extent. Hence, a significant relationship can be expected. The raw data already differentiate between the overall consolidation size, as well as tax-based and spending-based consolidation sizes. Based on the raw data, different indicators can be derived: One dummy variable, each capturing the occurrence of an overall fiscal consolidation and of tax or spending-based adjustments. Furthermore, in the next steps also the total values of budget balance improvement in percent of GDP for each of the three indicators will be used.¹³

Income per capita: This indicator is assumed to control for large parts of variation between countries and over time since many studies find a significant relationship between inequality and GDP levels as well as growth rates (Kuznets, 1955; Barro, 2000; Barro, 2008; Barro & Lee, 2013). The indicator will be measured twofold: i) The log of income per capita and ii) the square of the log of income per capita, which is used to consider the well-known inverted U-shaped (Kuznets) relationship between growth and inequality. Appendix 5 presents this relationship graphically. The logarithmic transformation is hereby undertaken in order to normalise the data since both time series tend to be skewed in their very nature. In line with the mentioned studies, the data are taken from the Penn World Tables (Version 7.1) and refer to the rate of real (PPP converted) GDP per capita in constant 2005 USD.

Inflation: Since inflation is known to be one of the main factors to explain the variance of inequality values, it is proven to be a good control variable. Theory suggests that high inflation would hurt the poor more than higher income groups and thereby widen the income gap. Different wealth and income protection abilities between the rich and the poor during inflation periods are often named to be the main lever for this mechanics

¹³ Moreover, alternative composition indicators will be introduced in Subsection 5.3.2.

(Bulir, 1998; Easterly & Fisher, 2001; Albanesi, 2007). However, the dataset comprises only high-income countries with moderate average inflation rates (4.4% p.a. over the whole sample period). As observed by Bulir (1998), during years of relatively low inflation, the impact on inequality tends to be counter-intuitive, if financial deepening is sufficiently high (which can be assumed as given in the sample). Moreover, causation might also run backwards in this case as suggested by Crowe (2006). Hence, the resulting effect of inflation is expected to be ambiguous, as can be observed in Appendix 4. The used data refer to the annual change in the Consumer Price Index (CPI). Data are extracted from the OECD Economic Outlook database (No. 98).

Trade Openness: Considering trade openness (the sum of imports and exports as a percent of GDP) is often undertaken as a proxy for the impact of (trade) globalization. Theories of international trade assume that the share of trade on GDP affects income distributions depending on the countries relative factor endowments. While inequality in developed countries is observed to rise with higher trade openness, the opposite is true for developing countries. The reasons mainly consist in the different relation of capital incomes over labour income, which are relatively higher in developed countries and benefit from greater trade openness (IMF, 2007). Since the countries used here are exclusively high-income countries, but the sample time is relatively long, trade openness is expected to have a somewhat ambiguous impact on income inequality, which is supported by Appendix 4. The data are extracted from the World Bank's World Development Indicators (WDI) database.

The variable overview (see Appendices 1 - 3) sums up all used variables and also reveals that not for all of the main variables observations exist in every year for every country. Especially inequality data are not always consistently available as pointed out by Solt (2012). Therefore, the number of possible observations throughout the dataset slightly drops from 544 down to 533. Hence, the panel is an unbalanced one, which requires paying some attention when undertaking statistical tests, as will be discussed in the next chapter.

5 Results

The following sections seek to provide econometric evidence for the above-described theories. All gathered data act as enablers to incorporate the literature findings and stated hypotheses into quantitative findings. Therefore, first, the baseline model will be applied and interpreted before further model extensions can be undertaken in order to dwell on certain characteristics such as the impact of redistribution and the composition of a consolidation package. However, it goes almost without saying that the following results should be interpreted as highlighting associations, rather than causations. Given the complex nature of statistic relationships, one should clearly bear in mind that the following analyses are to be treated as stylized facts, which emerge from the collected inequality data.

5.1 The effect of fiscal consolidation on market income inequality

This section aims to test the hypothesis that fiscal consolidations tend to be followed by elevated income inequality. Therefore, first, a baseline model focusing on the main determinants of market income inequality and therein the role of fiscal consolidation will be derived and tested on its statistical validity, using an array of tests. Afterwards, the model can further be extended.

Table 5 reports the output of three regressions undertaken to establish the baseline model as described in the last chapter and test different variables used for this end. Based on the availability of data in the dataset, 533 observations enter the regression, providing a sufficiently large sample size for further analyses. Column 1 focuses on the whole set of control variables, without adding consolidation variables. The two GDP indicators are used to test the expected Kuznets relationship as described above. As it can be seen, both the squared and the simple logarithm of GDP (lagged one year) are significant to explain the variation in within-country market income inequality. As expected, the squared term has a negative sign, while the simple term has a positive one, thereby suggesting the validity of the Kuznets relationship between GDP per capita and income inequality. Moreover, it is obvious that the lags of inflation and trade openness both entail sufficient eligibility to be included in the model since both comprise significant effects on income inequality. It can be observed that higher inflation here actually leads to lower inequality. This result might be a bit counter-intuitive, but is also in line with the literature, since e.g. Woo et al. (2014) observe it as well. Referring to Bulir (1998), it can be reasoned that this result is inherited in

the high-income country sample, used here. If lower income countries would be included and examined together with the sample in place one would have to expect a positive relationship between inflation and income inequality.

As it can be seen, higher trade openness is associated with a slight increase in inequality, although not significantly. The coefficient of determination (R^2) of this model sums up to 0.275, which indicates that these two variables are able to explain 27.5% of the variability of within-country market income inequality. Hence, a significantly high portion of variability can be explained by the controls. It should not be surprising that the value is not higher since such a complex concept like income inequality is expected to be influenced by an array of other factors than described here. Having established the elementary relationship between GDP levels, inflation and trade openness, seems to offer a good starting point to turn to test consolidations' influence on income inequality. Therefore, the main variables of interest, capturing fiscal consolidations can be added.

Column 2 introduces the dummy for fiscal consolidation to the equation. It can be seen that in line with the expectations and keeping all other factors constant, the occurrence of a fiscal consolidation on average raises the market inequality about 0.659 Gini points in the year after. The effect is found to be statistically significantly different from zero at a 95% confidence level. Given that the lagged value for consolidation occurrences is used, the first year of the sample period (1978) cannot be considered in this regression, since there are no consolidation values available for 1977. Hence, one observation for every country has to be dropped, leading to a reduction of the sample size down to 517. Nevertheless, adding the consolidation occurrence leads to a further R^2 increase up 0.296. Since this variable only captures the occurrence of a consolidation in the year before, coded with 1 for an occurrence or 0 for an absence, the coefficient can only be interpreted as the average effect of a consolidation occurrence. More interestingly to interpret would be the discretionary effect of a consolidation in points of GDP. Therefore, in column 3 the occurrence dummy is replaced by the absolute value of the consolidation size. As can be seen by the results, doing so does not strongly alter the signs, significance or dimension of the other variables. However, the consolidation coefficient now can be interpreted in a more meaningful way: A deliberate improvement of the primary balance about one percent of GDP in one year is (*ceteris paribus*) associated with an increase in market income inequality of 0.597 Gini points in the next year, which represent more than half a percent

increase in market income inequality.¹⁴ To put this value in perspective: As described in Chapter 3, the Gini coefficient for market income rose on average about 5 points between 1990 and 2010 throughout the OECD countries. Loosely speaking, keeping all other factors unchanged, a fiscal consolidation of 1% of GDP refers to one tenth of the income inequality rise in two decades in the sample. Interestingly, the effect is the second strongest of all controls after the GDP variable. The coefficient is found to be statistically significant at a 99% level. Moreover, both the R^2 and also the F-value are the highest in this model, indicating that controlling for absolute consolidation values adds to the overall explanatory power of the model. In this vein, it is quite obvious, that this effect is neither neglectable nor irrelevant for market income inequality.

Table 5: Effects of fiscal consolidation on market income inequality¹⁵

Variable	(1)	(2)	(3)
	Gini M coeff	Gini M coeff	Gini M coeff
GDP per capita, log, $t-1$	3.486** {0.015}	3.517** {1.395}	3.453** {1.386}
GDP per capita sqrd, log, $t-1$	-0.127** {0.060}	-0.130** {0.012}	-0.127** {0.013}
Inflation, $t-1$	-0.334*** {0.036}	-0.360*** {0.000}	-0.360*** {0.000}
Trade Openness, $t-1$	0.021* {0.069}	0.026** {0.022}	0.028** {0.014}
Consolidation Occurrence, $t-1$		0.659** {0.010}	
Consolidation (%), $t-1$			0.597*** {0.001}
Constant	23.760** {0.005}	23.281** {0.005}	23.577** {0.004}
Countries	17	17	17
N	533	517	517
R sqrd	0.275	0.296	0.303
F	48.613	41.568	43.124

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ P-Values in parantheses

These values are largely in line with the literature, as similar results for the variables are also found by IMF (2011), Agnello & Sousa (2012), OECD (2013) and Woo et al. (2013), as described in the literature review. Especially Woo et al. (2013) find coefficients results very close to the ones presented here, which is not surprising since the used models and data are congruent to a large extent. However, it has to be noted, that the results for the standard errors and test statistics differ in some way. The main departure in the results

¹⁴ However, one has to acknowledge that this result is with respect to a scenario in which no fiscal consolidation is implemented and deficits continue to not cause major disruptions. If this assumption would not hold and such a disruption in form of a fiscal crisis would occur because consolidations were not undertaken, risks for economic downturns could arise. These risks in turn could lead to even greater income inequality caused by absence of fiscal discipline, which cannot be considered in this model.

¹⁵ Note: The dependent variable is the market income Gini coefficient. The table reports the referring coefficients obtained by a Panel regression system with time and country fixed effects. *, ** & *** indicate significance of the coefficient on a 90%, 95% and 99% percent confidence level, respectively.

presented here from those of the baseline models of IMF (2012), Woo et al. (2013) and Agnello & Sousa (2014) stems from methodological differences. Different than this paper, the mentioned authors use seemingly unrelated regression technique in their main models. Such models consist in several regression equations, each having their own dependent and potentially different sets of independent variables. Each regression is used as a linear regression on its own and estimated separately (Moon & Perron, 2006). In their case, they separately regress a slightly different set of explanatory variables on both Gini coefficients. The main difference to normal linear regressions consists in the assumption of cross-equation error term correlation, which relates the two equations with each other. By using this technique, their models gain efficiency by combining the information of both equations (Srivastava & Maekawa, 1995). More precisely, in doing so, they are able to decrease the error terms in their regression and therefore obtain higher test results. Whatsoever, the referring coefficients are not affected by this methodology and therefore remain comparable.

Before the baseline model can be extended to test further hypotheses, one first has to make sure the model holds several statistical assumptions and proves to be suitable for deriving profound conclusions. Therefore, a series of statistical tests has to be undertaken to justify its validity. First, the assumption of non-stationarity has to be tested, to judge the legitimacy of the analysis. A Panel unit roots test based on Im et al. (2003) shows that the null hypothesis of the Gini coefficient to be stationary cannot be rejected.¹⁶ On the contrary, the alternative hypothesis, assuming that some of the countries' time series are stationary has to be rejected, giving prove to the non-stationarity assumption. The same is found by Schaltegger & Weder (2014), thus, the validity of the results is justified.

Another assumption of the model is that time-invariant characteristics are unique to the individual error terms and not correlated with other individual characteristics, why fixed effects are used. If the error terms would be correlated, the used model would not be suitable. In order to make sure this assumption holds, a Hausman test is undertaken and reported in Appendix 7. As it turns out, the P-value for the former is smaller than 0.05, hence, the H_0 has to be rejected and the usage of fixed effects is justified.

In order to generally test the validity of the model, the shape of the residuals is of greater interest. As the graphical tests (Appendix 8) reveal, the frequency distribution of the residuals shows some minor of non-normality, especially at the end of the tails. The augmented Jarque-Bera test applied here fails to reject the null hypothesis of normality at

¹⁶ See Appendix 6 for detailed results.

a 99% confidence level, but not so at a 95% confidence level. The results can be interpreted as a casual disturbance in the normal distribution. However, since the deviation from normality is relatively small it does not threaten the overall validity of the model. Yet, one should keep this point in mind when interpreting the standard errors and the test results, which are likely to be biased a bit.

Finally, based on several visual and formal tests reported in Appendix 9, a light form of heteroskedasticity has to be assumed. The results for both the Breusch-Pagan test and the White's test were able to reject the null hypothesis of constant variances across the error terms. However, the following analyses will continue to use the model specifications as described above, to test if its results still sustain.

5.2 The effect of fiscal consolidation on net income inequality

As Chapter 3 discussed, the two Gini coefficients are differently affected by fiscal consolidations. The theory chapter indicates that net income inequality does not increase as strong as market income inequality after a consolidation. This relationship was also reported by the graphical analysis in Chapter 3. Hence, it might be important to also examine this relationship econometrically, in order to be able to derive meaningful and robust conclusions. Turning to the baseline model, it is possible to use net income inequality as the dependent variable. By replacing market income inequality and applying the same models as before on this variable the effect of consolidations on disposable income is taken into consideration. By comparing the effects of the single variables above on this indicator, one can observe how redistributive mechanisms change the inequality effects of the different factors. Column 1 of Table 6 therefore reports the results of the control variables on the net income Gini coefficient. As it can be seen, the joint effects can only explain 19.7% of the variation in net income inequality while they were able to account for 27.5% in market inequality. This already indicates that there must be more factors involved in explaining changes in net income inequality. Also, the significance of the single effects is relatively lower. Only inflation and to a lower extent trade openness are able to explain the variation in net income inequality significantly at 99% and 95% confidence levels, respectively in this equation. The size of the single effects also decreases remarkably in comparison to the model with market inequality as the dependent variable, thereby indicating that their influences are much stronger on market than on disposable income inequality. E.g. an increase of trade volume about one percentage point of GDP in

the baseline model led to an increase in market income inequality about 0.028 Gini points in the year after while in this model the effect is 0.016 and thereby nearly half as sizeable. Focusing on the consolidation impact, one can see that the referring coefficient decreases both in size and in significance. Based on that, it can already be inferred that redistribution poses a very strong impact on net income inequality, not only in normal times but also during consolidation episodes. While the coefficient was significant and sizeable (0.597), when regressing on market income inequality it is significantly smaller (0.057) and completely loses its explanatory power for net income inequality.

Table 6: Effects of fiscal consolidations on net income inequality¹⁷

Variable	(1)		(2)	
	Gini N coeff		Gini N coeff	
GDP per capita, log, <i>t-1</i>	1.529	{0.113}	1.529	{0.108}
GDP per capita sqrd, log, <i>t-1</i>	-0.058	{0.150}	-0.059	{0.139}
Inflation, <i>t-1</i>	-0.180***	{0.000}	-0.200***	{0.000}
Trade Openness, <i>t-1</i>	0.016*	{0.037}	0.018**	{0.020}
Consolidation (%), <i>t-1</i>			0.057	{0.627}
Constant	18.841***	{0.001}	18.818***	{0.001}
Countries	17		17	
N	533		517	
R sqrd	0.197		0.212	
F	31.454		26.631	

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

P-Values in parantheses

Supporters of the social market economy might interpret this as evidence for functioning social states that are able to redistribute from the rich to the poor even in times of fiscal constraints and thereby offset negative effects on market income inequality. This presumption is also backed by redistribution theory. Paulus et al. (2009), OECD (2011) and Caminada et al. (2012) all find that redistributive fiscal policies reduce net inequality. The OECD (2015) argues that with greater progressivity in place greater inequality always leads to more redistribution, automatically and without policy interaction. Norris et al. (2015) find that an increase of government redistributive spending relative to total spending by ca. 7 % is associated with a 0.6% decrease in income inequality. This suggests that the composition of government spending is an important lever to lower net income inequality. However, it might be a bit too early for this conclusion only based on the used data since

¹⁷ Note: The dependent variable is the net income Gini coefficient. The table reports the referring coefficients obtained by a Panel regression system with time and country fixed effects. *, ** & *** indicate significance of the coefficient on a 90%, 95% and 99% percent confidence level, respectively.

more consolidation features would have to be considered. First and foremost, one would have to incorporate clear and unambiguous variables capturing redistribution.¹⁸ According to Meltzer & Richard (1981), higher inequality creates pressures to redistribute income with the voters having the incentive to push for reforms that are going to benefit them. Thereby, as pointed out by the OECD (2015), when more inequality leads to more redistribution, one would also have to consider reverse causality issues, which further exacerbate a valid econometric analysis. Yet, the results and the stated literature point to relevant inequality implications of focusing on government spending within consolidations. Therefore, the next section will deal with the differentiation between spending and tax-based consolidations and their effects on both Gini coefficients.

5.3 The compositional effects: Tax- vs. spending-based consolidations

After having established that consolidations on average lead to increased market and net income inequality, one might be interested in the effect of different compositions of consolidation packages. Therefore, this section first presents the findings of conventional analyses, which can also be found in the literature. Since these approaches are supposed to be flawed in identifying true tax- and spending-based consolidations in some way, a new procedure to account for these caveats will be defined and applied to the model afterwards.

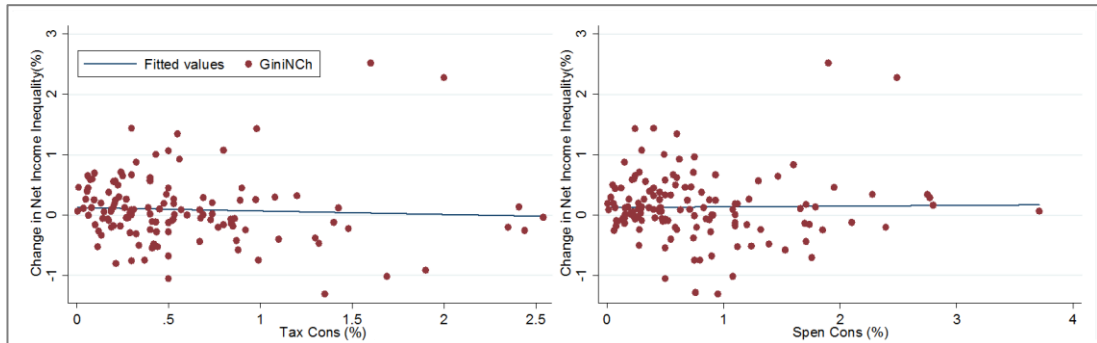
5.3.1 Conventional approach

As described in Chapter 2, spending cuts are more growth-friendly and in general lead to greater debt reduction than tax increases. Now, intuition and former studies indicate that the opposite might be the case for income inequality. Figure 4 already provides some graphical insight on this link. As it can be seen on the left part of the graphic there is a slightly decreasing line of fit between the size of occurred tax cuts and the resulting change in net income inequality in the sample. The opposite is true for spending cuts: As the graph suggests, the net income Gini coefficients increases slightly with the size of the spending

¹⁸ One usual way to account for the redistribution and inequality is to use the indicators proposed by Solt (2009). Namely „absolute redistribution“, calculated as the difference between market and net income inequality coefficients and „relative redistribution“ calculated by dividing this value by the referring market inequality coefficient are used as proxies to do so. However, since in the models used here, the dependent variables are the Gini coefficients, the usage of these indicators would entail closely related variables on both sides of the equation and thereby hazard serious flaws caused by autocorrelation and endogeneity. Further indicators such as changes in social spending and tax progressiveness were incorporated here as well, but will not further be discussed, since the results indicated some weaknesses in the used models, mainly caused by poor data availability.

cuts. Within the sample, 134 episodes are identified as tax-based consolidations, while spending-based ones occurred 142 times.¹⁹

Figure 4: The compositional effect of fiscal consolidations²⁰



More insightful than just looking at the graphs might be the turn to the data. In order to do so, the baseline regression model will be slightly adjusted. To account for spending and taxation based deficit cuts, the fiscal consolidation dummy is first replaced by a tax and a spending consolidation dummy variable. These two variables capture the occurrence of either a tax rise or a spending cut, respectively. Both are taken from the Devries et al. (2011) database and denote 1 if the respective measure is deliberately undertaken to reduce the deficit. Table 7 reports the findings of this model. Column 1 and 2 refer to market income inequality, whereas column 3 and 4 are dedicated to the effects on net income inequality. Looking at the results for market income inequality, one can observe that both coefficients have the expected sign: While tax hikes are associated with lower net income inequality in the year after, the opposite holds for spending cuts. More precisely, the occurrence of a tax hike within a consolidation leads to an average reduction of market income inequality of 0.409 Gini points, while a spending cut leads to a remarkably high rise in market income inequality about 1.192 Gini points in the following year. Nevertheless, only the latter is found to be statistically significant. All other variables remain significant as well. Compared to the baseline model, this augmentation only leads to a minor improvement of the overall explanatory power, since the R^2 increases slightly. Replacing the dummies by the actual values as done in column 2 indicates the absolute effect of both consolidation instruments. Surprisingly, the sign of the tax consolidation coefficient changes now: A one percent GDP deficit reduction, achieved by tax rises leads to an increase in market income inequality of 0.368 Gini points, although not being significant.

¹⁹ See Appendices 10 & 11 for more details.

²⁰ Note: The scatter plots only contains data points, of which the referring values were bigger than zero in order to illustrate the discretionary effect of tax rises and spending cuts, respectively.

Different than that, the spending cut effect is found to be significant and still relatively large (+ 0.753 Gini points). Column 2 replaces the dummy variables of spending and tax consolidations by the actual values. Doing so confirms the findings from before. However, this augmentation does not lead to an improvement of the model explanatory power. In the case of Woo et al. (2013) the results look relatively similar. They find spending-based consolidations to result in statistically significant inequality increases up to 2%, while tax based ones are slightly inequality reducing but not significant.

Turning to net income inequality, it is expected that these values are especially vulnerable to spending cuts as described in the theory above. By looking at the occurrence dummies as done in column 4, it can be seen, that these assumptions hold, although the coefficients are not significant. By replacing the occurrence dummies with absolute values the results look rather inconclusive, since a spending cut here would be associated with decreasing net income inequality, which is counter-intuitive. Once again, it is obvious that the model is less powerful in explaining the variation in the independent variable when net income inequality is used. At this note, it is important to mention the limitation of the data to capture the composition of the tax system and its progressivity. An increase in taxes can increase inequality if they are made through indirect taxes rather than e.g. by a progressive personal income tax. The data do not capture these alternatives, so it would be necessary to control for the tax composition of every country in order to further explore this effect. The results for tax-based consolidations can thereby be somewhat ambiguous.

**Table 7: Distributional effects of tax- and spending-based consolidations
(Conventional approach)²¹**

Variable	(1)	(2)	(3)	(4)
	Gini M coeff	Gini M coeff	Gini N coeff	Gini N coeff
GDP per capita, log, <i>t-1</i>	3.595** {0.010}	3.498* {0.012}	1.56 {0.101}	1.493 {0.117}
GDP per capita sqrd, log, <i>t-1</i>	-0.133* {0.023}	-0.128* {0.028}	-0.060 {0.131}	-0.058 {0.147}
Inflation, <i>t-1</i>	-0.353*** {0.000}	-0.356*** {0.000}	-0.198*** {0.000}	-0.203*** {0.000}
Trade Openness, <i>t-1</i>	0.026** {0.021}	0.028** {0.015}	0.018** {0.019}	0.018** {0.019}
Tax Consolidation Occurrence, <i>t-1</i>	-0.409 {0.270}		-0.195 {0.442}	
Spending Cons. Occurrence, <i>t-1</i>	1.192*** {0.001}		0.290 {0.237}	
Tax Consolidation (%), <i>t-1</i>		0.368 {0.273}		0.241 {0.293}
Spending Cons. (%), <i>t-1</i>		0.753** {0.004}		-0.068 {0.702}
Constant	22.817** {0.005}	23.253** {0.004}	18.616*** {0.001}	19.078*** {0.001}
Countries	17	17	17	17
N	517	517	517	517
R sqrd	0.305	0.304	0.214	0.213
F	36.170	36.016	22.394	22.332

* p<0.1, ** p<0.05, *** p<0.01 P-Values in parantheses

²¹ Note: The dependent variable is the Gini coefficient for market income Gini coefficient (columns 1 & 2) and net income inequality respectively. The table reports the referring coefficients obtained by

These results are overall largely in line with the literature, although the inconclusive results for net inequality are somewhat surprising. All in all, it has to be noted that the model as used here is not good enough to explain net income inequality variation. Furthermore, the results cast some doubt on the validity of the stated hypothesis to hold true. Hence, further analysis has to be conducted in the next subsection.

5.3.2 Augmented approach

As stated earlier, the conventional approach to differentiate compositional features of consolidations is expected to inherit some flaws. Namely, the cited literature just simply uses the un-adopted time series of Devries et al. (2011) and incorporates them into their regression analysis as done in the last subsection. This procedure is not free of critique. Buyse (2015) e.g. criticizes the IMF (2012) and Agnello & Sousa (2014) to use consolidation periods on a year-to-year basis, instead of focusing on the cumulative effects of multiple years. More important, problems in this approach arise, since most consolidations are mixed ones, meaning consisting of both spending cuts and tax increases. Out of the 165 consolidation episodes in the sample, 102 were mixed.²² Especially larger consolidations tend to be achieved by a composition of both measures. This is not surprising since it might be hard to justify, why a consolidation should only be done on one side of the budget balance. The traditional approach hereby just identifies any episode as a spending one, whenever a cut in spending occurs, not accounting for tax increases implemented in the same year and vice versa. After disentangling the episodes in spending-only, tax-only and mixed ones, the distribution of the episodes looks a bit different than presented in the last subsection: Only 25 of all consolidation years were tax-only ones, 38 spending-only and the rest mixed, as stated above.²³

Figure 5 graphically explains the big differences of the average results between the conventional and the augmented approach regarding the average length, cumulated consolidation size and the associated increases in both Gini coefficients in the same year and the year after. As shown here, both the length and the cumulated size of consolidations are much smaller for both tax-only and spending-only consolidations. While tax-only consolidations are slightly longer, spending-only ones are much larger in size. However, it is

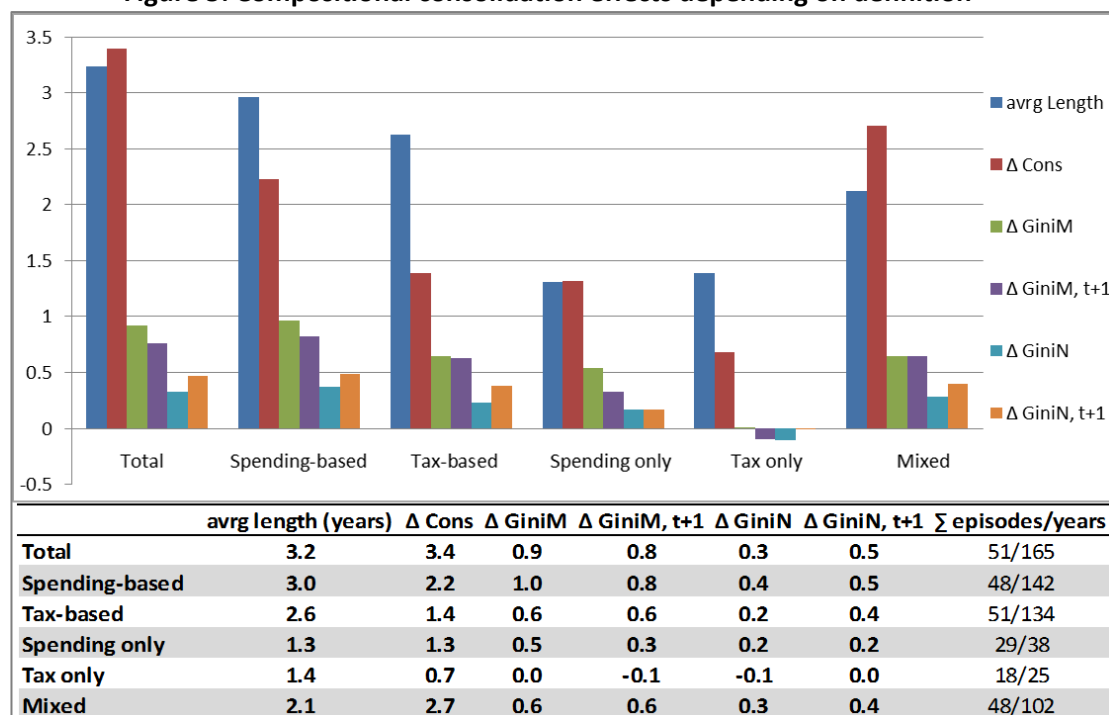
a Panel regression system with time and country fixed effects. *, ** & *** indicate significance of the coefficient on a 90%, 95% and 99% percent confidence level, respectively.

²² See Appendix 14 for more details.

²³ A detailed breakdown of the episodes into tax-based only, spending-based only and mixed consolidations can be found in Appendices 12-14.

striking that both are much shorter and less sizeable than mixed one, as assumed. The largest benefit of this approach lies in the more accurate way to look at distributional impacts of different consolidation compositions. While spending-only ones are followed by mild increases in both inequality measures, tax-only ones are actually followed by a decrease in income inequality. Mixed consolidations, on the other hand, are longer, larger and less equitable than single side measures.

Figure 5: Compositional consolidation effects depending on definition²⁴



Yet, these findings should be treated with extreme caution. As it has been said, single side consolidations tend to be much smaller than combined measures. Combining this thought with the earlier finding of the linear relationship between consolidation size and income inequality leads the way to the conclusion that causality rather runs from consolidation size to composition measure. However, it can clearly be seen that there is a difference in the inequality effects of spending-only and tax-only consolidations. Having said that and keeping the caveats of graphical approaches in mind, it makes sense to incorporate the new indicators in the econometric model from earlier. Table 8 presents the findings of the same model like in the last subsection but uses the augmented approach to identify compositional effects. Again, the first two columns report the coefficients' effects on

²⁴ Source: Author's own calculations based on Devries et al. (2011) & Solt (2009). Note: The vertical axis denotes the average cumulative values for the consolidation length (in years), the consolidation size (in percent of GDP), and the resulting changes in inequality (in Gini points), respectively.

market income inequality. As can be seen, the occurrence of a tax-only consolidation decreases market income inequality on average by 0.602 Gini points in the year after, *ceteris paribus*, although the effect is not significant.²⁵ The occurrence of a spending-only consolidation is found to be significant on a 95% confidence level and leads to an increase of market inequality by 1.061 Gini points in the year after. Mixed consolidations score up to 0.813 Gini points and are significant on a 99% confidence level. Replacing the dummies by absolute values confirm these findings with the same signs and significance levels. These results are also in the spirit of the theoretical concepts of Ball et al. (2001), who argue that spending-based consolidations reduce the wage share in total income. While wage loss effects are persistent over time, losses on capital and rent incomes are rather short-lived, hence the widening of market income inequality.

Turning to net income inequality (columns 3 & 4), the new approach produces findings congruent to the model applied before. Inconclusive results appear when comparing the model with occurrence dummies with the model including absolute values. Hence, again the applied variables seem to be not relevant enough to explain the full effect on net income inequality. However, it can clearly be seen that the augmented approach delivers meaningful results for market income inequality that are more accurate in describing the discretionary effect of one-sided and mixed consolidations, than what is defined in the literature. Hence, the hypothesis that spending-based consolidations are less equitable could be proved using both the conventional and the augmented approach.

²⁵ The low significance level might to some extent also be explained by the relative low amount of observations that are considered spending-only and even more relevant for those, which are tax-only. This fact already points to further research potential regarding these consolidation types in a bigger sample.

Table 8: Distributional effects of tax-only, spending-only and mixed consolidations (Augmented approach)²⁶

Variable	(1)	(2)	(3)	(4)
	Gini M coeff	Gini M coeff	Gini N coeff	Gini N coeff
GDP per capita, log, <i>t-1</i>	3.598*** {0.010}	3.608*** {0.010}	1.567* {0.099}	1.537 {0.107}
GDP per capita sqrd, log, <i>t-1</i>	-0.134** {0.022}	-0.133** {0.023}	-0.062 {0.123}	-0.060 {0.135}
Inflation, <i>t-1</i>	-0.353*** {0.000}	-0.357*** {0.000}	-0.197*** {0.000}	-0.201*** {0.000}
Trade Openness, <i>t-1</i>	0.026** {0.022}	0.027** {0.016}	0.017** {0.024}	0.018** {0.018}
Tax-only Cons. Occurrence, <i>t-1</i>	-0.602 {0.272}		-0.739* {0.048}	
Spending-Only Cons. Occurrence, <i>t-1</i>	1.061** {0.019}		-0.082 {0.790}	
Mixed Cons. Occurrence, <i>t-1</i>	0.813*** {0.007}		0.179 {0.386}	
Tax-Only Consolidation (%), <i>t-1</i>		-0.008 {0.992}		0.078 {0.886}
Spending-Only Cons. (%), <i>t-1</i>		0.798** {0.013}		-0.132 {0.546}
Mixed Cons. (%), <i>t-1</i>		0.524*** {0.003}		0.148 {0.225}
Constant	22.861** {0.005}	22.640** {0.006}	18.741*** {0.001}	18.795*** {0.001}
Countries	17	17	17	17
N	517	517	517	517
R sqrd	0.306	0.305	0.220	0.215
F	30.987	30.965	19.867	19.267

* p<0.1, ** p<0.05, *** p<0.01 P-Values in parantheses

The results shown here indicate a strong justification for the usage of the augmented approach to identify compositions of fiscal consolidations. While the conventional approach delivers flawed results in differentiating between the true effects of spending cuts and tax rises, respectively, the augmented approach seems to be more accurate. Hence, a more pronounced view on the composition of consolidations is possible: By comparing the results of both approaches, one can see that the most relevant distributional effects of consolidations stem from spending-side measures and mixed consolidations. Especially the latter it highly interesting and adds a strong contribution to the literature since the traditional approach does not account for mixed consolidations, although they form the big majority of all consolidations in the sample. Both approaches find that tax-based consolidations are actually income inequality-reducing, although not statistically significantly. Interestingly, the coefficients for spending-based consolidations in both approaches are similar in size and significance. At first sight, these results suggest using tax hikes as preferred instrument for fiscal consolidations, since they tend to be followed by improving distributional outcomes. However, it seems that this fact can rather be ascribed to the generally smaller consolidation sizes that these consolidation packages are usually comprised of. Furthermore, as pointed out in the literature review, these consolidations are found to be less suitable to meet debt reduction and growth targets. Thus, the augmented approach points to the importance of also considering the accompanying conditions of all

²⁶ Note: The dependent variable is the Gini coefficient for market income Gini coefficient (columns 1 & 2) and net income inequality (columns 3 & 4), respectively. The table reports the referring coefficients obtained by a Panel regression system with time and country fixed effects. *, ** & *** indicate significance of the coefficient on a 90%, 95% and 99% percent confidence level, respectively.

three types of consolidations: E.g. while tax-based ones tend to be followed by a reduction in income inequality, they should not be interpreted as equity-friendly per se. It rather seems that this effect rather stems from the small size that tax-only consolidations entail. This thought is also backed by the somewhat larger and significant effect of mixed consolidations, which are also found to be the largest in cumulative consolidation size. Hence, further research potential focusing on the interplay between accompanying consolidation conditions, such as pressure to consolidate, their composition and the public opinion on these plans is found already here.

Speaking for this whole chapter, some important notes on the results have to be made. However convincing any regression results might look like, one should be cautious about drawing any definite implications for country-specific causes or even policy implication from cross-country analysis. Different policies tend to have varying effects across countries and also at different points in time, possibly depending on further accompanying features, not accounted for here.²⁷ Moreover, limitations in measuring inequality across time and countries cannot be ruled out with certainty. What is a caveat of every regression analysis, surely also holds in this case: Correlations, as reported here, do not necessarily imply causation of any of the discussed influences to actual income inequality outcomes. As it is shown, an array of inter-related factors, that sometimes take a long time until they fully unfold, drive inequality outcomes over time. Bearing these limitations in mind, the present analysis still is able to point to different policies for tackling inequality under the shadows of consolidation policies. To judge if the reported effects hold under changing framework specifications, a sensitivity analysis will be undertaken in the next chapter.

²⁷ Other features such as the size and length of the consolidation, occurrence during and after financial crises, and accompanying macroeconomic conditions were also examined econometrically form during the preparation of this article, but will not be interpreted here, since this would go beyond the scope and space limits of this article.

6 Sensitivity Analysis

In order to test, whether the results obtained in the previous chapter are robust enough, different types of sensitivity analyses are presented in the following sections. First, the main models from above will be re-estimated without time lags. Afterwards, these tests will be repeated for European countries only and for different time frames used in the sample.

6.1 Distributional effects in the year of consolidation

So far, each of the applied models used one year time lags in the independent variables, in order to account for the slightly delayed effects, any policy changes pose on income inequality. However, as seen in the graphical presentations in the last chapter, there seem to be some reactions already in the year of consolidation occurrence. Therefore, this section will test the sensitivity of the baseline model including both inequality measures as dependent variables, as well as the augmented approach for compositional differences for distributional changes in the year of occurrence.

Table 9 provides the re-estimated baseline model without lags in the variables. Column 1 depicts the augmented results for market income inequality and column 2 for net income inequality. Since all observations now can be used, the sample size increases to 533. Interestingly, the coefficients for market income inequality keep their signs and significance levels with the exception of trade openness, which now even is significant on a 99% confidence level. The coefficients of the control variables all stay very close to the original values of the baseline model. Turning to the consolidation effect, the referring coefficient is 0.488, which indicates that the distributional effect of a consolidation is somewhat smaller in the year of the occurrence than in the year after. This is not surprising, as the graphical presentation in the last chapter has already indicated. The R^2 is only slightly lower in this model. Hence, it can be derived that the model is robust in replacing lagged effects by same year consequences. Looking at the results for net income inequality, the control variables appear largely congruent to the baseline model. However, the consolidation effect here turns negative, which is incongruent with the original model. Therefore, this again proves the weaknesses of the model for net income inequality.

Table 9: Effects of fiscal consolidation on income inequality in the year of occurrence²⁸

Variable	(1) Gini M coeff	(2) Gini N coeff
GDP per capita, log	3.611** {0.011}	1.949* {0.042}
GDP per capita sqrd, log	-0.134** {0.025}	-0.074* {0.066}
Inflation	-0.348*** {0.000}	-0.185*** {0.000}
Trade Openness	0.033*** {0.004}	0.019** {0.012}
Consolidation (%)	0.488*** {0.004}	-0.078 {0.492}
Constant	22.182*** {0.008}	23.281** {0.005}
Countries	17	17
N	533	533
R sqrd	0.291	0.202
F	41.942	25.912

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

P-Values in parantheses

Perhaps more important than testing the sensitivity of the baseline model is to see if the augmented approach on the compositional effect holds true, since this approach was not tested before. Table 10 presents the findings for the model from Subsection 5.3.2, using non-lagged regressor sets. As can be seen in the first two columns, all controls remain significant, with trade openness again increasing its significance. The coefficients are slightly lower in size than in the usual model, although not remarkably. Moreover, the significance levels almost stay the same; only mixed consolidations are now found to be significant at a 95% level instead of the former 99%. The R² drops only slightly in both cases. Turning to the results for net income inequality confirms the rather mixed findings from the last subsection, since all consolidation types are found to lower inequality, whereas none of them is statistically significant. Therefore, the models for net income inequality will no longer be considered for the next composition sensitivity tests.

²⁸ Note: The dependent variable is the Gini coefficient for market income Gini coefficient (column 1) and net income inequality (columns 2) respectively. The table reports the referring coefficients obtained by a Panel regression system with time and country fixed effects. *, ** & *** indicate significance of the coefficient on a 90%, 95% and 99% percent confidence level, respectively.

Table 10: Distributional effects of tax-only, spending-only and mixed consolidations in the year of occurrence (augmented approach)²⁹

Variable	(1)	(2)	(3)	(4)
	Gini M coeff	Gini M coeff	Gini N coeff	Gini N coeff
GDP per capita, log	3.758*** {0.008}	3.694*** {0.009}	1.955** {0.042}	1.961** {0.042}
GDP per capita sqrd, log	-0.14** {0.020}	-0.136** {0.023}	-0.075* {0.063}	-0.075* {0.064}
Inflation	-0.342*** {0.000}	-0.344*** {0.000}	-0.184*** {0.000}	-0.186*** {0.000}
Trade Openness	0.032*** {0.005}	0.033*** {0.004}	0.019** {0.014}	0.019** {0.015}
Tax-only Cons. Occurrence	-0.382	0.948**	-0.695*	-0.157
Spending-Only Cons. Occurrence	0.948** {0.041}		-0.157 {0.615}	
Mixed Cons. Occurrence	0.662** {0.032}		-0.022 {0.914}	
Tax-Only Consolidation (%)		-0.162 {0.840}		-0.415 {0.445}
Spending-Only Cons. (%)		0.798** {0.026}		-0.265 {0.273}
Mixed Cons. (%)		0.439** {0.016}		-0.027 {0.828}
Constant	21.316** {0.011}	21.572*** {0.010}	16.050*** {0.004}	15.952*** {0.005}
Countries	17	17	17	17
N	533	533	533	533
R sqrd	0.292	0.293	0.207	0.204
F	29.932	30.167	18.981	18.657

* p<0.1, ** p<0.05, *** p<0.01 P-Values in parantheses

Overall, these results thereby again confirm the stated idea that i) spending-only consolidations are less equitable and ii) the effects of any consolidation are more pronounced one year after the package is implemented. Thus, it seems that the augmented approach to identify the composition of fiscal consolidations can be considered as robust in this case.

6.2 Specific effects in European countries

Focusing on the composition of the sample, one can observe that out of 17 countries in the sample 14 are European. Therefore, it seems promising to further test the robustness limiting the sample to these countries. The biggest motivation to do so consists in the fact that these countries present an even more homogenous sample, since they are geographically attached and therefore more dependent on each other than the overseas countries. By doing so, the number of observations drops to 399, which is still sufficiently large for statistical analyses. Looking at the effects of fiscal consolidations on income inequality in Europe (Table 11), one finds very similar results for both significance and size of the coefficient. Although the controls behave a bit differently, the overall results are close to the original model, with a similar R^2 . The actual effect is even found to be somewhat higher for European countries. Testing the same approach for the augmented

²⁹ Note: The dependent variable is the Gini coefficient for market income Gini coefficient (columns 1 & 2) and net income inequality (columns 3 & 4), respectively. The table reports the referring coefficients obtained by a Panel regression system with time and country fixed effects. *, ** & *** indicate significance of the coefficient on a 90%, 95% and 99% percent confidence level, respectively.

compositional model indicates an only slightly different picture. Spending-only and mixed consolidations are found to have somewhat smaller effects on market income inequality but score even higher significance levels for the European sample groups. Tax-only consolidations on the other hand have an inequality increasing effect here, although not significant.

Table 11: Specific effects in European countries³⁰

Variable	(1)	(2)
	Gini M coeff	Gini M coeff
GDP per capita, log, <i>t-1</i>	6.839** {0.023}	6.626** {0.029}
GDP per capita sqrd, log, <i>t-1</i>	-0.332** {0.025}	-0.320** {0.033}
Inflation, <i>t-1</i>	-0.317*** {0.000}	-0.315*** {0.000}
Trade Openness, <i>t-1</i>	0.029** {0.012}	0.028** {0.015}
Consolidation (%), <i>t-1</i>	0.636*** {0.000}	
Tax-Only Consolidation (%), <i>t-1</i>		0.138** {0.866}
Spending-Only Cons. (%), <i>t-1</i>		0.763* {0.015}
Mixed Cons. (%), <i>t-1</i>		0.539*** {0.003}
Constant	10.394 {0.498}	11.303 {0.464}
Countries	17	17
N	399	399
R sqrd	0.292	0.292
F	31.474	22.292

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

P-Values in parantheses

6.3 Changes in the effects in the first and second half of the sample period

As previously described, the sample period ranges from 1978 until 2009, which sums up to 32 years in total. During that time the world economy went through many transformations. Therefore, one could expect changing effects over time. To account for this possibility the sample will be subdivided into two periods: one before 1994 and one after.³¹ Doing so results in a sample size of 246 observations in the first half and 271 in the second half, indicating improving data availability (Table12). Results suggest that the inequality effect of consolidations first gained significance in the second half. Also the effect itself in both

³⁰ Note: The dependent variable is the Gini coefficient for market income Gini coefficient. The table reports the referring coefficients obtained by a Panel regression system with time and country fixed effects. *,** & *** indicate significance of the coefficient on a 90%, 95% and 99% percent confidence level, respectively.

³¹ 1994 denotes the middle of the sample period. Values for 1994 will therefore be included in the second group.

halves is smaller than in the overall period. The results for composition on the other hand are relatively similar in both halves and also compared to the standard model. Even more interesting are the changes in the control variables, particularly for trade openness: While its sign is found negative in the first sample period it turned positive in the second. This suggests that there might have been a point in time, where world trade changed its distributional effect and stopped to serve the prosperity of large parts of the society.

Table 12: Effects in both samples halves³²

Variable	(1)		(2)		(3)		(4)	
	before 1994		after 1994		before 1994		after 1994	
	Gini M coeff		Gini M coeff		Gini M coeff		Gini M coeff	
GDP per capita, log, <i>t-1</i>	2.044	{0.358}	0.899	{0.755}	2.833	{0.214}	0.867	{0.764}
GDP per capita sqrd, log, <i>t-1</i>	-0.065	{0.454}	-0.001	{0.995}	-0.094	{0.289}	0.001	{0.996}
Inflation, <i>t-1</i>	-0.184***	{0.000}	-0.094	{0.354}	-0.181***	{0.000}	-0.098	{0.337}
Trade Openness, <i>t-1</i>	-0.048	{0.137}	0.015	{0.208}	-0.048	{0.138}	0.015	{0.190}
Consolidation (%), <i>t-1</i>	0.131	{0.573}	0.276	{0.068}				
Tax-Only Consolidation (%), <i>t-1</i>					-1.168	{0.186}	-0.136	{0.880}
Spending-Only Cons. (%), <i>t-1</i>					0.067	{0.877}	0.283	{0.303}
Mixed Cons. (%), <i>t-1</i>					0.202	{0.383}	0.314**	{0.047}
Constant	33.979**	{0.014}	37.528***	{0.006}	28.976**	{0.040}	37.649***	{0.006}
Countries	17		17		17		17	
N	246		271		246		271	
R sqrd	0.116		0.061		0.126		0.066	
F	5.892		3.238		4.562		2.490	

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

P-Values in parantheses

Summarizing, it can be seen that the three tests confirm both the baseline model as well as the augmented approach for compositional effects. Therefore, the stated models can be seen as robust regarding changes in their design and the conclusions based on them to be firm.

³² Note: The dependent variable is the Gini coefficient for market income Gini coefficient. The table reports the referring coefficients obtained by a Panel regression system with time and country fixed effects. *,** & *** indicate significance of the coefficient on a 90%, 95% and 99% percent confidence level, respectively.

7 Conclusion

This thesis examined the effects of several fiscal consolidation indicators and a set of compositional variables on income inequality by using econometric analysis for a panel of high-income countries over the last four decades. The results suggest that fiscal consolidations are relevant levers for income inequality. It was found that on average, a consolidation of one percent of GDP is associated with an increase in market income inequality of 0.6% in the next year. Net income inequality is found to be less affected by austerity measures, which indicates the strong redistributive power of the social welfare state. Moreover, the hypothesis that spending cuts spark income inequality more than tax rises could be supported by the data. Even more relevant, in adopting the conventional approach to identify compositional features of consolidations to episodes that are exclusively undertaken on the spending or the tax revenue side, this paper acts as an innovation for the very narrow literature in this field. Applying this novel approach leads to even more pronounced findings regarding the compositional effect. It was proven that consolidations, which were undertaken only through tax hikes, produce more equitable outcomes, although they tend to be rather small in consolidation size. Another important finding consists in the fact that especially mixed consolidations are found to be significantly harming the income distribution. Since these consolidations tend to be most sizeable, these two findings combined, point in the direction of considering accompanying consolidation features such as policymakers' pressure to consolidate and the public opinion on these plans as decisive elements for the distribution outcomes, rather than just looking at the pure composition.

This paper thereby clearly demonstrates that the conventional method for studying compositional effects of fiscal consolidations entails some serious flaws since it fails to identify consolidation episodes, only based on spending cuts or tax rises. In this vein, it is important to note that all studies on the success and growth effect of fiscal consolidations so far rely on the conventional approach on how to identify spending and tax-based episodes. Therefore, it might be promising to implement the augmented approach also for this kind of studies in order to produce meaningful results for the discretionary effect of tax-only and spending-only consolidation. Since this paper was not able to obtain conclusive results for compositional effects on net income inequality, there is potential for further research on the proper analysis of the referring levers. Furthermore, it seems that there is still a gap in the literature regarding the effect of certain instruments of fiscal consolidation and their discretionary effect on income inequality.

The findings survive a battery of sensitivity checks: Not only are the results for inequality changes similar in the year of the occurrence, but also slightly lower in magnitude, which proves the idea that fiscal policies take some time until their effects fully unfold. Furthermore, the results remain similar after restricting the sample in several ways. Namely, the limitation of the sample to European countries and the split between the first and the second halves of the sample period did not change the results significantly. Further tests to these results should be undertaken using different inequality indicators, since the Gini coefficient is not sensitive to changes at the tails of income distributions and a large share of the surge in income inequality is expected to stem from diverging top and bottom income groups.

Although one should be careful about deriving concrete policy recommendations from these results, one conclusion clearly stands out: Fiscal consolidations generally go hand in hand with increased inequality. Even though consolidations exclusively undertaken on the tax side lead to favourable income equality outcomes, they seem to act less successful on debt reduction and are considered less growth-friendly. Looking ahead, further large consolidations are expected to be required for many developed countries, given their current fiscal positions. Keeping the historically unprecedented high levels of inequality and their possible social and economic fallouts in mind, these countries should do everything in their power to prevent another rise in income inequality. Therefore, it will be critical to design upcoming consolidation packages in a way that they are able to fairly distribute their burden throughout the society and not disproportionately on the back of the most vulnerable citizens. Yet, given the sizeable consolidation needs, it is more than questionable if a single focus on tax revenue rises might be the right strategy to achieve both, positive outcomes for debt reduction and growth on the one hand and a containment of inequality on the other. Hence, there is a large need for further academic research to elaborate on specific consolidation instruments that fulfil all these targets. Moreover, it might be the right time to conclude that it seems that the dangerous economic cocktail of high-income inequality and large consolidation needs might entail a greater risk for the stability of market economies than is usually believed among academic scholars. Perhaps, if in this environment the conventional consolidation methods are not sufficient enough to meet the described targets; one should seriously reconsider the robustness of the current macroeconomic structure of many developed countries. In this vein, this paper ends with the words of the U.S. Federal Reserve's chair Janet Yellen (2014): "Inequality has risen to the point that it seems to me worthwhile [...] to seriously consider taking the risk of making our economy more rewarding for more of the people".

Bibliography

- Acemoglu, D. (2003). Cross-country Inequality Trends. *The Economic Journal*, 113(485), F121-F149.
- Afonso, A., & Scaglioni, C. (2006). *Public sector efficiency: evidence for new EU member states and emerging markets (January 2006)* (No. 581). ECB Working Paper.
- Afonso, A., Baxa, J., & Slavík, M. (2011). *Fiscal developments and financial stress: a threshold VAR analysis* (No. 1319).
- Agnello, L., & Sousa, R. M. (2012). *How Does Fiscal Consolidation Impact on Income Inequality?*. Banque De France, No. 382.
- Agnello, L., & Tavares, R. M. S. (2014). How does fiscal consolidation impact on income inequality?. *Review of Income and Wealth*, 60(4), 702-726.
- Ahrend, R., Arnold, J. M., & Moeser, C. (2011). The sharing of macroeconomic risk: who loses (and gains) from macroeconomic shocks. *Available at SSRN 2126666*.
- Ahrend, R., Catte, P. A., & Price, R. (2006). Interactions between monetary and fiscal policy: How monetary conditions affect fiscal consolidation.
- Albanesi, S. (2007). Inflation and inequality. *Journal of Monetary Economics*, 54(4), 1088-1114.
- Alesina, A. (1998). Too large and too small governments. *Economic Policy and Equity*, 216-34.
- Alesina, A., & Ardagna, S. (2010). Large changes in fiscal policy: taxes versus spending. In *Tax Policy and the Economy, Volume 24* (pp. 35-68). The University of Chicago Press.
- Alesina, A., & Ardagna, S. (2013). The design of fiscal adjustments. In *Tax Policy and the Economy, Volume 27* (pp. 19-67). University of Chicago Press.
- Alesina, A., & Perotti, R. (1995). Fiscal expansions and adjustments in OECD countries. *Economic policy*, 10(21), 205-248.
- Alesina, A., Favero, C., & Giavazzi, F. (2012). *The output effect of fiscal consolidations* (No. w18336). National Bureau of Economic Research.
- Altindag, D., & Mocan, N. (2010). Joblessness and Perceptions about the Effectiveness of Democracy. *Journal of Labor Research*, 31(2), 99-123.
- Alvaredo, F. (2011). A note on the relationship between top income shares and the Gini coefficient. *Economics Letters*, 110(3), 274-277.
- Anderson, B. (2010). Restoring Fiscal Sustainability: Lessons for the Public Sector. *Public Policy Review*, 6(4), 611-624.
- Ardagna, S. (2004). *Financial markets' behavior around episodes of large changes in the fiscal stance* (No. 0390).
- Autor, D. H., Levy, F., & Murnane, R. J. (2003). The skill content of recent technological change: An empirical exploration, forthcoming: *Quarterly Journal of Economics*.
- Avram, S., Figari, F., Leventi, C., Levy, H., Navicke, J., Matsaganis, M., & Sutherland, H. (2013). *The distributional effects of fiscal consolidation in nine EU countries* (No. EM2/13). Euromod Working Paper.

- Ayala, L., Martínez, R. & Ruiz-Huerta, J. (2001). The impact of unemployment on inequality and poverty in OECD countries. *Economics of Transition*, 9(2), 417-447.
- Baldacci, E., Gupta, S., & Mulas-Granados, C. (2013). *Debt Reduction, Fiscal Adjustment, and Growth in Credit-Constrained Economies*.
- Ball, L., & Mankiw, N. G. (1995). *What do budget deficits do?* (No. w5263). National Bureau of Economic Research.
- Ball, L., Leigh, D., & Loungani, P. (2011). Painful medicine. *Finance & Development*, September, 2011.
- Baltagi, B. (2008). *Econometric analysis of panel data*. John Wiley & Sons.
- Banerjee, A. V., & Duflo, E. (2003). Inequality and growth: What can the data say?. *Journal of economic growth*, 8(3), 267-299.
- Barbiero, O., & Cournède, B. (2013). *New Econometric Estimates of Long-term Growth Effects of Different Areas of Public Spending* (No. 1100). OECD Publishing.
- Barrios, S., Langedijk, S., & Pench, L. R. (2010). EU fiscal consolidation after the financial crisis Lessons from past experiences. *Bank of Italy Occasional Paper*.
- Barro, R. J. (2000). Inequality and Growth in a Panel of Countries. *Journal of economic growth*, 5(1), 5-32.
- Barro, R. J. (2008). *Inequality and growth revisited* (No. 11). ADB Working paper series on regional economic integration.
- Barro, R. J., & Lee, J. W. (2013). A new data set of educational attainment in the world, 1950–2010. *Journal of development economics*, 104, 184-198.
- Blanchard, O. J. (1991). Crowding out. In *The World of Economics* (pp. 155-159). Palgrave Macmillan UK.
- Blanchard, O. J., & Leigh, D. (2013). *Growth forecast errors and fiscal multipliers* (No. w18779). National Bureau of Economic Research.
- Blanchard, O. J., & Summers, L. H. (1986). Hysteresis and the European unemployment problem. In *NBER Macroeconomics Annual 1986, Volume 1* (pp. 15-90). Mit Press.
- Blot, C., Cochard, M., Creel, J., Ducoudré, B., Schweisguth, D., & Timbeau, X. (2015). Fiscal consolidation, public debt and output dynamics in the Euro area: lessons from a simple model with time-varying fiscal multipliers. *Revue d'économie politique*, 124(6), 953-989.
- Boix, C. (1995). *Building a Socialdemocratic Strategy in Southern Europe: Economic Policy Under the González Government (1982-93)*. Instituto Juan March de Estudios e Investigaciones, Centro de Estudios Avanzados en Ciencias Sociales.
- Bulir, M. A. (1998). *Income inequality: does inflation matter?*. International Monetary Fund.
- Buyse, T. (2015). Fiscal consolidation and inequality: an empirical assessment, *paper to be presented at the ECFIN Workshop on "Fiscal policy after the crisis", 19/01/2016, Brussels*.
- Callegari, G., Melina, G., & Batini, N. (2012). *Successful Austerity in the United States, Europe and Japan* (No. 12/190). International Monetary Fund.
- Caminada, K., Goudswaard, K., & Koster, F. (2012). Social income transfers and poverty: A cross-country analysis for OECD countries. *International Journal of Social Welfare*, 21(2), 115-126.
- Campos, M. M. (2011). Learning from the past: Fiscal adjustments on the run-up to the euro area. *Economic Bulletin*, 17(2).

- Canale, R. R., Liotti, G., & Napolitano, O. (2014). Structural public balance adjustment effects on growth in 25 OECD countries and the Eurozone. *Comparative Economic Studies*, 56(4), 635-656.
- Cecchetti, S., Mohanty, M., & Zampolli, F. (2011). Achieving growth amid fiscal imbalances: the real effects of debt. In *Economic Symposium Conference Proceedings. Federal Reserve Bank of Kansas City* (pp. 145-196).
- Chu, M. K. Y., Davoodi, M. H. R., & Gupta, M. S. (2000). *Income distribution and tax and government social spending policies in developing countries* (No. 0-62). International Monetary Fund.
- Corsetti, G., Kuester, K., Meier, A., & Müller, G. (2010). *Debt consolidation and fiscal stabilization of deep recessions* (No. 7649). CEPR Discussion Papers.
- Cottarelli, C. (2010). Strategies for Fiscal Consolidation in the Post-Crisis world. *IMF Working Papers*, 10-43.
- Cournède, B., Goujard, A., & Pina, Á. (2013). How to achieve growth-and equity-friendly fiscal consolidation? A proposed methodology for instrument choice with an illustrative application to OECD countries. *OECD Journal: Economic Studies*, 13(1).
- Crafts, N. (2013). Long-term growth in Europe: what difference does the crisis make?. *National Institute Economic Review*, 224(1), R14-R28.
- Crowe, C. W. (2006). *Inflation, Inequality, and Social Conflict* (No. 6-158). International Monetary Fund.
- Dao, M., & Loungani, P. (2010). The Tragedy of Unemployment. Available at SSRN 1724833.
- De Grauwe, P., & Ji, Y. (2013). The legacy of austerity in the Eurozone. *CEPS Commentary*, 4.
- Devries, P., Guajardo, J., Leigh, D., & Pescatori, A. (2011). A new action-based dataset of fiscal consolidation. *IMF Working Papers*, 1-90.
- Dubois, E., Cour, P., Mahfouz, S., & Pisani-Ferry, J. (1996). *The cost of fiscal retrenchment revisited: How strong is the evidence?*. CEPII.
- Easterly, W. (2007). Inequality does cause underdevelopment: Insights from a new instrument. *Journal of Development Economics*, 84(2), 755-776.
- Easterly, W., & Fischer, S. (2001). Inflation and the Poor. *Journal of Money, Credit and Banking*, 160-178.
- Espinoza, R. A., & Perez Ruiz, E. (2016). *How Do Fiscal and Labor Policies in France Affect Inequality?*.
- European Commission (2007). Public finance in EMU-2007. *European Economy, Public finance report*, No. 3/2007.
- European Commission (2014). Report on Public finances in EMU 2014. *European Economy*, No. 9/2014.
- Favero, C., Giavazzi, F., & Perego, J. (2011). Country heterogeneity and the international evidence on the effects of fiscal policy. *IMF Economic Review*, 59(4), 652-682.
- Feenstra, R. C., Inklaar, R., & Timmer, M. P. (2015). *Penn World Table 8.1*.
- FES (2015). *Die Verteilung von Einkommen in Deutschland: (k)ein Problem?*. WISO Direkt, Friedrich-Ebert-Stiftung, Bonn 2015.
- Fitoussi, J. P., & Saraceno, F. (2010). *Inequality and macroeconomic performance*. HAL.

- Giavazzi, F., & Pagano, M. (1990). Can severe fiscal contractions be expansionary? Tales of two small European countries. In *NBER Macroeconomics Annual 1990, Volume 5* (pp. 75-122). MIT Press.
- Girouard, N., & Price, R. W. (2004). *Asset Price Cycles, "One-Off" Factors and Structural Budget Balances* (No. 391). OECD Publishing.
- Goos, M., Manning, A., & Salomons, A. (2009). Job polarization in Europe. *The American Economic Review*, 99(2), 58-63.
- Greene, William H. (2012). *Econometric Analysis* (Seventh ed.). Upper Saddle River: Pearson Prentice-Hall. pp. 332–344
- Guajardo, J., Leigh, D., & Pescatori, A. (2014). Expansionary austerity? International evidence. *Journal of the European Economic Association*, 12(4), 949-968.
- Hayes, A. F., & Cai, L. (2007). Using heteroskedasticity-consistent standard error estimators in OLS regression: An introduction and software implementation. *Behavior research methods*, 39(4), 709-722.
- Illing, G., & Watzka, S. (2014). Fiscal multipliers and their relevance in a currency union—a survey. *German Economic Review*, 15(2), 259-271.
- Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of econometrics*, 115(1), 53-74.
- IMF (2007). Globalization and Inequality. *World Economic Outlook: 31-65*.
- IMF (2012). *Fiscal Monitor: Taking Stock—A Progress report on fiscal adjustment*. International Monetary Fund. Washington, December 2012.
- IMF (2014). *Fiscal Policy and Income Inequality*. IMF Policy Paper (January). International Monetary Fund.
- IMF (2015). *Causes and consequences of income inequality: a global perspective*. International Monetary Fund.
- Ioannou, D., & Stracca, L. (2014). Have the euro area and EU governance worked? Just the facts. *European Journal of Political Economy*, 34, 1-17.
- Jaramillo, L., & Cottarelli, M. C. (2012). *Walking hand in hand: fiscal policy and growth in advanced economies* (No. 12-137). International Monetary Fund.
- Jarque, C. M., & Bera, A. K. (1987). A test for normality of observations and regression residuals. *International Statistical Review/Revue Internationale de Statistique*, 163-172.
- Jenkins, S. P., Burkhauser, R. V., Feng, S., & Larrimore, J. (2011). Measuring inequality using censored data: a multiple-imputation approach to estimation and inference. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 174(1), 63-81.
- Jordà, Ò., & Taylor, A. M. (2015). The time for austerity: estimating the average treatment effect of fiscal policy. *The Economic Journal*.
- Jourard, I., Pisu, M., & Bloch, D. (2012). *Less Income Inequality and More Growth—Are They Compatible? Part 3. Income Redistribution via Taxes and Transfers Across OECD Countries* (No. 926). OECD Publishing.
- Jovanovic, B. (2012). *How Policy Actions Affect Short-term Post-crisis Recovery?* (No. 253). Tor Vergata University, CEIS.
- Kaplanoglou, G., Rapanos, V. T., & Bardakas, I. C. (2015). Does fairness matter for the success of fiscal consolidation?. *Kyklos*, 68(2), 197-219.

- Krugman, P. (2010). Alesina On Stimulus. *New York Times Blog*. [Online] Available at http://krugman.blogs.nytimes.com/2009/12/27/stimulus-timing/?_r=0 [Accessed 23 April 2016].
- Krugman, P. (2013). How the case for austerity has crumbled. *New York Times Blog. The New York Review of Books*, 6. [Online] Available at <http://www.nybooks.com/articles/2013/06/06/how-case-austerity-has-crumbled/> [Accessed 30 April 2016].
- Krugman, P. (2015). *Musings on Inequality and Growth*, [Online] Available at <http://krugman.blogs.nytimes.com/2015/06/08/musings-on-inequality-andgrowth/> [Accessed 01 May 2016].
- Lambertini, L., & Tavares, J. A. (2005). Exchange Rates and Fiscal Adjustments: Evidence from the OECD and Implications for the EMU. *Contributions in Macroeconomics*, 5(1).
- Leigh, D., Devries, P., Freedman, C., Guajardo, J., Laxton, D., & Pescatori, A. (2010). Will it hurt? Macroeconomic effects of fiscal consolidation. *World Economic Outlook*, 93-124.
- Martinez-Vazquez, J., Moreno-Dodson, B., & Vulovic, V. (2012). The impact of tax and expenditure policies on income distribution: Evidence from a large panel of countries. *Andrew Young School of Policy Studies Research Paper Series*, (12-30).
- Matsaganis, M., & Leventi, C. (2014). *Distributive effects of the crisis and austerity in seven EU countries* (No. 14/04). Herman Deleeck Centre for Social Policy, University of Antwerp.
- Mauro, P. (2011). What Failed and What Worked in Past Attempts at Fiscal Adjustment. *Rules and Institutions for Sound Fiscal Policy after the Crisis*, 107.
- McDermott, C. J., & Wescott, R. F. (1996). An empirical analysis of fiscal adjustments. *Staff Papers-International Monetary Fund*, 725-753.
- McManus, R. (2014). *Fiscal policy effectiveness and its redistributive consequences: a theoretical and empirical exploration* (Doctoral dissertation, University of York).
- Meltzer, A. H., & Richard, S. F. (1981). A rational theory of the size of government. *The Journal of Political Economy*, 914-927.
- Molnár, M. (2012). Fiscal consolidation: What factors determine the success of consolidation efforts?. *OECD Journal: Economic Studies*, 2012(1).
- Monti, M. 2009. How to save the market economy in Europe. *Financial Times*, 05.04.2009. [Online] Available at <http://www.ft.com/cms/s/0/4e78b1f0-220d-11de-8380-00144feabdc0.html#axzz47DLmS4Mk> [Accessed 29 April 2016].
- Moon, H. R., & Perron, B. (2006). Seemingly unrelated regressions. *The New Palgrave Dictionary of Economics*, 1-9.
- Morgan, J., & Kelly, N. J. (2013). Market inequality and redistribution in Latin America and the Caribbean. *The Journal of Politics*, 75(03), 672-685.
- Mulas-Granados, C. (2002). *The political economy of fiscal adjustments in the European Union*. Instituto Juan March de Estudios e Investigaciones.
- Mulas-Granados, C. (2003). The political and economic determinants of budgetary consolidation in Europe. *European Political Economy Review*, 1(1), 015-039.
- Mulas-Granados, C. (2005). Fiscal adjustments and the short-term trade-off between economic growth and equality. *Hacienda Pública Española/Revista de Economía Pública*, 172(1), 61-92.

- Nuti, D. M. (2013). Austerity versus development. In *International Conference on Management and Economic Policy for Development*.
- OECD (2011a). *Divided We Stand: Why Inequality Keeps Rising*, OECD Publishing, Paris.
- OECD (2011b). Restoring Public Finances, Special Issue of the OECD Journal on Budgeting, Volume 2011/2, OECD Publishing, Paris.
- OECD (2012). What are the Best Policy Instruments for Fiscal Consolidation?. *OECD Economics Department Policy Notes*, No. 12, April 2012.
- OECD (2013). How much scope for growth and equity-friendly fiscal consolidation?. *OECD Economics Department Policy Notes*, No. 20 July 2013.
- OECD (2015a). *In It Together: Why Less Inequality Benefits All*, OECD Publishing, Paris.
- OECD (2015b). *OECD Economic Outlook (No. 98)*, OECD Publishing, Paris.
- Oesch, D., & Menes, J. R. (2010). Upgrading or polarization? Occupational change in Britain, Germany, Spain and Switzerland, 1990–2008. *Socio-Economic Review*, mwq029.
- Ortiz, I., & Cummins, M. (2013). *The age of austerity: a review of public expenditures and adjustment measures in 181 countries*.
- Ostry, J. D., Ghosh, A. R., Kim, J. I., & Qureshi, M. S. (2010). *Fiscal space*. International Monetary Fund, Research Department.
- Ostry, M. J. D., Berg, M. A., & Tsangarides, M. C. G. (2014). *Redistribution, inequality, and growth*. International Monetary Fund.
- Paulus, A., Čok, M., Figari, F., Hegedüs, P., Kump, N., Lelkes, O., & Morawski, L. (2009). *The effects of taxes and benefits on income distribution in the enlarged EU* (No. EM8/09). EUROMOD Working Paper.
- Perotti, R. (1999). Fiscal policy in good times and bad. *Quarterly Journal of Economics*, 1399-1436.
- Perotti, R. (2012). The "austerity myth": gain without pain?. In *Fiscal Policy after the Financial Crisis* (pp. 307-354). University of Chicago Press.
- Pescatori, A., Sandri, D., & Simon, J. (2014). *Debt and growth: is there a magic threshold?* (No. 14-34). International Monetary Fund.
- Piketty, T. (2014). *Capital in the twenty-first century*. Harvard University Press.
- Przewoski, A. (1986). *Capitalism and Social Democracy*, Cambridge: Cambridge University Press.
- Rajan, R. G. (2011). *Fault Lines: How Hidden Fractures Still Threaten the World Economy*. Princeton University Press.
- Rawdanowicz, Ł., Wurzel, E., & Christensen, A. K. (2013). *The Equity Implications of Fiscal Consolidation* (No. 1013). OECD Publishing.
- Romer, C. D., & Romer, D. H. (2010). The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks. *American Economic Review*, 100(3), 763-801.
- Roubini, N. (2016). The Global Growth Funk. *Project Syndicate*, May 2016. [Online] <https://www.project-syndicate.org/commentary/global-growth-slowdown-factors-by-nouriel-roubini-2016-05> [Accessed 09 May 2016].
- Schaltegger, C. A., & Weder, M. (2014). Austerity, inequality and politics. *European Journal of Political Economy*, 35, 1-22.

- Schäuble, W. (2011). Why austerity is only cure for the Eurozone. *Financial Times*, 5(09), 2011. [Online] Available at <http://www.ft.com/intl/cms/s/0/97b826e2-d7ab-11e0-a06b-00144feabdc0.html> [Accessed 13 February 2016].
- Schäuble, W. (2013). Ignore the doomsayers: Europe is being fixed, *Financial Times*, 16.09.2013. [Online] Available at <http://www.ft.com/intl/cms/s/0/e88c842a-1c67-11e3-a8a3-00144feab7de.html> [Accessed 10 February 2016].
- Smeeding, T. M., & Grodner, A. (2000). *Changing income inequality in OECD countries: updated results from the Luxembourg Income Study (LIS)* (pp. 205-224). Springer Berlin Heidelberg.
- Solt, F. (2009). Standardizing the world income inequality database. *Social Science Quarterly*, 90(2), 231-242.
- Solt, F. (2014). *The Standardized World Income Inequality Database (SWIID)*.
- Srivastava, V. K., & Maekawa, K. (1995). Efficiency properties of feasible generalized least squares estimators in SURE models under non-normal disturbances. *Journal of Econometrics*, 66(1), 99-121.
- Stiglitz, J. (2012). The Price of Inequality: How Today's Divided Society Endangers Our Future. *Publica, Bucharest*.
- Stiglitz, J. (2014). Austerity has been an utter disaster for the eurozone. *The Guardian*, 01.10.2014 [Online] <http://www.theguardian.com/business/2014/oct/01/austerity-eurozone-disaster-joseph-stiglitz> [Accessed 02 March 2016].
- Sutherland, D., Hoeller, P., & Merola, R. (2012a). Fiscal consolidation: How much, how fast and by what means?. *OECD Economic Policy Papers*, (1), 3.
- Sutherland, D., Hoeller, P., & Merola, R. (2012b). *Fiscal Consolidation: Part 1. How Much is Needed and How to Reduce Debt to a Prudent Level?* (No. 932). OECD Publishing.
- Tanzi, M. V., Chu, M. K. Y., & Gupta, M. S., (Eds.). (1999). *Economic policy and equity*. International Monetary Fund.
- The Economist (2016). A pre-budget update on Britain's public finances, *The Economist*, 14.02.2016 [Online] <http://www.economist.com/news/21694917-george-osborne-may-have-double-down-austerity-wednesdays-budget-pre-budget-update> [Accessed 02 March 2016].
- Tsibouris, M. G. C., Horton, M. M. A., Maliszewski, W., & Flanagan, M. M. J. (2006). *Experience with large fiscal adjustments* (No. 246). International Monetary Fund.
- van den Noord, P., & Koen, V. (2005). *Fiscal gimmickry in Europe: One-off measures and creative accounting*. OECD Economics Department Working Paper 417. Paris: Organization for Economic Cooperation and Development.
- Von Hagen, J., & Strauch, R. R. (2001). Fiscal consolidations: Quality, economic conditions, and success. *Public Choice*, 109(3-4), 327-346.
- Wagschal, U., & Wenzelburger, G. (2006). *Erfolgreiche Budgetkonsolidierungen im internationalen Vergleich*. Bertelsmann-Stiftung.
- Warmendinger, T., Checherita-Westphal, C. D., & De Cos, P. H. (2015). Fiscal multipliers and beyond. *ECB Occasional Paper*, 162.
- Weisbrot, M., & Jorgensen, H. (2013). *Macroeconomic policy advice and the Article IV consultations: A European Union case study* (No. 2013-03). Center for Economic and Policy Research (CEPR).

Wilkinson, R., Pickett, K., & Cato, M. S. (2009). *The spirit level. Why more equal societies almost always do better.*

Wolff, E. N., & Zacharias, A. (2007). The distributional consequences of government spending and taxation in the US, 1989 and 2000. *Review of income and wealth*, 53(4), 692-715.

Woo, J., Bova, M. E., Kinda, M. T., & Zhang, M. Y. S. (2013). *Distributional consequences of fiscal consolidation and the role of fiscal policy: what do the data say?* (No. 13-195). International Monetary Fund.

World Bank (2015). *World Development Indicators.*

Yellen, J. (2014). *Perspectives on Inequality and Opportunity from the Survey of Consumer Finances: a speech at the Conference on Economic Opportunity and Inequality, Federal Reserve Bank of Boston, Boston, Massachusetts, October 17, 2014* (No. 821). Board of Governors of the Federal Reserve System (US).

Appendices

Appendix 1: Variable description

Variable	Description	Source	
<i>I. Dependent</i>			
Gini M	Market income inequality Gini coeff.	SWIID, v. 4.1	
Gini N	Net income inequality Gini coeff.	SWIID, v. 4.1	
<i>II. Fiscal consolidation</i>			
Consolidation Occurrence	1 - Occurrence, 0 - no occurrence	<i>all from Devries et al. (2011)</i>	
Consolidation (%)	improvement of primary balance in % of GDP		
Spending based consolidation occurrence	1 - Occurrence, 0 - no occurrence		
Spending based consolidation (%)	improvement of primary balance in % of GDP		
Tax based consolidation occurrence	1 - Occurrence, 0 - no occurrence		
Tax based consolidation (%)	improvement of primary balance in % of GDP		
Spending-only occurrence	1 - Occurrence, 0 - no occurrence		
Spending-only (%)	improvement of primary balance in % of GDP		
Tax-only occurrence	1 - Occurrence, 0 - no occurrence		
Tax-only (%)	improvement of primary balance in % of GDP		
Mixed consolidation occurrence	1 - Occurrence, 0 - no occurrence		
Mixed consolidation (%)	improvement of primary balance in % of GDP		
<i>III. Controls</i>			
GDP per capita	Real GDP (PPP converted) in const. 2005 USD		Penn World Tables (v. 7.1)
GDP per capita sqrd	Real GDP (PPP converted) in const. 2005 USD	Penn World Tables (v. 7.1)	
Inflation	Annual change in CPI	OECD Economic Outlook database (No. 98)	
Trade Openness	Sum of Imports & Exports divided by GDP	World Bank's WDI database	
Europe	1 - European country, 0 - not		
Before 1994	1 - before 1994, 0 - not		

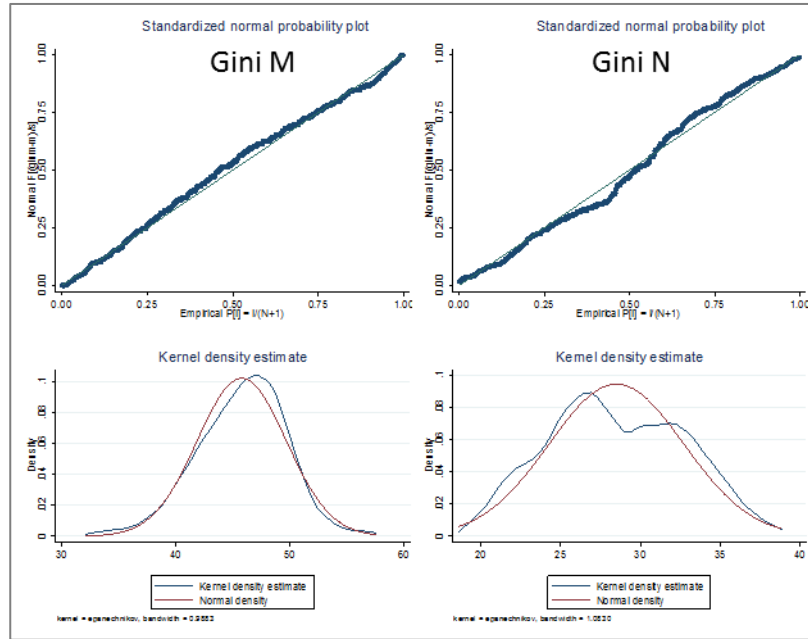
Appendix 2: Summary Statistics

Variable	Obs	Unique	Mean	Min	Max	Label
year	538	33	1993.586	1977	2009	Year
ginin	533	164	28.49081	19.7	37.8	GiniN
ginig	533	160	45.77824	33.1	56.6	Ginig
cons	538	131	.3174796	-.75	4.743	Cons (%)
taxcons	538	121	.1194257	-.75	2.54	Tax Cons
spencons	538	111	.1980502	-.29	3.71	Spen Cons (%)
taxonlyocc	538	2	.0464684	0	1	Tax only (Occ)
spenonlyocc	538	2	.070632	0	1	Spen only (Occ)
mixedocc	538	2	.1895911	0	1	mixed (Occ)
taxonlyocc~g	521	2	.0479846	0	1	Tax only (Occ), lag
spenonlyocc~g	521	2	.0729367	0	1	Spen only (Occ), lag
mixedocclag	521	2	.193858	0	1	Mixed (Occ), lag
taxonly	538	21	.0229368	0	1.9	Tax only (%)
spenonly	538	37	.0708922	0	3.71	Spen only (%)
mixed	538	80	.2412268	0	4.74	Mixed (%)
taxonlylag	521	3	.0172745	0	2	Tax only (%), lag
spenonlylag	521	5	.074856	0	4	Spen only (%), lag
mixedlag	521	5	.2476008	0	4	Mixed (%), lag
consocc	538	2	.3066914	0	1	Cons (Occ)
taxconsocc	538	2	.2360595	0	1	Tax Cons (Occ)
spenconsocc	538	2	.260223	0	1	Spen Cons (Occ)
loggdppc	538	416	10.18027	7.226	17.477	log(GDP p C)
loggdppcs	538	533	103.9263	52.218	305.438	log(GDP p C), s
tradeop	538	537	63.76428	15.924	175.174	Trade Op
inflation	538	517	4.328725	-1.347	28.385	Inflation
inflationlag	538	517	4.693983	-.9	31.017	Inflation, lag
conslag	521	130	.3187351	-.75	4.49	Cons (%), lag
taxconslag	521	120	.1188138	-.75	2.54	Tax Cons (%), lag
spenconslag	521	110	.1999175	-.29	3.71	Spen Cons (%), lag
consocclag	521	2	.3147793	0	1	Cons (Occ), lag
taxconsocclag	521	2	.2418426	0	1	Tax Cons (Occ), lag
spenconsocclag	521	2	.2667946	0	1	Spen Cons (Occ), lag
tradeoplag	538	537	63.09067	15.924	175.174	Trade Op, lag
loggdppclag	538	417	10.15913	7.226	17.477	log(GDP p C), lag
loggdppcslag	538	532	103.4904	52.218	305.438	log(GDP p C), s, lag
europe	538	2	.7732342	0	1	EUROPE
gininch	530	457	.0796038	-1.477	2.6	GiniNCh
ginigch	530	476	.1934642	-3.431	4.932	GinigCh
before1994	538	2	.4962825	0	1	before 1994
country	538	17	9.055762	1	17	Country

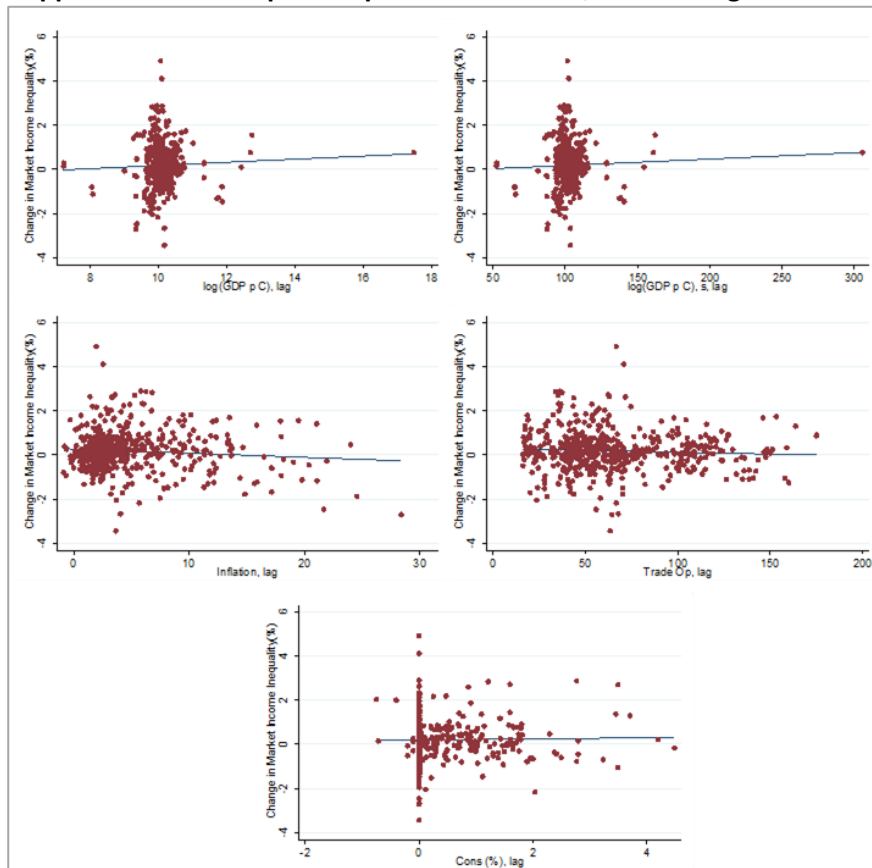
Appendix 3: Consolidations per country

country	Consocc	
	0 N	1 N
Australia	22	10
Austria	25	7
Belgium	21	11
Canada	12	14
Denmark	28	4
Finland	26	6
France	26	6
Germany	17	15
Ireland	24	8
Italy	20	12
Japan	20	12
Netherlands	19	13
Portugal	26	6
Spain	23	9
Sweden	25	7
United Kingdom	22	10
United States	17	15
Total	373	165

Appendix 4: Normality tests



Appendix 5: Scatter plots dependent variables, $t-1$ & Change in Gini M



Appendix 6: Stationarity test results

Im-Pesaran-Shin unit-root test for ginig				
Ho: All panels contain unit roots		Number of panels = 17		
Ha: Some panels are stationary		Avg. number of periods = 31.35		
AR parameter: Panel-specific		Asymptotics: T,N -> Infinity sequentially		
Panel means: Included				
Time trend: Not included				
ADF regressions: No lags included				
	Statistic	p-value	Fixed-N exact critical values	
			1%	5% 10%
t-bar	-1.0782		(Not available)	
t-tilde-bar	-1.0131			
Z-t-tilde-bar	2.2371	0.9874		

Appendix 7: Hausman test results

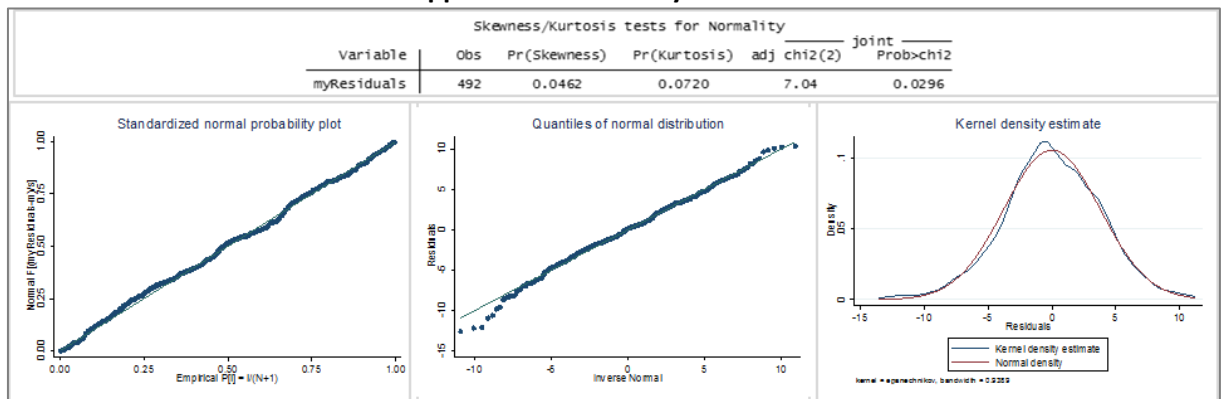
	Coefficients		(b-B)	sqrt(diag(V_b-V_B))
	(b)	(B)	Difference	S.E.
	Reg6	random		
loggdppclag	2.850961	2.785496	.065465	.0688334
loggdppclag	-.1040793	-.1014958	-.0025835	.
inflationlag	-.3225421	-.3193685	-.0031736	.0041624
tradeoplag	.0249165	.0225723	.0023441	.0047291
conslag	.5801842	.5662217	.0139625	.0076806

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

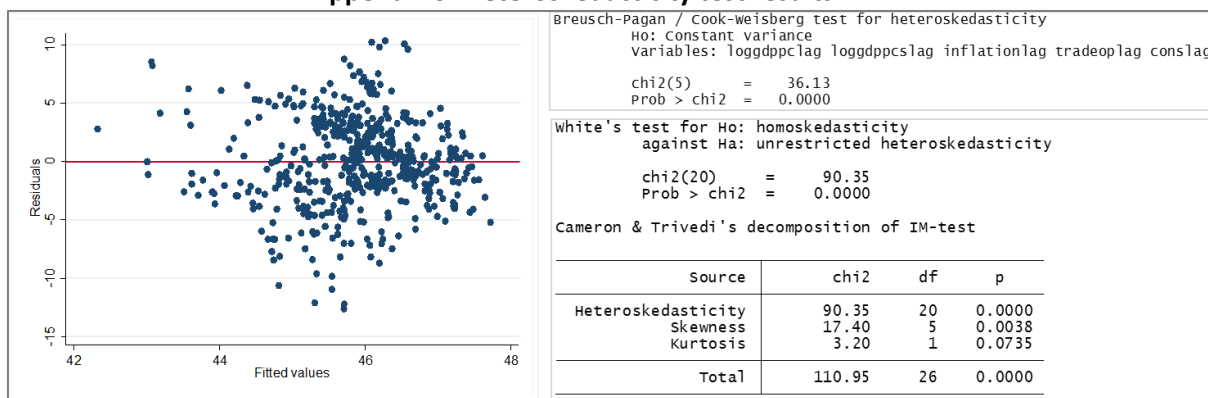
Test: Ho: difference in coefficients not systematic

$\chi^2(5) = (b-B)' [(V_b-V_B)^{-1}] (b-B)$
 $= 17.44$
 Prob>chi2 = 0.0037
 (V_b-V_B is not positive definite)

Appendix 8: Normality of residuals



Appendix 9: Heteroskedasticity test results



Appendix 10: Overview of Tax-based consolidations (conventional approach)

	Period	Δ Cons	Δ GiniM	Δ GiniM, t+1	Δ GiniN	Δ GiniN, t+1	Period	Δ Cons	Δ GiniM	Δ GiniM, t+1	Δ GiniN	Δ GiniN, t+1
Australia	1986-1987	0.36	-0.56	0.16	0.03	0.50	Japan	1979-1983	1.13	-6.33	-4.21	-1.10
	1994-1998	1.32	3.38	2.50	1.38	1.17		1997-1998	1.30	1.18	2.01	1.14
Austria	1980-1981	0.61					2004-2007	0.85	-0.85	-0.34	0.21	0.21
	1984	1.30	-0.94	-2.16	-0.38	-0.88	Netherlands	1981	0.53	0.98	0.46	0.27
1996-1997	1.32	-0.91	-0.44	-1.10	-0.80	1983		0.49	0.79	-0.69	0.34	
2001	0.90	0.81	0.72	0.45	0.33	1987		1.48	0.21	-0.92	-0.23	
Belgium	1983-1985	1.70	2.43	1.88	-0.11	0.09	1991-1993	0.13	1.00	0.18	-0.90	
	1990	0.40	1.08	0.37	0.02	-0.44	2004-2005	0.60	0.51	0.24	0.71	
	1992-1994	1.97	1.12	1.60	1.61	4.40	Portugal	1983	1.35	-2.46	0.47	-1.31
1996-1997	0.91	1.00	0.36	-1.60	0.35	2002		1.20	1.22	2.74	0.32	
Canada	1984-1997	3.34	5.01	6.74	0.49	2.53	2005-2007	2.12	2.13	-0.05	-1.16	
Denmark	1983-1985	2.36	-1.79	-1.11	-0.88	-0.55	Spain	1983-1984	2.27	-1.81	-2.24	-1.67
	1995	0.30	-0.18	0.07	-0.76	0.23		1989	0.98	2.31	2.84	1.43
Finland	1994	0.69	1.32	1.37	0.29	0.34	1992-1993	1.10	3.76	2.79	2.51	
France	1979	0.85	0.10	0.22	-0.18	-0.12	1996-1997	0.30	-1.32	-1.15	-0.33	
	1995-1997	1.70	0.64	0.03	-0.28	-0.27	Sweden	1984	0.21	0.20	0.36	0.25
Germany	1982-1983	0.86	0.80	2.77	1.60	1.17		1993-1998	3.81	0.67	-0.04	-0.33
	1991-1995	2.20	1.66	0.36	0.76	0.38	United Kingdom	1981-1982	1.90	1.71	1.89	0.31
	1997	0.50	0.21	0.16	-0.13	-0.13		1994-1995	0.90	1.46	-0.03	0.45
	1999	0.30	0.28	0.83	0.01	-0.01	1994-1999	1.04	-0.37	-0.51	0.29	
	2003	0.74	0.43	0.39	0.20	0.19	United States	1978	0.14	0.05	0.04	-0.34
2007	0.50	0.41	0.03	0.45	0.45	1980-1981		0.29	0.41	0.52	0.75	
Ireland	1981-1986	6.66	-0.96	0.06	-0.64	-0.14		1985-1986	0.31	1.50	0.89	1.26
	2008	2.35	1.74	2.01	-0.20	-0.12	1988	0.39	0.20	0.21	0.12	
Italy	1991-1998	7.59	5.72	6.54	4.59	4.88	1990-1997	1.61	3.62	3.16	3.86	
	2004-2007	2.89	-0.74	-2.20	-0.90	-1.60						
	Average	2.63	1.39	0.64	0.63	0.23	0.38					
	<i>Σ episodes/years 51/134</i>											

Appendix 11: Overview of Spending-based consolidations (conventional approach)

	Period	Δ Cons	Δ GiniM	Δ GiniM, t+1	Δ GiniN	Δ GiniN, t+1		Period	Δ Cons	Δ GiniM	Δ GiniM, t+1	Δ GiniN	Δ GiniN, t+1	
Australia	1985-1988	2.38	1.01	0.00	0.82	1.00	Italy	1991-1998	11.64	5.72	6.54	4.59	4.88	
	1996-1999	1.19	0.33	1.57	0.11	1.01		2004-2007	1.83	-0.74	-2.20	-0.90	-1.60	
Austria	1980-1981	1.75					Japan	1982-1983	0.76	-1.05	0.28	0.49	1.05	
	1984	0.74	-0.94	-2.16	-0.38	-0.88		1997-1998	0.60	1.18	2.01	1.14	1.32	
	1996-1997	2.65	-0.91	-0.44	-1.10	-0.80		2003-2006	1.42	-1.74	-0.85	0.05	0.21	
	2001-2002	0.67	1.53	1.40	0.78	0.57	Netherlands	1981-1986	10.42	1.12	0.14	-0.59	-1.08	
Belgium	1982-1985	4.05	2.91	2.65	-0.01	0.10			1988	0.75	-0.92	-0.71	0.97	0.93
	1987	2.80	0.32	0.16	0.17	0.12		1992-1993	1.60	0.76	-0.11	-0.48	-0.59	
	1990	0.20	1.08	0.37	0.02	-0.44		2004-2005	1.60	0.51	0.24	0.71	0.41	
	1992-1994	1.89	1.12	1.60	1.61	4.40	Portugal	1983	0.95	-2.46	0.47	-1.31	-1.04	
	1996-1997	1.00	1.00	0.36	-1.60	0.35			2000	0.50	-1.12	0.62	-0.10	0.23
Canada	1985-1997	4.59	4.54	6.51	0.53	2.60		2002	0.40	1.22	2.74	0.32	0.45	
Denmark	1983-1985	4.33	-1.79	-1.11	-0.88	-0.55		2005-2007	1.53	2.13	-0.05	-1.16	-1.68	
Finland	1992-1997	12.07	6.51	4.11	2.02	2.74	Spain	1984	0.75	-0.79	-1.45	-0.75	-1.18	
France	1987	0.76	-0.31	0.15	-1.28	-0.80			1989	0.24	2.31	2.84	1.43	1.95
	1991	0.25	0.00	0.04	-0.02	0.04		1992-1997	5.24	5.26	2.30	3.73	1.93	
	1996-1997	0.56	0.28	-0.22	-0.17	-0.21	Sweden	1984	0.69	0.20	0.36	0.25	0.25	
Germany	1982-1984	1.78	3.40	2.59	2.10	0.98			1993-1998	6.78	0.67	-0.04	-0.33	1.18
	1991-1995	1.47	1.66	0.36	0.76	0.38	United Kingdom	1979-1982	1.14	4.04	3.41	0.81	0.71	
	1997	1.10	0.21	0.16	-0.13	-0.13			1994-1999	0.68	0.56	-0.90	0.65	0.32
	2000	0.75	0.26	0.83	-0.01	0.43	United States	1988	0.46	0.20	0.21	0.12	0.10	
	2004	1.10	0.39	0.26	0.19	0.22			1990-1998	2.31	3.45	2.98	3.73	3.47
	2006-2007	0.90	0.74	0.44	0.78	0.34								
Ireland	1981-1982	0.32	-0.65	-1.02	-0.29	-0.54								
	1986-1987	3.07	1.25	0.20	0.65	0.19								
	2008	2.39	1.74	2.01	-0.20	-0.12		Average	2.96	2.23	0.96	0.83	0.37	0.48
								<i>Σ episodes/years 48/142</i>						

Appendix 12: Overview of Tax-only consolidations (augmented approach)

	Period	Δ Cons	Δ GiniM	Δ GiniM, t+1	Δ GiniN	Δ GiniN, t+1	
Australia	1994-1995	0.75	3.69	1.47	1.72	0.56	
Canada	1984	0.27	0.47	0.23	-0.04	-0.07	
	1988	0.33	0.13	0.22	-0.31	-0.18	
Denmark	1995	0.30	-0.18	0.07	-0.76	0.23	
France	1979	0.85	0.10	0.22	-0.18	-0.12	
	1995	0.43	0.37	0.25	-0.11	-0.06	
Germany	1999	0.30	0.28	0.26	0.01	-0.01	
	2003	0.74	0.43	0.39	0.20	0.19	
Ireland	1983-1985	1.15	-0.75	0.27	-0.54	-0.06	
Italy	2007	1.32	-0.61	-0.86	-0.47	-0.61	
Japan	1979-1981	0.76	-5.28	-4.49	-1.60	-0.98	
	2007	0.15	0.11	0.17	0.06	0.05	
Netherlands	1987	1.48	0.21	-0.92	-0.23	0.97	
	1991	0.87	0.24	0.29	-0.42	-0.24	
Spain	1983	1.90	-1.02	-0.79	-0.92	-0.75	
United States	1978	0.14	0.05	0.04	-0.34	-0.48	
	1980-1981	0.29	0.41	0.52	0.75	0.66	
	1985-1986	0.31	1.50	0.89	1.26	0.71	
Average		1.39	0.69	0.01	-0.10	-0.11	
		<i>Σ episodes/years 18/25</i>					

Appendix 13: Overview of Spending-only consolidations (augmented approach)

	Period	Δ Cons	Δ GiniM	Δ GiniM, t+1	Δ GiniN	Δ GiniN, t+1
Australia	1985	0.45	1.33	-0.49	0.38	-0.06
	1988	0.37	0.23	0.33	0.41	0.56
	1999	0.07	0.65	0.53	0.44	0.40
Austria	2002	0.55	0.72	0.68	0.33	0.24
Belgium	1982	1.66	0.48	0.77	0.11	0.01
	1987	2.80	0.32	0.16	0.17	0.12
Canada	1992-1993	0.58	1.47	1.59	0.18	0.24
Finland	1992-1993	4.62	4.11	3.19	0.07	0.35
	1995-1997	4.68	1.08	-0.45	1.66	2.04
France	1987	0.76	-0.31	0.15	-1.28	-0.80
	1991	0.25	0.00	0.04	-0.02	0.04
Germany	1984	0.59	2.60	-0.18	0.50	-0.20
	1993	0.18	-0.58	-0.07	0.14	0.13
	2000	0.75	0.26	0.83	-0.01	0.43
	2004	1.10	0.39	0.26	0.19	0.22
	2006	0.50	0.33	0.41	0.33	0.45
Ireland	1987	1.95	0.81	-0.61	0.46	-0.26
Italy	1994	1.70	-0.16	0.26	-0.13	0.13
	1996	1.08	0.22	0.34	0.09	0.25
Japan	2003	0.48	-0.78	-0.35	-0.11	0.06
Netherlands	1982	1.71	0.46	0.79	0.18	0.34
	1984-1986	4.74	-1.11	-0.21	-1.37	-0.90
	1988	0.75	-0.92	-0.71	0.97	0.93
	1992-1993	1.60	0.76	-0.11	-0.48	-0.59
Portugal	2000	0.50	-1.12	0.62	-0.10	0.23
Spain	1994-1995	2.34	2.82	0.65	1.55	0.54
United Kingdom	1979-1980	0.93	2.34	1.52	0.50	0.15
	1996	0.30	-0.53	-0.35	-0.09	0.01
United States	1998	0.15	-0.18	-0.18	-0.13	-0.14
Average		1.31	1.32	0.54	0.32	0.17
<i>Σ episodes/years</i>		<i>29/38</i>				

Appendix 14: Overview of mixed consolidations (augmented approach)

	Period	Δ Cons	Δ GiniM	Δ GiniM, t+1	Δ GiniN	Δ GiniN, t+1		Period	Δ Cons	Δ GiniM	Δ GiniM, t+1	Δ GiniN	Δ GiniN, t+1
Australia	1986-1987	1.92	-0.56	0.16	0.03	0.50	Italy	1996-1997	2.50	0.78	0.28	0.71	-0.26
	1996-1998	1.69	-0.32	1.04	-0.33	0.61		2004-2006	3.69	-0.13	-1.34	-0.43	-0.99
Austria	1980-1981	2.36					Japan	1982-1983	1.13	-1.05	0.28	0.49	1.05
	1984	2.04	-0.94	-2.16	-0.38	-0.88		1997-1998	1.90	1.18	2.01	1.14	1.32
	1996-1997	3.97	-0.91	-0.44	-1.10	-0.80	2004-2006	1.64	-0.96	-0.51	0.15	0.15	
	2001	1.02	0.81	0.72	0.45	0.33	Netherlands	1981	1.75	0.98	0.46	0.27	0.18
Belgium	1983-1985	4.09	2.43	1.88	-0.11	0.09		1983	3.24	0.79	-0.69	0.34	-0.70
	1990	0.60	1.08	0.37	0.02	-0.44	2004-2005	2.20	0.51	0.24	0.71	0.41	
	1992-1994	3.86	1.12	1.60	1.61	4.40	Portugal	1983	2.30	-2.46	0.47	-1.31	-1.04
1996-1997	1.91	1.00	0.36	-1.60	0.35	2002		1.60	1.22	2.74	0.32	0.45	
Canada	1985-1986	2.30	0.24	0.14	-0.27	-0.50	2005-2007	3.65	2.13	-0.05	-1.16	-1.68	
	1989-1991	1.58	1.67	2.16	0.11	0.34	Spain	1984	1.12	-0.79	-1.45	-0.75	-1.18
	1994-1997	2.92	1.03	2.40	0.82	2.70		1989	1.22	2.31	2.84	1.43	1.95
Denmark	1983-1985	6.69	-1.79	-1.11	-0.88	-0.55	1992-1993	1.80	3.76	2.79	2.51	1.91	
Finland	1994	3.46	1.32	1.37	0.29	0.34	1996-1997	2.50	-1.32	-1.15	-0.33	-0.52	
France	1996-1997	1.83	0.28	-0.22	-0.17	-0.21	Sweden	1984	0.90	0.20	0.36	0.25	0.25
Germany	1982-1983	2.05	0.80	2.77	1.60	1.17		1993-1988	10.59	0.67	-0.04	-0.33	1.18
	1991-1992	1.57	1.98	-0.15	0.56	0.40	United Kingdom	1981-1982	2.11	1.71	1.89	0.31	0.56
	1994-1995	1.99	0.26	0.58	0.06	-0.15		1994-1995	1.10	1.46	-0.03	0.45	0.41
	1997	1.60	0.21	0.16	-0.13	-0.13	1997-1999	1.21	-0.37	-0.51	0.29	-0.10	
Ireland	2007	0.90	0.41	0.03	0.45	-0.11	United States	1988	0.85	0.20	0.21	0.12	0.10
	1981	5.30	-0.65	-1.02	-0.29	-0.54		1990-1997	3.77	3.62	3.16	3.86	3.61
	1986	1.65	0.44	0.81	0.19	0.46							
Italy	2008	4.74	1.74	2.01	-0.20	-0.12							
	1991-1993	10.76	4.62	5.44	3.79	4.67	Average	2.13	2.70	0.65	0.65	0.29	0.40
	1995	4.20	0.26	0.22	0.13	0.09	<i>Σ episodes/years</i>		<i>48/102</i>				