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HOW DOES FISCAL CONSOLIDATION IMPACT ON INCOME INEQUALITY?

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In this paper, we assess the impact of fiscal consolidation on income inequality. Using a panel of 18 industrialized countries from 1978 to 2009, we find that income inequality significantly rises during periods of fiscal consolidation. In addition, while fiscal policy that is driven by spending cuts seems to be detrimental for income distribution, tax hikes seem to have an equalizing effect. We also show that the size of the fiscal consolidation program (in percentage of GDP) has an impact on income inequality. In particular, when consolidation plans represent a small share of GDP, the income gap widens, suggesting that the burden associated with the effort affects disproportionately households at the bottom of the income distribution. Considering the linkages between banking crises and fiscal consolidation, we find that the effect on the income gap is amplified when fiscal adjustments take place after the resolution of such financial turmoil. Similarly, fiscal consolidation programs combined with inflation are likely to increase inequality and the effects of fiscal adjustments on inequality are amplified during periods of relatively low growth. Our results also provide support for a non-linear relationship between inequality and income and corroborate the idea that trade can promote a more equal distribution of income.

JEL Codes: D63, E62, E64

Keywords: fiscal consolidation, income inequality, Kuznets curve

> Growing inequality is a "key test" for market economy. (Mario Monti, May 17, 2009)

1. Introduction

The most recent financial turmoil that emerged in 2008 led to a quick and aggressive response by monetary authorities with the aim of boosting the economy. However, its deepening severity associated with the collapse and massive destruction of asset wealth suggested that large fiscal stimulus programs should be a key additional ingredient of the policy mix. As a result, fiscal authorities in many

Note: The opinions expressed herein are solely those of the authors and do not necessarily reflect those of the Banque de France.

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G20 countries implemented comprehensive support packages based on expenditure hikes which, combined with cyclical revenue losses, resulted in sharp increases in budget deficits.

More recently, the uncertainty regarding the economic path and the concerns about long-term (un)sustainability of public finances has supported in a relatively consensual way the view about the need to withdraw such stimulus and the emergence of the implementation of budgetary consolidation measures. This should, in turn, deliver a return to more "normal" fiscal stances and sustain the path of debt growth.

In this context, it is interesting to investigate the impact of fiscal consolidations on income inequality. In fact, while some literature has been devoted toward addressing the linkages between fiscal consolidation and economic growth, there is an important gap regarding our understanding of the effects of such fiscal programs on the distribution of income.

Will fiscal austerity measures increase inequality or contribute to a more even distribution of income? To what extent does such a relationship depend on whether fiscal consolidation is led by spending cuts or tax hikes? Is it more likely to affect income inequality when undertaken during a severe financial crisis or afterwards?

These questions have gained a renewed momentum in recent times, especially if one takes into account that, in order to deal with financial crises, governments have employed a broad range of policies, which reallocated wealth toward banks and debtors and away from taxpayers. We aim at providing the answers to the abovementioned questions in this work.

Overall, we find that during periods of fiscal consolidation, income inequality significantly rises. However, while fiscal adjustments that are led by spending cuts tend to be detrimental for income distribution, tax hikes seem to have an equalizing effect.

The empirical evidence also suggests that the size of the fiscal consolidation program (in percentage of GDP) and its composition matters for income distribution. In particular, the income gap substantially widens when consolidation plans represent a relative small share of GDP (below 1 percent) and spending cuts exceed 0.77 percent of GDP. Therefore, the burden associated with such fiscal austerity measures affects disproportionately households at the bottom of the income distribution. By contrast, tax increases above 0.57 percent of GDP tend to significantly reduce income inequality. Interestingly, this evidence suggests that properly designed tax-based consolidation plans could be an effective tool for reducing income inequality.

When we condition the effects of fiscal consolidation on the role played by banking crises, the empirical findings suggest that: (i) in the *absence* of crises episodes, fiscal austerity leads to a more unequal distribution of income; (ii) if fiscal consolidation is implemented *during* banking crises, the impact on inequality is negligible; and (iii) in the aftermath of a banking crisis, fiscal consolidation substantially raises income inequality. Therefore, the impact on the income gap is amplified when fiscal austerity takes place after the resolution of banking crises.

In addition, we find that fiscal austerity combined with inflation boosts inequality even further, and show that the effect of fiscal consolidation on inequal-

ity is amplified during periods of relatively low growth. Similarly, our results support the existence of a non-linear relationship between inequality and income, that is, while per capita GDP has a significantly positive effect on inequality, the square of per capita GDP has a negative impact. This gives rise to the idea that the benefits of the early stages of economic development accrue only to a small share of the population, while further increases in per capita GDP eventually reduce inequality.

Finally, we show that the degree of openness of a country is negatively related to income inequality. That is, both the *indirect* effect of trade on income inequality (via boosting economic growth) and its *direct* impact help to narrow the income gap. Consequently, trade may be a determinant not only for poverty reduction, but also for income equalization.

The rest of the paper is organized as following. Section 2 reviews the literature on fiscal consolidation. Section 3 presents the data and describes the methodological approach. Section 4 discusses the empirical results. Section 5 considers the size of the consolidation plan and the existence of threshold effects. Section 6 looks at the relationship between fiscal consolidation, banking crises, and income inequality. Section 7 concludes.

2. Review of the Literature

There is a relatively large number of works looking at the potential impact of fiscal consolidation on economic growth[1] or, more generally, the effect of fiscal policy on the economy.[2]

However, the sharp increase in deficits and quick debt build up that have been recently observed in many developed countries—as a result of the fiscal response to the most recent financial turmoil—are now calling for a return to "normal" times via the implementation of fiscal austerity. This brings a new question into the scene: What is the impact of fiscal consolidation on income distribution?

Up to now, only a few studies have looked at the distributional effects of fiscal policy. Wolff and Zacharias (2007) emphasize that net government spending reduces income inequality in a considerable manner and the effect is owed more to expenditures than to taxes. Bertola (2010) argues that Europe's Economic and Monetary Union (EMU) had a small (although significantly positive) impact on income inequality, partially reflecting the implementation of less generous social policies. In the same vein, Perugini and Martino (2008) assess the determinants of economic inequality within European regions. The authors emphasize the role of institutions and the qualitative and quantitative aspects of the centrality of labor markets, and uncover a positive relationship between inequality and growth. Bouvet (2010) uses data for a set of European regions and finds that, while income inequality has decreased (mainly because of a fall in between-country inequality), the establishment of the convergence criteria widened the income gap in less

[1]See, for instance, Feldstein (1982), Giavazzi and Pagano (1990), Alesina and Ardagna (1998, 2010), Miller and Russek (2003), Castro (2007, 2011), Heim (2010a, 2010b), and Afonso and Jalles (2011).

[2]For a review of the topic, see Blanchard and Perotti (2002), Mountford and Uhlig (2009), Afonso and Sousa (2011, 2012), Romer and Romer (2010), and Ramey (2011).

advanced countries. Some research has also highlighted that fiscal consolidations: (i) run together with an increase in poverty and a rise in the income gap (Smeeding, 2000);[3] and (ii) impact on the trade-off between economic growth and income inequality (Mulas-Granados, 2005).

Moreover, the discussion has been centered on how income inequality changes in the outcome of a banking crisis. From a theoretical point of view, financial crises can lead to bankruptcies and falls in asset prices, generate deep recessions, and demand policy responses such as bailouts, but their effects on inequality are not clear (Atkinson and Morelli, 2011). From an empirical perspective, the 1929 crash was followed by a substantial correction in inequality, because wealth losses and financial reforms hit the top of income distribution.

In this context, Stiglitz (2009) suggests that the combination of excessive liquidity, lax regulation, stagnant real incomes, and increased borrowing by low income households leads to an unsustainable path that makes default and financial crises more likely. Freeman (2010) finds that inequality increases substantially before financial crises. More recently, Agnello and Sousa (2012) show that banking crises have a dramatic effect on income distribution, raising inequality before the event occurs and sharply declining it afterwards. The authors also suggest that a better access to credit provided by the banking sector leads to a more equal distribution of income, but the size of the government does not reduce inequality *per se*. Agnello *et al.* (2012) find that financial reforms, such as removal of policies toward directed credit and excessively high reserve requirements and improvements in the market of securities, can help to mitigate income inequality.

The recent financial crisis seems to have witnessed a slight fall in income gap, but there is no clear trend on how it will evolve in the future as it depends on the groups that are affected and where they are in terms of the income distribution. Notably and as pointed out by Jenkins *et al.* (2011), in the case of the Great Recession, countries with a relatively strong welfare state did observe a more stable income distribution as a result of a greater automatic stabilization. However, there is a growing sentiment that the coming fiscal austerity measures are somewhat unfair and, as the authors emphasize, they are likely to have a dramatic impact on inequality. For instance, Ball *et al.* (2011) estimate that a 1 percent of GDP of fiscal consolidation leads to a fall in inflation-adjusted wage income by 0.9 percent, while inflation-adjusted profit and rents are reduced by 0.3 percent. Rather than judging about the merits of such policies, our paper tries to provide a comprehensive description of the effects of fiscal consolidation on income inequality.

3. Data and Methodological Approach

We use annual data for 18 industrialized countries; the sample period is 1978–2009.

[3]Notably, Wolff (1996) provides estimates of the distribution of wealth for eight OECD countries and shows that wealth inequality: (i) rose substantially in the U.S.; (ii) increased modestly in Sweden; and (iii) showed a little decline in Canada, France, and the U.K.

Gini inequality index data come from the Standardized World Income Inequality Database (SWIID). As highlighted by Nolan *et al.* (2011), this measurement of income and wage inequality improves comparability across different studies. More specifically, while accounting for the concept, definition of income and recipient unit, it captures different points in the distribution and measures income inequality levels and trends in a harmonized way. Similarly, as pointed out by Solt (2009), it covers a large set of countries (153) and a long time span (annual data since 1960).[4] In order to increase comparability of available cross-national inequality data, the SWIID employs a transparent procedure. The starting point is the Gini index from the World Income Inequality Database (WIID). Two series of gross and net income inequality from the Luxembourg Income Study (LIS) are added to the dataset and serve as the baseline to which the WIID data are standardized via a custom missing-data statistical algorithm.

We focus on two different income definitions, i.e. gross or net of taxes. Therefore, significant gaps between inequality in gross and net income help to explain the differences in redistributive policies across countries. As shown in Figure 1, this might be particularly important for the advanced economies included in our sample, as the panel correlation between the gross and the net income inequality indexes is relatively low (0.37).

Data for per capita GDP and the degree of openness are provided by the World Development Indicators of the World Bank, and the Penn World Table (PWT) Version 7.0, respectively (Heston *et al.*, 2011).

Finally, the IMF fiscal consolidation episodes are identified from the work of Devries *et al.* (2011), which is based on a narrative approach. As argued by the authors, the standard statistical approach focuses on variation in the cyclically adjusted primary budget balance (CAPB). While structural indicators represent a useful benchmark to evaluate the state of the fiscal policy stance, they are also subject to a number of limitations (Larch and Turrini, 2010). First, there is substantial uncertainty about the cyclical adjustment procedure. In particular, there is a certain degree of arbitrariness in the selection of the statistical smoothing technique that is used to net out the automatic impact of the cycle on the headline fiscal figures (Canova 1998; Jaeger and Schuknecht 2007; Darby and Melitz, 2008). Second, while standard methods imply that elasticities of budgetary components with respect to output are treated as constant, the empirical evidence suggests that

[4]Research on the causes and consequences of income inequality has been hindered by the limitations of the two most popular existing inequality datasets: the Luxembourg Income Study (LIS) and the database by Deininger and Squire (1996). The former has generated the most comparable income inequality statistics that are currently available, but only covers a relatively small number of countries (30) and years (on average, 5, and not necessarily consecutive since 1993). This makes any econometric work extraordinarily challenging. The latter and also its more recent successor (i.e., the WIID) include many more observations, but at a substantial loss of comparability given that (gross and net) income definitions vary substantially across countries and over time. This, in turn, implies two types of problem. First, from a theoretical point of view, the data heterogeneity is particularly problematic while assessing the distributional effects of fiscal policy because, as explained in the text, we need to exclusively refer to net income inequality figures. Second, from an econometric point of view, the changes in income definitions across the two panel dataset dimensions (i.e., the cross-section units (countries) and the time series units (years)) would lead to biased results. The same problems of data heterogeneity potentially arise from the use of the top income shares dataset provided by Atkinson and Piketty (2010).

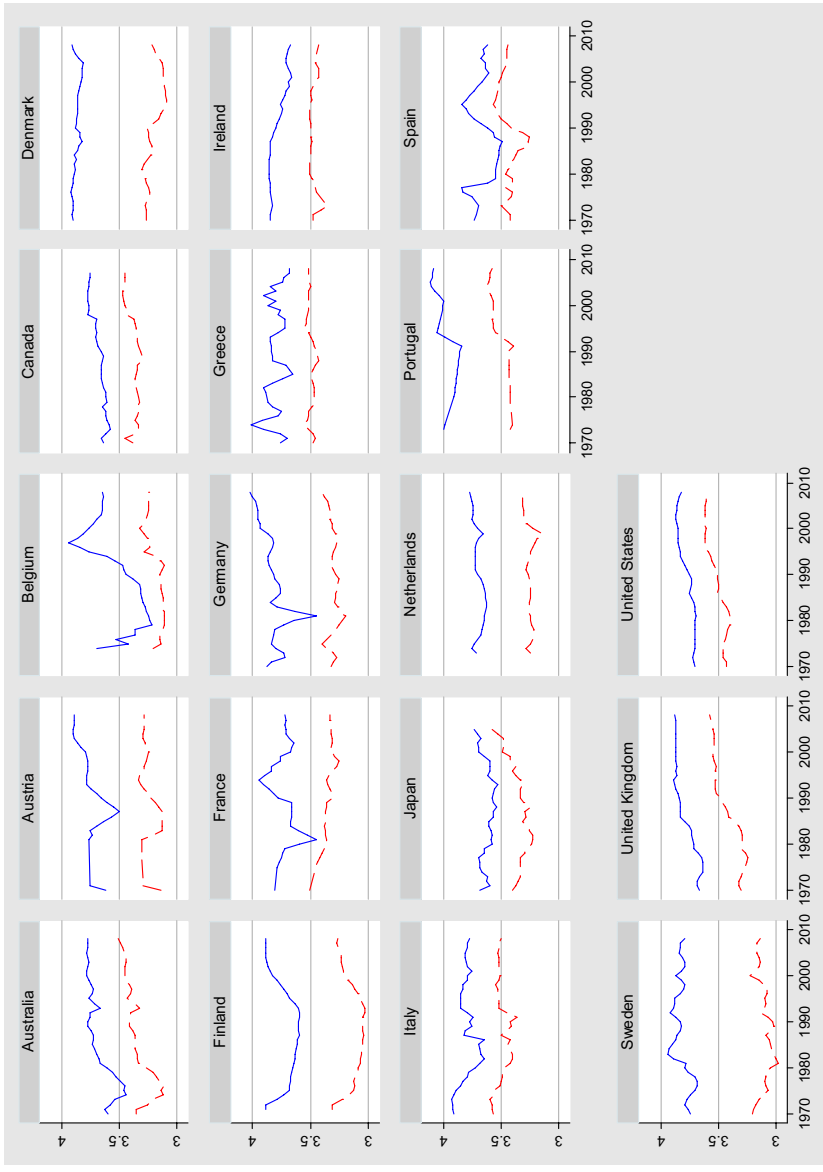

Figure 1. Gross and Net Income Gini Indexes

Notes: The solid line denotes the gross income inequality index, while the dashed line corresponds to the net income inequality index. Both series are expressed in log terms. The correlation between gross and net income inequality is relatively low (0.37). This is not surprising for advanced countries where, in contrast with developing countries, differences in redistributive policies are much more relevant at explaining differences in net inequality.

they can vary over time and may be characterized by high volatility (Eschenbach and Schuknecht, 2004; Jaeger and Schuknecht, 2007). Third, unemployment benefits and other categories of social spending (such as age- and health-related expenditures or incapacity and sickness benefits) may respond to the business cycle (Darby and Melitz, 2008), that is, the CAPB may suffer from measurement error that can be correlated with economic developments. Finally, the statistical approach omits periods during which fiscal consolidation actions were followed by adverse shocks and offsetting discretionary measures.

In addition to the measurement issues, it is important to emphasize that the definition of a pure "statistical" rule that is used to identify consolidation periods includes some arbitrariness. For instance, Alesina and Ardagna (2010) make assumptions about the "amplitude" (1.5 percent of GDP) and the "duration" (two years) of the CAPB adjustments. Thus, by changing such thresholds, the number of austerity episodes is likely to change.

Consequently, commonly used cyclically-adjusted fiscal indicators may provide inaccurate measures of discretionary policies (Chalk, 2002; Larch and Salto, 2005). For these reasons, we use the narrative approach to identify episodes of fiscal consolidation. More specifically, rather than looking at fiscal *outcomes*, we follow Devries *et al*. (2011), who assess policy *actions* that are motivated by deficit reduction by examining accounts and records of what countries were intending to do at the time of publications (such as the *IMF Recent Economic Developments* reports, the *IMF Staff Reports*, or the *OECD Economic Surveys*). Therefore, this procedure eliminates the endogeneity of the response of fiscal policy to the economy, as it captures policymakers' decisions, and should capture the discretionary component of fiscal policy more effectively than commonly used cyclically-adjusted fiscal indicators.[5] Additionally, it allows for a quantification of the size and the composition of fiscal consolidation programs (tax hikes and/or spending cuts), whereas the statistical approach is built on CAPB figures and, therefore, looks at the fiscal balance as a whole, making it impossible to assess the compositional effects of austerity packages.

As can be seen in Figure 2, fiscal adjustments typically involve substantial variation in income inequality measures. Moreover, there is a reasonably large number of countries for which fiscal consolidation programs were carried out with a significant increase in inequality. This is the case, for instance, for Finland, Italy, and Spain in the 1990s, where aggressive austerity measures of up to 3–4 percent of GDP were implemented (Devries *et al*., 2011), or for Germany, Japan, and Portugal in the 1980s, where fiscal consolidation totaled, approximately, 0.4–1.4 percent of GDP. These preliminary considerations do not account for the fact that the impact on inequality may also depend on the nature of the consolidation program (i.e., whether it is tax- or spending-driven), as well as the size of the implemented measures. These are features that we will also address in this paper.

[5]We remark that the current paper looks at consolidation measures that are *explicitly motivated* by the deficit reduction. As a result, other political, institutional, and economic factors that may impact on the adoption of austerity packages are not taken into account, as this would require the use of a different modeling approach. Moreover, from a conceptual point of view, it would also imply a substantial departure from the procedure that is used in the identification of the fiscal consolidation episodes.

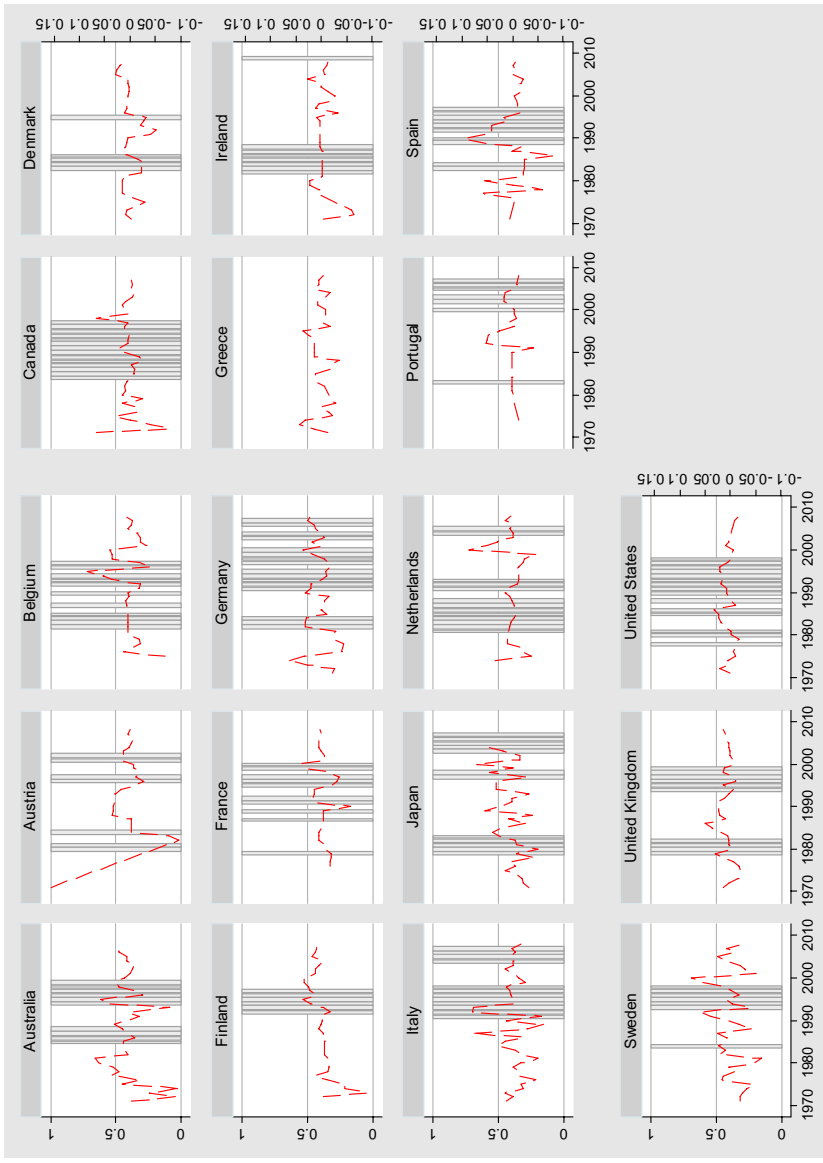

Figure 2. IMF Consolidation Episodes and Net Income Gini Index

Notes: The dashed line denotes the annual change in the net income Gini Index (on the right axis), while the shaded regions correspond to the IMF fiscal consolidation episodes (on the left axis).

In order to explore the empirical relationship between gross and net income inequality measures and fiscal consolidation, we estimate a panel regression system:[6]

$$\boldsymbol{y}_{it} = \boldsymbol{X}_{it}\boldsymbol{\beta} + \boldsymbol{\alpha}_i + \boldsymbol{u}_{it} = \boldsymbol{X}_{it}\boldsymbol{\beta} + \boldsymbol{\varepsilon}_{it},$$

where the vector $\boldsymbol{y}_{it} = \left(y_{it}^{net}, y_{it}^{gross}\right)'$ includes either the net income Gini inequality index or the gross income Gini inequality index, $\boldsymbol{X}_{it} = \left(\boldsymbol{x}_1^{net}, \boldsymbol{x}_2^{gross}\right)$ is the regressor matrix, and $\boldsymbol{\beta} = \left(\boldsymbol{\beta}_1^{net}, \boldsymbol{\beta}_2^{gross}\right)$ is the vector of the associated coefficients. Finally, $\boldsymbol{\alpha}_i$ and $\boldsymbol{u}_{it}$ denote the latent effects and the genuine country-specific disturbance (with $i = 1, \ldots, N$), respectively. We assume that $\boldsymbol{\alpha}_i$ and $\boldsymbol{u}_{it}$ have zero mean and are mutually uncorrelated and uncorrelated with $\boldsymbol{X}_{it}$.

Following Barro (2008), the matrix $\boldsymbol{X}_{it}$ includes a core set of variables that have been found to be strongly related with income inequality, namely, the log of per-capita GDP and its squared term (which is used to test the Kuznets relationship) and the trade openness. From an empirical point of view, this choice also guarantees the existence of a parsimonious model, because of the relatively small number of countries covered in the sample for which data are available and the need to keep a certain level of degrees of freedom.

Figure 3 shows that per capita income and inequality seem to share a non-linear relationship. In fact, the Gini inequality index is typically lower when per capita income is either extremely low or substantially high. In contrast, the distribution of income tends to be more even for levels of per capita income that are close to the average or the median. This may reflect a stronger progressivity of the tax system and a strengthening of the welfare system and can help to explain the inverse U-shaped relationship between per capita GDP and income inequality.

In addition, we consider a variety of dummy variables (D) capturing fiscal consolidation episodes and aimed at assessing the relationship between income inequality and fiscal adjustments. In particular, we account for the *timing* of the potential redistributive effects of the adopted austerity measures by using two dummy variables labeled as D_c and D_{pc}. Based on Devries *et al.* (2011), the first one takes the value one during periods of fiscal consolidation and zero otherwise. The second one takes the value of one over the two years after the implementation of austerity measures and zero otherwise. Moreover, we analyze the *contribution* of spending versus tax-driven consolidation programs by constructing two alternative dummy variables, D_{cs} and D_{cr}: following Devries *et al.* (2011), D_{cs} takes the value of one if the adopted austerity measure is driven by a spending cut and zero otherwise; D_{cr} takes the value of one if the adopted austerity measure is driven by an increase in taxation and zero otherwise.

We remark that all abovementioned dummy variables enter only the net income inequality equation. In fact, the set of consolidation measures consists of discretionary changes in taxes (increases) and government spending (cuts), which are designed to reduce the budget deficit. Therefore, one can only infer about the effects of fiscal consolidation on income inequality after deducting direct taxes and

[6]See Magnus (1982) for the estimation of a seemingly unrelated regression (SUR) system with balanced panel data, and Biørn (2004) for further extensions to the case of unbalanced panels.

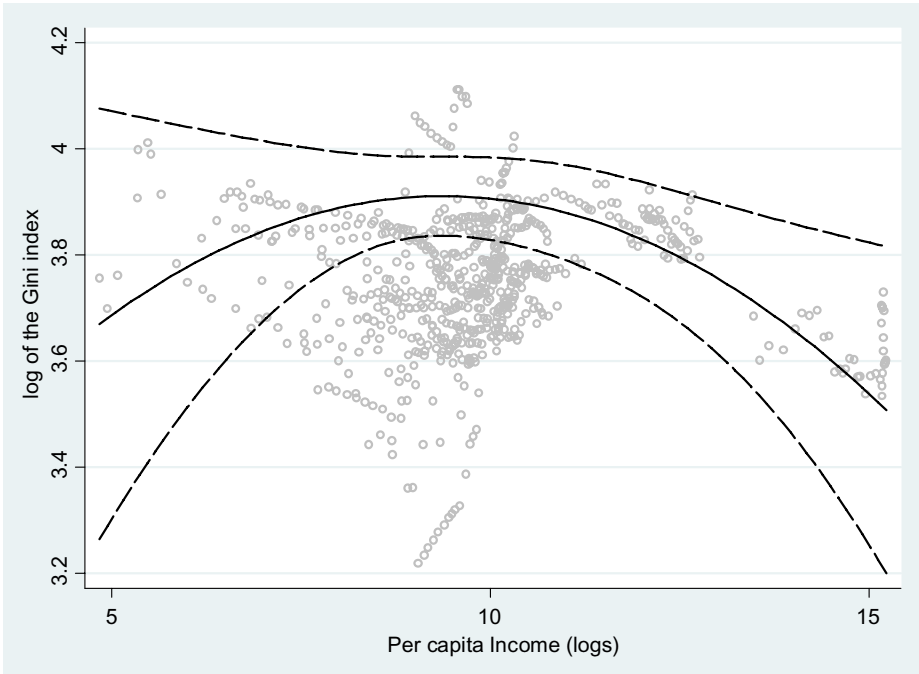

Figure 3. The Non-Linear Relationship Between Per Capita GDP and Income Inequality
Note: 95% confidence intervals in dotted lines.

social security contributions from gross income (i.e., by looking at the net income figures). To do so, we impose cross-equations restrictions on the vector of coefficients, $\boldsymbol{\beta}$. Formally, the coefficients associated to the dummy variables in the gross income inequality equation are assumed to be equal to zero, that is, $\boldsymbol{\beta}_2^{gross} = \{\boldsymbol{\beta}_2 | \mathbf{0}_D\}$ where $\mathbf{0}_D$ is the vector of zeros.

4. Empirical Findings

Table 1 provides a summary of the results using the net and gross SWIID Gini Index as the measure of income inequality. Column 1 focuses on the IMF consolidation periods, Column 3 looks at IMF tax driven and spending driven consolidation episodes, and Column 5 addresses IMF consolidation and post-consolidation periods.

Our findings show that income inequality increases during periods of fiscal consolidation (as one can see in Column 1). Moreover, the evidence suggests that fiscal adjustments that are driven by the revenue side help reduce the income gap, although the effect is not statistically significant. Interestingly, when fiscal consolidation is achieved via spending cuts, income inequality seems to widen substantially (see Column 3). In fact, the coefficient associated with spending-driven consolidation episodes is positive (0.035), while the one linked with tax-driven fiscal adjustment programs is negative (–0.004), in light of the progressivity of

TABLE 1

Income Inequality and Fiscal Consolidation (evidence from the SWIID net and gross Gini Index)

	Gini Index					
	Net	Gross	Net	Gross	Net	Gross
log (per capita GDP)	0.250*** [0.019]	0.359*** [0.018]	0.260*** [0.019]	0.358*** [0.018]	0.249*** [0.019]	0.357*** [0.018]
log (per capita GDP) squared	–0.011*** [0.001]	–0.014*** [0.001]	–0.012*** [0.001]	–0.014*** [0.001]	–0.011*** [0.001]	–0.013*** [0.001]
Consolidation periods (D_c)	0.026*** [0.004]				0.028*** [0.004]	
Tax driven consolidation episodes (D_{cr})			–0.004 [0.006]			
Spending driven consolidation episodes (D_{cs})			0.035*** [0.005]			
Post-consolidation period (D_{pc})†					0.007 [0.005]	
Openness	–0.024** [0.011]	–0.131*** [0.010]	–0.043*** [0.011]	–0.126*** [0.010]	–0.024** [0.011]	–0.129*** [0.010]
Observations	518	518	518	518	518	518
Number of countries	18	18	18	18	18	18
Tests:						
Ho: $D_{cr} = D_{cs}$			30.12 (0.00)***			
Ho: $D_c = D_{pc}$					12.2 (0.00)***	

Notes: The dependent variables are the Gini Indexes. Standard errors of coefficients are in square brackets, p-values in parentheses.

*p < 0.10, **p < 0.05, ***p < 0.01.

†Two years after the implementation of the consolidation program.

taxation. These results are close in spirit with the argument by Ball *et al*. (2011) that fiscal consolidation reduces the wage share in total income. The authors suggest that, while the effect on wage income is persistent, the fall in capital and property income is short-lived. This can be explained by the fact that fiscal austerity plans typically call for a fall in public sector wages or lead to an increase in unemployment (in particular, long-term unemployment) via the decrease in government consumption or the cut in government investment. As a result, although spending cuts can be more effective (than tax increases) at promoting a stabilization of the debt and boosting economic growth in the medium-term (as Alesina and Ardagna (2010) argue), they are also more likely to lead to an increase in the inequality of income distribution (as pointed out by Mulas-Granados (2005) regarding the European case).

We also find that the effects of fiscal consolidation on income inequality tend to disappear two years after the implementation of the program. As shown in Column 5, the coefficient associated with the post-consolidation period is close to zero and not statistically significant (0.007).

Additionally and in line with Barro (2008), our results also point to the usual Kuznets relationship, i.e. an inverse U-shaped curve between income inequality

and per capita GDP. In fact, while the coefficient associated with per capita GDP is significant and always exhibits a positive sign,[7] the estimates for the impact of per capita GDP squared are negative in magnitude. As a result, for low levels of income, a rise in per capita GDP increases income inequality. However, for sufficiently high levels of income, one observes the opposite relationship: a boost in per capita GDP reduces inequality. This result actually holds for both definitions of income inequality.

We also show that an increase in the degree of openness of a country leads to less divergence in the distribution of income and, thereby, trade seems to be important at promoting equality.[8] This result gives support to the idea that trade intensifies economic competition and reduces prices of basic consumption goods (Birdsall, 1998). This, in turn, benefits the poor more than the rich, because: (i) competition leads to a fall in the monopoly power that is enjoyed by the upper class and, thereby, reduces income inequality; and (ii) the poor spend a relatively larger share of their income on basic consumption goods. Another argument consistent with our finding is that trade increases labor productivity, which brings an increase in wages and a fall in inequality (Held *et al*., 1999). Moreover, to the extent that trade reduces the wages of unskilled labor, it can provide incentives for workers to acquire education and for firms to employ more unskilled labor, again reducing inequality (Blanchard, 2000). Finally, the winners from trade could compensate the losers, reducing inequality, although such compensation is not typically done voluntarily (Rodrik, 1997; Salvatore, 1998).

We also test the robustness of the previous findings to the presence of time-outliers (that is, years during which many countries have simultaneously adopted consolidation measures). Indeed, Figure 4 shows that the distribution of fiscal consolidation episodes is skewed: around 85 percent of the episodes occurred in the first two decades (black and dark gray bars), of which 45 percent were recorded in the late 1970s and 80s.

As a result, the model is run whilst accounting for the timing of fiscal consolidations (D_c), but dropping, from the sample, the years that recorded the highest number of consolidation episodes by decade (i.e., in the 1970s, 1980s, and 2000s, respectively). More specifically, this means excluding from the sample the years of 1984 (9 fiscal consolidation episodes) and 1997 (13 episodes), and the period 2004–07 (4 episodes). This ensures that the results are not an artifact of the time period selected. The empirical findings are reported in Table 2 and show that the estimates are robust to the presence of time-outliers.

In Table 3, we report the estimates of the baseline model where all the right-hand variables do not enter simultaneously. This robustness check with the right-hand variables used allows us to assess if the coefficient estimates of the baseline model are an artifact of the level of multicollinearity between right-hand variables.

[7]Notably, Chattopadhyay and Mallick (2007) show that when income follows a log-normal distribution, an increase in mean income leads to a reduction in poverty, while an increase in the variance of the income raises poverty.

[8]Previous studies offer conflicting theoretical explanations for the effects of trade openness on income inequality and the empirical evidence is still inconclusive. Indeed, while some works argue that trade rises inequality (Wood, 1994; Rodrik, 1997), others show that it may allow a more even distribution of income (Birdsall, 1998; Salvatore, 1998; Held *et al*., 1999; Blanchard, 2000). Our findings are in line with this second strand of the literature.

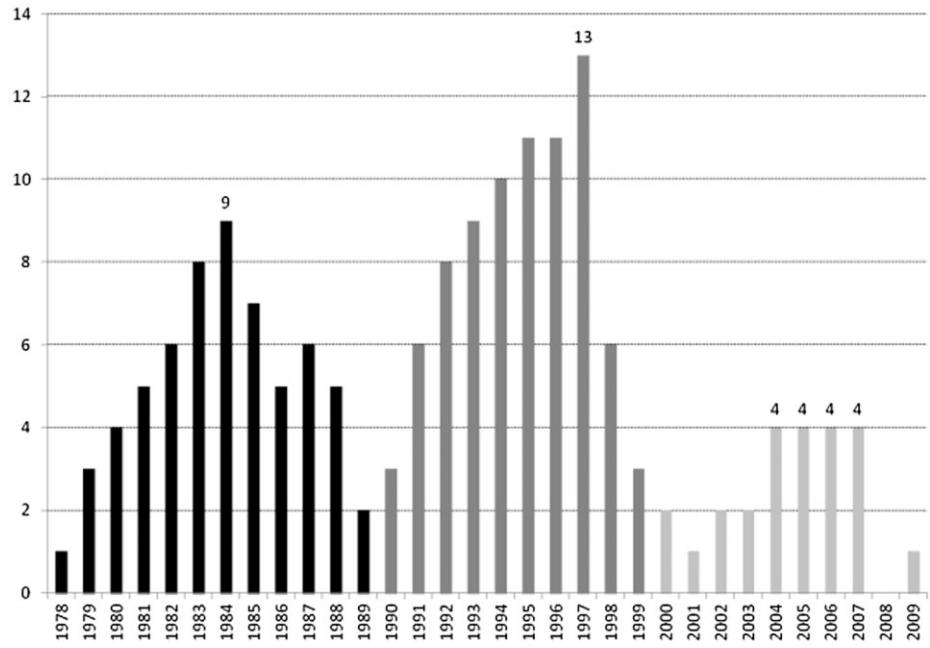

Figure 4. Distribution of Fiscal Consolidation Episodes Over Time

Notes: The different colors denote decades. The numbers in selected bars (years) represent the largest observations of fiscal consolidation episodes in a given decade.

In Column 1, we consider only the effect of the level of GDP and the fiscal consolidation dummy variable (D_c) on income inequality (gross and net income indexes). Then, we add the GDP squared to the set of explanatory variables (Column 2). By also controlling for the effect of trade openness, we recover the specification of the baseline model (Column 3). Regardless the specification considered, the qualitative and quantitative impact of fiscal consolidation on income inequality remains unchanged.

In Table 4, we also control for the effect of inflation (as a proxy for the cost of living) and economic growth on income inequality. In particular, we test if fiscal austerity combined with inflation increases inequality. To this end, we interact the inflation rate with the fiscal consolidation dummy variable. In addition, we further explore the relationship between inequality and GDP developments, namely, by replacing the consolidation dummy variable with a pair of dummy variables: the first one refers to consolidation measures undertaken during periods of sustained economic growth (i.e., above 2 percent); and the second one captures episodes of fiscal consolidation that were implemented in periods characterized by relatively low growth (i.e., a GDP growth rate below 2 percent).

In line with Albanesi (2007), our results show that there is a strongly positive relationship between inflation and income inequality. Moreover, we find that the effects of inflation are magnified during periods of fiscal consolidation. Indeed, the interaction term between inflation and the dummy variable for consolidation is

TABLE 2

Income Inequality and Fiscal Consolidation (controlling for the presence of time-outliers)

	Net Income Gini Index Sample: All Observations, Except:				
	1984	1997	1984 and 1997	2004–07	All the Outliers
log (per capita GDP)	0.383***	0.400***	0.249***	0.212***	0.199***
	[0.019]	[0.019]	[0.019]	[0.020]	[0.021]
log (per capita GDP) squared	–0.018***	–0.018***	–0.011***	–0.010***	–0.009***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Consolidation periods (D_c)	0.018***	0.021***	0.028***	0.010**	0.012**
	[0.004]	[0.004]	[0.005]	[0.005]	[0.005]
Openness	–0.100***	–0.103***	–0.042***	–0.041***	–0.037***
	[0.011]	[0.011]	[0.011]	[0.012]	[0.013]
	Gross Income Gini Index				
log (per capita GDP)	0.501***	0.534***	0.327***	0.159***	0.146***
	[0.018]	[0.018]	[0.019]	[0.020]	[0.020]
log (per capita GDP) squared	–0.020***	–0.021***	–0.012***	–0.005***	–0.004***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Openness	–0.237***	–0.267***	–0.100***	0.050***	0.056***
	[0.010]	[0.010]	[0.010]	[0.012]	[0.012]
Observations	501	501	484	452	418
Number of countries	18	18	18	18	18

Notes: The dependent variables are the Gini Indexes. Standard errors of coefficients are in square brackets, p-values in parentheses. The time-outliers denote the years with the highest concentration of fiscal consolidation episodes over each of the three decades covered in the analysis.

*p < 0.10, **p < 0.05, ***p < 0.01.

statistically significant and the coefficient associated with this variable is positive (0.005). Finally, we provide evidence that consolidation programs are detrimental for income, in particular, during periods of relatively low growth: the coefficient associated with the interaction between consolidation and growth below 2 percent is positive (0.010) and almost twice as large as the coefficient associated with the interaction between consolidation and growth above 2 percent (0.006).

5. Does the Size of Fiscal Consolidation Matter?

In this section, we extend the previous analysis by considering the characteristics of the consolidation plan in terms of its size and the existence of threshold effects in the relationship between income inequality and the size of consolidation.

We start by distinguishing between tax- and spending-based measures with sizes (in percentage of GDP) that are higher or lower than their corresponding sample averages over the period of the analysis (Table 5).

Next, we replace the fiscal consolidation dummy variables with the size (in percentage of GDP) of each adopted consolidation measure, as reported by Devries *et al*. (2011). Then, benchmark models (1) are estimated.

The results are reported in Columns (1)–(2) of Table 6. Overall, they confirm that the larger the size of the fiscal consolidation package, the stronger the impact

TABLE 3

Income Inequality and Fiscal Consolidation (controlling for potential multicollinearity)

	Net Income Gini Index		
	(1)	(2)	(baseline)
log (per capita GDP)	0.013***	0.167***	0.250***
	[0.002]	[0.013]	[0.019]
log (per capita GDP) squared		–0.007***	–0.011***
		[0.001]	[0.001]
Consolidation periods (D_c)	0.024***	0.020***	0.026***
	[0.005]	[0.004]	[0.004]
Openness			–0.024**
			[0.011]
		Gross Income Gini Index	
log (per capita GDP)	0.061***	0.217***	0.359***
	[0.002]	[0.014]	[0.018]
log (per capita GDP) squared		–0.008***	–0.014***
		[0.001]	[0.001]
Openness			–0.131***
			[0.010]
Observations	518	518	518
Number of countries	18	18	18

Notes: The dependent variables are the Gini Indexes. Standard errors of coefficients are in square brackets, p-values in parentheses.

*p < 0.10, **p < 0.05, ***p < 0.01.

TABLE 4

Income Inequality and Fiscal Consolidation (the effect of inflation and economic growth)

	Net Income Gini Index		
log (per capita GDP)	0.286***	0.297***	0.262***
	[0.019]	[0.019]	[0.019]
log (per capita GDP) squared	–0.012***	–0.013***	–0.012***
	[0.001]	[0.001]	[0.001]
Consolidation periods (D_c)	0.029***	0.013**	
	[0.004]	[0.006]	
Openness	–0.022**	–0.030***	–0.022**
	[0.011]	[0.011]	[0.011]
Inflation	0.007***	0.005***	
	[0.001]	[0.001]	
Consolidation x inflation		0.005***	
		[0.001]	
Consolidation x (growth > 2%)			0.006***
			[0.002]
Consolidation x (growth < 2%)			0.010***
			[0.003]
Observations	518	518	518
Number of countries	18	18	18

Notes: The dependent variable is the net income Gini Index. Standard errors of coefficients are in square brackets.

*p < 0.10, **p < 0.05, ***p < 0.01.

TABLE 5

Consolidation Size

Variable	Number of Episodes	Average (% GDP)	Min (% GDP)	Max (% GDP)
Consolidation size >0.99%GDP	68	1.87	0.99	4.74
Consolidation size <0.99%GDP	97	0.48	0.03	0.98
Tax-based >0.57%GDP	41	1.17	0.60	2.54
Tax-based <0.57%GDP	86	0.29	0.00	0.56
Spending cut-based >0.77%GDP	50	1.47	0.80	3.71
Spending cut-based <0.77%GDP	90	0.37	0.00	0.76

TABLE 6

Income Inequality and Fiscal Consolidation (size effects)

	Net Income Gini Index			
log (per capita GDP)	0.258***	0.263***	0.259***	0.258***
	[0.019]	[0.019]	[0.019]	[0.019]
log (per capita GDP) squared	–0.012***	–0.012***	–0.012***	–0.012***
	[0.001]	[0.001]	[0.001]	[0.001]
Consolidation size %GDP	0.018***	–		
	[0.003]	–		
Tax-based size %GDP		–0.010*		
		[0.005]		
Spending cut-based %GDP		0.030***		
		[0.004]		
Consolidation size >0.99%GDP			0.018***	
			[0.003]	
Consolidation size <0.99%GDP			0.034***	
			[0.009]	
Tax-based >0.57%GDP				–0.012**
				[0.006]
Tax-based <0.57%GDP				0.022
				[0.017]
Spending cut-based >0.77%GDP				0.029***
				[0.004]
Spending cut-based <0.77%GDP				0.008
				[0.012]
Openness	–0.020*	–0.027**	–0.021**	–0.029***
	[0.011]	[0.011]	[0.011]	[0.011]
Observations	518	518	518	518
Number of countries	18	18	18	18
Tests:				
Ho: *Above* = *Below*			3.36	
			(0.06)*	

Notes: For sake of space, we report estimates of equation with the net income Gini Index as the dependent variable. Standard errors of coefficients are in square brackets, p-values in parentheses.

*p < 0.10, **p < 0.05, ***p < 0.01.

on income inequality will be. However, when we look at the characteristics of the fiscal consolidation plan, we find that inequality is generally driven by the size of the spending cuts. This can be associated with the theoretical view that austerity measures that mainly rely on government consumption (especially, the wage bill) and/or social transfer cuts have a high probability of generating strong economic growth and reducing the debt ratio (Alesina and Perotti, 1995).

In contrast, our estimates indicate that tax-driven austerity plans contribute to reducing inequality. This might be the result of an increase of the tax-system progressiveness (direct effect) and/or a rise of additional revenue to finance growth-enhancing expenditure (indirect effect). Consequently, reducing the government debt and deficit could be achieved in an equitable way via tax-hikes.

We also test for the presence of threshold effects in the relationship among inequality and the size of consolidation. A summary of the results can be found in Columns (3)–(4). Interestingly, Column 3 shows that consolidation plans that amount to less than 1 percent of GDP have a more detrimental impact on income inequality than austerity measures that are bigger in size (i.e., that represent more than 1 percent of GDP) (0.034 versus 0.018, respectively). This suggests that the burden of the consolidation program is shared unevenly when the size of the plan is relatively small, affecting more negatively the households at the bottom of the income distribution. In the same line of reasoning and similar in spirit with this finding, Mallick and Granville (2005) argue that debt relief (which could be achieved, for instance, via fiscal consolidation) would only provide a temporary (although not sustainable) solution to poverty reduction.

Only when the size of the program is reasonably large, does the evidence support that rich households are requested to participate more strongly in the consolidation effort and, as a result, the impact on inequality is much smaller.

This result seems to hold even when we consider the composition effects (Column 4) and, in particular, for tax-driven consolidation programs. In fact, while spending cuts above 0.77 percent of GDP lead to an important widening of the income gap, tax rises above 0.57 percent of GDP contribute to a large fall in inequality. From a policy perspective, the last result suggests that properly designed tax-based consolidation plans could be an effective tool for promoting a more even distribution of income.

Additionally, we assess whether the results are robust to the presence of potential outliers related to the size effects of fiscal consolidation programs. In particular, we estimate the baseline model whilst dropping, from the sample, the fiscal consolidation episodes that amount to more than 3.5 percent of GDP. As illustrated in Figure 5, the distribution of fiscal consolidation episodes by size is strongly asymmetric, with the majority of plans representing less than 0.5 percent of GDP and only a few of them (potentially outliers) with a size larger than 3.5 percent of GDP.

The results are summarized in Table 7 and show that they remain both quantitatively and qualitatively unchanged.

Table 8 summarizes the estimates of the baseline model where all the right-hand variables do not enter simultaneously. As mentioned previously, this empirical exercise is aimed at accounting for potential multicollinearity between right-hand variables. In Column 1, we consider the effect of the level of GDP and the size of the fiscal consolidation program in percentage of GDP on income inequality (gross and net income indexes). Then, we add the GDP squared to the set of explanatory variables (Column 2). Finally, we control for the effect of trade openness, which corresponds to our baseline model (Column 3). As before, multicollinearity does not seem to be driving the empirical findings, as results remain both qualitatively and quantitatively unchanged.

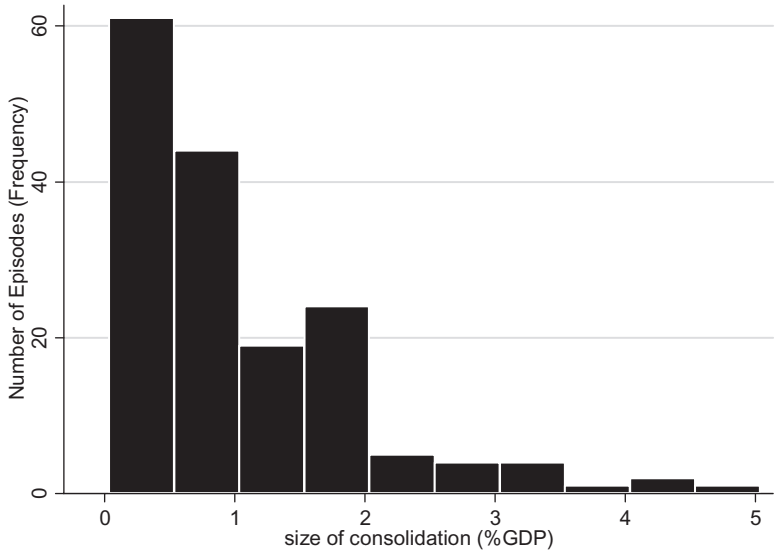

Figure 5. Distribution of Consolidation Episodes by Size

TABLE 7

Income Inequality and Fiscal Consolidation (controlling for outliers regarding size effects)

	Net	Gross	Net	Gross
log (per capita GDP)	0.488***	0.722***	0.490***	0.723***
	[0.016]	[0.017]	[0.016]	[0.017]
log (per capita GDP) squared	–0.021***	–0.031***	–0.021***	–0.031***
	[0.001]	[0.001]	[0.001]	[0.001]
Consolidation size (<3.5%GDP)	0.016***			
	[0.003]			
Of which:				
Tax-based size %GDP			–0.026***	
			[0.006]	
Spending-cut based %GDP			0.028***	
			[0.005]	
Openness	–0.063***	–0.265***	–0.065***	–0.266***
	[0.008]	[0.008]	[0.008]	[0.008]
Observations	513	513	513	513
Number of countries	18	18	18	18

Notes: The dependent variables are the Gini Indexes. Standard errors of coefficients are in square brackets, p-values in parentheses.

*p < 0.10, **p < 0.05, ***p < 0.01.

Finally, we assess the importance of accounting for the optimal level of fiscal consolidation. Put differently, fiscal consolidation can be labeled as "successful" if it helps reducing the deficit-to-GDP ratio in a substantial manner. Therefore, we restrict our sample of consolidation episodes to those associated with a significant

TABLE 8

Income Inequality and Fiscal Consolidation (size effects and controls for potential multicollinearity)

	Net Income Gini Index		
	(1)	(2)	(baseline)
log (per capita GDP)	0.014***	0.169***	0.258***
	[0.002]	[0.013]	[0.019]
log (per capita GDP) squared		–0.007***	–0.012***
		[0.001]	[0.001]
Consolidation size % GDP	0.015***	0.012***	0.018***
	[0.003]	[0.003]	[0.003]
Openness			–0.020*
			[0.011]
	Gross Income Gini Index		
log (per capita GDP)	0.061***	0.219***	0.376***
	[0.002]	[0.014]	[0.018]
log (per capita GDP) squared		–0.008***	–0.014***
		[0.001]	[0.001]
Openness			–0.142***
			[0.010]
Observations	518	518	518
Number of countries	18	18	18

Notes: The dependent variables are the Gini indexes. Standard errors of coefficients are in square brackets, p-values in parentheses.

*p < 0.10, **p < 0.05, ***p < 0.01.

improvement of the CAPB (amounting to 1.5 percent of GDP) and re-estimate the baseline models. This exercise can be thought of as a combination of the narrative (as in Devries *et al.*, 2011) and the statistical (as in Alesina and Ardagna, 2010) approaches for identifying fiscal consolidation programs.

The results are shown in Table 9 and corroborate our previous findings. In fact, they show that fiscal consolidation is typically associated with a more unequal income distribution (Column 1), and while spending driven consolidation episodes lead to a widening of the income gap, tax-based consolidation programs help to narrow it (Column 3). Similarly, the size of the fiscal consolidation package is positively related to income inequality (Column 5), but there is an important composition effect: the size of tax-driven fiscal consolidation (in percentage of GDP) guarantees that inequality is reduced, while the size of spending cut-based consolidation (in percentage of GDP) is detrimental for the distribution of income. In addition, we still uncover a non-linear relationship between inequality and per capita GDP and find that trade openness is beneficial for income equalization.

6. Fiscal Consolidation and Banking Crises

A number of authors have analyzed the link between income inequality, household debt leverage, and financial crises, and emphasized the role of credit demand (Rajan, 2010) or credit supply (Fitoussi and Saraceno, 2010) in explaining the high debt levels of households at the bottom of income distribution. For this

TABLE 9

INCOME INEQUALITY AND FISCAL CONSOLIDATION (SIZE EFFECTS COMBINING THE NARRATIVE AND THE STATISTICAL APPROACHES)

	Gini Index							
	Net	Gross	Net	Gross	Net	Gross	Net	Gross
log (per capita GDP)	0.261***	0.379***	0.260***	0.376***	0.259***	0.379***	0.259***	0.375***
	[0.019]	[0.018]	[0.019]	[0.018]	[0.019]	[0.018]	[0.019]	[0.018]
log (per capita GDP) squared	–0.012***	–0.014***	–0.012***	–0.014***	–0.012***	–0.014***	–0.012***	–0.014***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Consolidation periods (D_c)	0.023***							
	[0.007]							
Tax driven consolidation episodes (D_{cr})			–0.045***					
			[0.013]					
Spending driven consolidation episodes (D_{cs})			0.042***					
			[0.008]					
Consolidation size %GDP					0.012***			
					[0.004]			
Tax-based size %GDP							–0.051***	
							[0.013]	
Spending cut-based %GDP							0.026***	
							[0.005]	
Openness	–0.019*	–0.146***	–0.023**	–0.143***	–0.017	–0.145***	–0.021**	–0.142***
	[0.011]	[0.010]	[0.011]	[0.010]	[0.011]	[0.010]	[0.011]	[0.010]
Observations	518	518	518	518	518	518	518	518
Number of countries	18	18	18	18	18	18	18	18

Notes: The consolidation dummy variable refers to consolidation periods associated to a fall in CAPB amounting to (at least) 1.5% of GDP. The dependent variables are the Gini indexes. Standard errors of coefficients are in square brackets, p-values in parentheses.

*p < 0.10, **p < 0.05, ***p < 0.01.

reason, Hubbard (2010) argues that policymakers appear to be responsible for the latest crises.

Similarly, Moss (2009) investigates whether huge income gaps create "wrong" incentives that increase the vulnerability of the financial system. Blair (2010) shows that, because asset bubbles typically lead to higher returns, the banking system has the potential to generate highly leveraged systems and increase inequality.

From a historical perspective, banking crises typically preceded or coincided with sovereign debt crises (Reinhart and Rogoff, 2011). Some reasons for this pattern can be associated with the contingent liability argument, whereby the government steps in and takes on massive debts from the private banks, which ultimately undermines its own solvency (Diaz-Alejandro, 1985). Another potential explanation lies in the "twin crisis" story, where banking crises occur before currency crashes and these may, in turn, lead to the insolvency of sovereign borrowers who hold large amounts of foreign-currency denominated liabilities (Kaminsky and Reinhart, 1999).

Whatever the theoretical ground underlying the temporal sequence between banking crises and sovereign debt crises is, the need to restore fiscal sustainability afterwards forces governments to reduce their budget deficits via the implementation of fiscal consolidation programs. As a result, we investigate the impact of such fiscal adjustments undertaken during and after the occurrence of financial crises as identified by Laeven and Valencia (2010) and Reinhart and Rogoff (2011).

More specifically, we assess the conditional *dependence* of the redistributive effects on the occurrence of financial crises. To that end, the consolidation dummy variable, D_c, as defined in Section 3, is interacted with the series dating banking crisis as provided by Laeven and Valencia (2010) and Reinhart and Rogoff (2011). We also construct a dummy variable that takes the value of one if the fiscal consolidation measures are adopted immediately after the end of banking crises.

Table 10 summarizes the findings. The empirical evidence provides some interesting results. First, when fiscal consolidation is implemented during banking crises, the impact on inequality is not statistically significant. Second, in the absence of crises episodes, fiscal austerity leads to a more unequal distribution of income: the coefficients associated with consolidation programs during no banking crises are statistically significant and positive for both the identification based on the work of Laeven and Valencia (2010)—i.e., 0.025—and the research by Reinhart and Rogoff (2011)—i.e., 0.015. Third, in the aftermath of a banking crisis, fiscal consolidation has a strongly positive impact on income inequality. That is, compared to the benchmark case of no banking crises, the impact on the income gap is magnified when austerity plans are implemented after the resolution of banking crises.

7. Conclusions

After the substantial reduction in public deficits during the 1990s and early 2000s, the fiscal stance of many OECD countries has strongly deteriorated. Similarly, while until early 2010 policymakers questioned whether tax cuts or spending increases were a better recipe for boosting the economy, the subsequent developments in government bond markets signaled doubts about the long-term sustainability of the debt path and led to the implementation of fiscal austerity.

TABLE 10

Income Inequality and Fiscal Consolidation (evidence for banking crises episodes)

	Banking Crises Identification			
	Reinhart and Rogoff (2011)		Laeven and Valencia (2010)	
	Net	Gross	Net	Gross
log (per capita GDP)	0.241***	0.301***	0.271***	0.393***
	[0.019]	[0.018]	[0.019]	[0.018]
log (per capita GDP) squared	–0.011***	–0.012***	–0.013***	–0.015***
	[0.001]	[0.001]	[0.001]	[0.001]
Consolidation (IMF) during banking crises	–0.006		0.003	
	[0.010]		[0.013]	
Consolidation (IMF) after banking crises (A)†	0.036***		0.099***	
	[0.007]		[0.010]	
Consolidation (IMF) during no banking crises (B)	0.015***		0.025***	
	[0.005]		[0.005]	
Openness	–0.059***	–0.073***	–0.019*	–0.151***
	[0.011]	[0.010]	[0.011]	[0.010]
Number of consolidation episodes:				
During banking crises	84		11	
After banking crises	64		29	
During no financial crises	25		133	
Observations	518		518	
Number of countries	18		18	
Tests:				
Ho: A = B	7.04		45.4	
	(0.00)***		(0.00)***	

Notes: The dependent variables are the Gini Indexes. Standard errors of coefficients are in square brackets, p-values in parentheses.

*p < 0.10, **p < 0.05, ***p < 0.01.

†Two years after the implementation of the consolidation program.

In this paper, we look at fiscal consolidation via the lenses on its impact on income inequality and check whether it can be regarded as "regressive" or "progressive."

Considering the *timing* of consolidation, we find that austerity packages are, overall, regressive in nature, as the income gap rises during periods of fiscal adjustment.

However, after exploring their characteristics, we show that both the *size* and the *composition* effects play an important role in determining the impact of fiscal consolidation programs on income inequality. In particular, we find that fiscal adjustments led by spending cuts are detrimental for income distribution, especially when their size is larger than 0.77 percent of GDP. As for tax hikes, they contribute to a strong fall in inequality and this "equalizing" effect is magnified when tax adjustments amount to more than 0.57 percent of GDP. This result is consistent with the idea that top-level taxation (usually, on capital income, land, wealth, or the financial sector) leads to a fall in inequality given that the tax base is disproportionately held by the rich.

We also show that the effects of fiscal consolidation on income distribution are amplified in the aftermath of a banking crisis, during periods of relatively low growth (i.e., below 2 percent), and combined with inflation.

Finally, we confirm the existence of a non-linear (inverse-U) relationship between inequality and growth and find that inflation and low growth amplify the detrimental impact of fiscal consolidation on inequality. We also show that the higher the degree of openness is, the lower the level of inequality will be. As a result, trade can help countries to achieve long-term economic prosperity and to reduce income inequality.

From a policy perspective, our work points to the importance of the composition, the size, and the timing of austerity programs for income distribution. It follows that properly designed tax-based consolidation plans can be an effective tool for simultaneously: (a) promoting a more even distribution of income; and (b) reducing public deficit and government debt. This result is in line with the evidence that income taxes—which represent the main source of government revenue in the majority of developed countries—are usually progressive in nature, which, in turn, implies that income tax hikes can boost the progressivity of the overall taxation system.

On the spending side, fiscal consolidation plans driven by spending cuts are found to be regressive in nature. This feature can be associated with the theoretical view that austerity measures that mainly rely on decreases in government consumption (especially, the wage bill) and/or cuts in social transfers and welfare payments have a high probability of disproportionately affect low-income groups.

The final policy implication of our study is that consolidating immediately after a financial crisis and/or during periods of relatively low growth might negatively impinge on income distribution.

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