Dynamic Distributional Effects of Fiscal Consolidation: A Sample of 16 OECD Countries

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Summary

We explore the long-term distributional consequences of fiscal adjustment episodes and the dynamic consequences of fiscal consolidation for countries with large sized consolidations vis-a-vis countries with small sized consolidations. In this direction, panel ARDL and impulse response functions using local projections are adopted for a panel of 16 OECD countries covering the period 1980 to 2019 based on a newly updated fiscal adjustment dataset, compiled by Gustavo Adler et al. (2024). The evidence suggests that adverse income disparities which tend to arise upon implementation of fiscal adjustments are dynamic and persist through the long run. While baseline results for the Gini suggest that long-term inequality levels hold at approximately the same as peak levels (by the 7th period), inequality measured by the bottom 40 income share appear to exhibit peak levels at the 14th period, suggesting a more persistent impact. Disaggregating impact by adjustment size, evidence is also offered for small-sized adjustment and large-sized adjustment countries showing that small-sized adjustments lead to gradual but prolonged inequality effects, while large-sized adjustments generate steeper but shorter-lived inequality increases.

Key words**:** Income inequality, Fiscal consolidation, Labour income share

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1. Introduction

Since the 1980s deregulation and liberalisation, global income inequality has risen at varying rates (World Inequality Report 2022). The 2007/8 Global Financial Crisis and subsequent austerity measures sparked debate over their redistributive impacts (Till van Treeck and Simon Sturn 2012; Alfredo Calcagno 2012), renewing interest in fiscal policy's dual goals of stability and equity.

One strand focuses on austerity's effects on output; while some studies report contractionary outcomes like lower growth and higher unemployment, others suggest expansionary results. Such differences are partly due to how fiscal stance is measured (e.g., CAPB vs. narrative approach). Another strand highlights austerity's disproportionate impact on lower-income groups with higher consumption propensities (IMF 2017), and its role in triggering equity conflicts (Alberto Alesina and Allan Drazen 1991).

Whether through spending cuts or tax hikes, fiscal adjustments often have distributional effects, particularly through labour income and employment (Carlos Mulas-Granados 2005; Luca Agnello and Ricardo Sousa 2011, 2012; IMF 2014; Angela Okeke and Constantinos Alexiou 2025). Despite growing interest, long-term inequality impacts remain under researched. Existing studies (see, Phillip Heimberger 2020) show negative short-to-medium-term effects.

This paper contributes to the literature by examining the long-run effects of fiscal consolidations in 16 OECD countries (1980–2019), finding persistent inequality effects lasting up to 15 years—immediate in large adjustments and delayed in smaller ones. It also identifies the most affected income groups using diverse inequality measures.

The rest of the paper is organised as follows: Section 2 reviews the extant literature whilst section 3 expounds upon the econometric strategy adopted. Section 4 presents the empirical estimates as well as discusses the results and section 5 concludes.

2. Relevant literature

Austerity concerns post the expansionary fiscal policies undertaken during the 2007/8 financial crisis have led to a resurgence of the debate surrounding fiscal adjustment. The trajectory of the austerity debate in the last few decades has been largely driven by: (i) the theoretical concepts governing austerity and relates to the fiscal strategies that should be pursued during recessionary times with the over-arching issue being *"Austerity or Stimulus"* and more recently (ii) the economic and distributional effects pertaining to the implementation of Austerity.

2.1 The distributional aspects of fiscal adjustment

Although fiscal policy plays a key role in altering the distribution of income in the short and medium term through redistributive policies, it is also used to achieve budgetary adjustments that stabilise the government's deficit and debt. Since improving the fiscal stance involves either acting on the revenue or expenditure side or both, the distributional consequences associated with the use of these fiscal instruments have become a focal point in the literature in recent years. By employing both the narrative approach and the cyclically adjusted primary balance (CAPB) methodology to identify changes in the fiscal stance, studies (see for instance Agnello and Sousa 2011, 2012; Diane Elson 2013; IMF 2014; Gabriele Ciminelli et al. 2019) suggest that fiscal adjustments tend to have regressive distributional consequences particularly through the labour income share and unemployment channels. Other channels for transmission include capitalisation, labour market institutions, macroeconomic, political and institutional factors (Lucas Chancel, Alex Hough and Tancrède Voituriez 2017). The extent to which these adjustment policies impact inequality depends on several factors including their composition, magnitude, duration, design and timing – and are discussed below:

While the austerity literature (e.g. Alesina and Perotti 1995; Alberto F. Alesina and Silvia Ardagna 1998, 2010, 2013; Granados 2005; Rajmund Mirdala 2017) finds that expenditure-based adjustments – particularly those targeting public sector wage cuts, social benefits and transfers – are more effective in achieving successful and expansionary fiscal consolidations, evidence from the inequality literature (e.g. Agnello and Sousa 2011, 2012; Lawrence Ball et al. 2013; Boris Cournede et al. 2013; Alari Paulus et al. 2017) suggests that these measures tend to exacerbate income inequality more than revenue-based adjustment. While tax-based adjustments are generally considered more effective in moderating inequality, further evidence suggests that their effects remain mixed. One such strand in the literature, Bova, Kinda, and Woo (2018), find that although direct taxes (such as income tax) can help smooth inequality, depending on their progressivity, however, indirect recessionary effects may emerge through the labour supply channel, as higher unemployment tends to exacerbate inequality. They also find that indirect taxes tend to be regressive. In contrast, Ciminelli et al. (2019) argue that indirect taxes reduce inequality more effectively than direct taxes. They suggest that when tax increases take the form of indirect taxes (such as consumption tax), they reduce disposable income, thereby incentivising the voluntarily unemployed to seek employment. Higher labour force participation rates, in turn, increase the probability of employment, ultimately leading to a reduction in income inequality.

Large fiscal adjustments are typically defined as those exceeding 1.5% of GDP (Alesina and Ardagna 2010; Woo et al. 2013). Although the literature emphasises that adjustment size plays a crucial role in its impact on inequality, its effects can be influenced on by the size of existing automatic stabilisers – since large automatic stabilisers can help cushion income shocks and support economic stability, thereby mitigating the adverse effects of fiscal adjustment programmes (IMF, 2014). However, the extent to which the size of the adjustment contributes to inequality also depends on the composition of the adjustment. Bova, Kinda, and Woo (2018) note that most large-size adjustments are predominantly expenditure-based, long-lasting, and tend to worsen inequality. Specifically, a consolidation size of 1% of GDP is associated with a 0.6%–0.7% increase in the Gini coefficient of disposable income.

Whether fiscal adjustments are frontloaded or backloaded are some of the key issues typically under consideration when designing fiscal adjustments. Frontloaded adjustments involve achieving more than 50% of the total deficit reduction within the first half of the adjustment period, whereas backloaded adjustments concentrate the majority of deficit reduction in the latter half. Adjustments that are gradual and backloaded tend to be more successful in achieving their objectives than those that are frontloaded and large ((Emanuele Baldacci et al. 2004), as the latter can have significant consequences for output and employment, potentially triggering a hysteresis effect on the economy (Constantinos Alexiou and Joe Nellis 2016). Equity considerations therefore play a crucial role in fiscal adjustment deliberations and implementation, as they can influence the long-term sustainability of such programmes.

Finally, the literature finds that the *timing of fiscal adjustments* plays a crucial role in shaping their distributional effects. Adjustments implemented during recessionary or inflationary periods tend to exacerbate inequality (Jaejoon Woo et al. 2013; Joao T. Jalles 2017; Bova, Kinda, and Woo 2018). Higher borrowing costs and credit constraints during these periods disproportionately affect lower-income households, as they have a higher marginal propensity to consume. Additionally, some studies (e.g., Philipp Heimberger 2020) suggest that adjustments implemented in post-crisis periods are more harmful than those undertaken in non-recessionary times. Furthermore, another strand of literature (Mathias Klein and Roland Winkler 2019) finds that regardless of the economy's position - austerity increases inequality when private debt is high - particularly through the earnings, income and savings channels whereas the opposite effect occurs when the debt overhang is low. While the earnings channel magnifies inequality through employment losses, income share declines through the incomes channel.

2.2 Discussion on the distributional mechanism, short -and- long-run dynamics of fiscal adjustment

The impact of fiscal adjustment on income inequality operates through multiple transmission channels and includes *inter alia* labour income share, unemployment, capitalisation, political and institutional factors and the macroeconomic environment (Lucas Chancel, Alex Hough, and Tancrède Voituriez 2017). However, the pass-through effects could differ for the short and long run depending on the underlying mechanisms driving these impacts. Although in the short run, fiscal adjustments tend to contract disposable income and consumption, in the long run, labour market adjustments, investment shifts, and potential tax reforms influence whether inequality effects persist or are mitigated. Instances where no discernible effects manifest in the short run after adjustment implementation might be due to lags as economic systems take time to fully adjust (Benedict Clements et al. 2015). In highlighting, the mechanisms driving these impacts, since a key component of this study investigates the dynamic effects of large sized consolidations vis-à-vis small sized ones, our discussions are further categorised along this line.

One of such mechanisms is via the *labour market:* fiscal adjustments tend to have regressive distributional effects in the *short and medium-term* especially *through the wage and unemployment channels*. Deficit reduction measures taken on *the revenue side* especially actions targeted at income earnings (direct tax) via higher taxation tend to lead to an increase in income inequality since they decrease net wage thereby affecting the disposable income of households (Agnello and Sousa 2011, 2012; Elson 2013; IMF 2014; Ciminelli et al. 2019). Furthermore, an increase in direct taxes could also lead to an increase in unemployment if they produce a substitution effect (Ciminelli et al. 2019) or recessionary impacts resulting from their indirect effects (Woo et al. 2013). *Measures taken on the expenditure side* – particularly actions targeting public sector job and wage cuts, as well as cash and social benefits tend to lead to an increase in inequality. While cuts to social benefits increase the market inequality, cuts to cash-benefits increase the disposable income inequality. Cuts in public spending which result in lower public sector employment (job losses or lower wages), can potentially lead to increased labour supply in the economy and therefore a depression of private sector wages thereby increasing inequality. *Over time*, labour markets tend to adjust through wage reallocation and labour market flexibility, as displaced workers find new employment or transition to different industries. However, if job creation is skewed towards low-wage or precarious employment, inequality may persist. The impact of skill-biased technological change further exacerbates this trend, as workers with skills that are easily replaceable by technology are more likely to experience job displacement and precarious employment (IMF 2014) – with the likelihood of long-term unemployment persisting (Ball et al. 2013; Woo et al. 2013; and Bova, Kinda, and Woo 2018).

Large contractions in government spending particularly those targeted at public sector jobs tend to be associated with deep immediate employment shocks. Furthermore, if labour unions are weakened (due to accompanying policy mixes affecting union density for instance), shifts in wage bargaining power can entrench long-term wage suppression, further exacerbating labour market scarring (Alesina and Ardagna 2010) and exacerbating inequality particularly for low-income groups (Ball et al. 2013). In contrast, wage and employment shocks arising from small retrenchments tend to be milder, with the labour market adjusting faster; since time associated with job reallocation is shorter, wage shocks and inequality increases are minimally impacted in the short run.

Other mechanisms include through the actions of automatic stabilisers, revenue and expenditure instruments, investment effects, etc. Automatic stabilisers and social protection policies play a significant role in mitigating distributional concerns by providing a safety net and lessening the impact of income shocks on low-income households. However, spend adjustment shocks particularly those that target social welfare programmes tend to disproportionately affect low-income households - with adverse impact manifesting immediately (Mathias Dolls, Clemens Fuest, and Andreas Peichl 2010). Furthermore, cuts to healthcare and education can have long-term negative effects on human capital development thereby perpetuating transgenerational inequality (WIR 2018, 2021). Although, overtime, some of these cuts may be replaced by more targeted policies or institutional reforms (such as improved labour policies) that could potentially offset the adverse effects on inequality in the long run, the multi-year design of most adjustment policies may contribute to the persistence of inequality overtime.

Targeted spend cuts are typically associated with small-sized adjustments and generally have less severe distributional effects – since governments prioritise efficiency gains rather than outright reductions on expenditure. In contrast, large-sized adjustments often involve significant cuts to social and welfare programmes. As social mobility declines due to reduced government spending, adverse distributional effects tend to become more firmly entrenched (WIR 2018, 2021). On the other hand, large revenue-based adjustments usually rely on an abrupt mix of direct and indirect tax instruments, unlike the gradual changes associated with smaller adjustments. The regressive effects of such high taxations disproportionately impact lower-income households, which have a higher marginal propensity to consume than top-income groups (WIR 2018, 2021).

Fiscal adjustments are typically enacted with the expectation of long-term economic growth, which, in turn, has implications for positive long-run distributional outcomes. However, expenditure-based adjustments that involve cuts to public investment tend to reduce capital formation, leading to a decline in private investment due to lower government demand and increased business uncertainty, which in turn, can slow economic growth overtime (Robert Perotti 1999). If the measures implemented improve fiscal sustainability and are accompanied by lower interest rates, they may stimulate higher private-sector investment and long-term economic growth (Alesina and Ardagna 2010). However, poorly designed adjustments can exacerbate long-run inequality rather than mitigate it. Since small-size adjustments, unlike large-size ones, are less likely used to target long-term public investments, capital formation (both human and non-human) tends to remain intact, allowing for sustained economic mobility and improved distributional outcomes (Joseph E. Stiglitz 2012).

In consideration of the above and the distributional effects of consolidation programmes, the dynamic effects of fiscal consolidation episodes on income inequality remain comparatively under-researched in the extant literature. Seminal studies in this area, such as Ball et al. (2013) and Furceri, Jalles, and Loungani (2015) estimate baseline panel-corrected standard error (PCSE) fixed effects models and subsequently derive impulse response functions from local projections, providing empirical support for dynamic adverse effects – albeit only for the *short and medium term*. Woo et al. (2013), on the other hand, employs a univariate autoregressive model (lagged up to two periods) to estimate impulse response functions and similarly finds evidence for dynamic adverse effects in the short and medium term. In recent times, Heimberger (2020) explores the short- and medium-term dynamic impact of fiscal adjustment episodes on income inequality and adds to the literature by extending the dataset to cover a longer period up to 2013 and investigating whether the dynamic impacts are dependent on the size, duration, and timing of the business cycle.

In view of the above, we set out to explore the far-reaching effects i.e., the *long-term dynamic effects* of fiscal consolidation episodes on income inequality. We make use of more recent fiscal adjustment data and cover up to year 2019 as well as use a wider selection of inequality indicators than previously used in the extant literature in order to establish the distributional points that are particularly affected by government's fiscal adjustment decisions and also ascertain if these indicators exhibit persistent dynamic distributional effects. Notably the IMF (2017) provides evidence suggesting that those at the lower end of the income distribution tend to be more adversely affected during instances of fiscal adjustments and therefore a reduction in inequality might positively impact economic growth since the poor tend to have a higher marginal propensity to consume. Furthermore, since the inequality literature highlights the significance of the composition of the adjustment as important channels through which inequality is impacted, this paper additionally explores the respective effects in order to determine the transmission channels that drive dynamic distributional effects. Finally, this paper also explores the large-sized and small-sized adjustment nexus by assessing the *dynamic effects* of fiscal adjustments for countries with large sized consolidations vis-à-vis countries with small sized consolidations.

3. Empirical investigation

3.1 *Data*

The data used to evaluate the hypotheses covers a span of 40 years from 1980 to 2019 and were sourced from various data bases (see tables 1A and 2A in Section 1 of the Appendix). The panel of countries selected is guided by fiscal adjustment data availability based on the chosen methodology – the narrative approach – and therefore is limited to 16 OECD countries – Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Portugal, Spain, Sweden, United Kingdom and the United States of America. Using a peer-focused metric, we split our panel of countries into two groups based on the magnitude of adjustments implemented - countries with large-size adjustments versus those with small-size adjustments. This approach aligns with Roberto Perotti (2011) who observes that countries in comparable circumstance (similar conditions) are best grouped together for analysis. Fiscal Adjustment data includes the most recent episodes of fiscal adjustments (i.e. the austerity measures implemented post the Great Recession while the income inequality data covers the evolution time frame (1980) of global rise of the income inequality trajectory up to 2019 - this is because *post 2019* inequality indicators might simultaneously reflect the impact of the COVID-19 pandemic as well as the expansionary policies pursued by fiscal authorities in a bid to manage the fiscal consequence arising from the pandemic thereby rendering potentially biased estimates.

3.2 Income Inequality Data

In this study apart from the Gini coefficient which is widely used in the literature (see for instance Furceri, Jalles, and Loungani 2015; Heimberger 2020), we also use additional inequality indicators in order to elicit a more holistic picture as well to check the robustness of our initial estimates. Although the Gini is one of the most widely used measures of inequality, it has been criticised for often downplaying shifts at the top and bottom of the distribution (Alex Cobham and Andy Sumner 2013). Consistent with this, significant findings in the inequality literature pertain to the evolution of top income shares and their corresponding impact on income distribution (see WIR 2018.wid.world for extensive discussion on this and the trajectory of inequality growth in the past few decades). To that end, a rich stream of literature (see for instance Michael Kumhof and Romain Ranciere 2010; Woo et al. 2013; Franz J. Prante 2018) employs the top income share as alternative indicators of inequality. Following the same rationale, we also make use of the top income share ratios (Top 1 and Top 10), income ratios which capture the dynamics at the bottom of the distribution (Bottom 40 and the Palma ratio) as well as the labour income share to elicit a more holistic picture and to ascertain the robustness of our initial estimates. In so far as spend-based fiscal adjustments entail public sector job loss and wage cuts, the share of income which accrues to labour becomes significant as an important channel for inequality increase due to potential loss in earnings. Consistent with this, the inequality literature (e.g. Ball et al. 2013; Davide Furceri and Prakash Loungani 2013; IMF 2014; Philips Arestis, Jesús Ferreiro, and Carmen Gómez 2021) highlights the significance of this indicator as a measure of inequality. Refer to Tables 1A and 2A in Section 1 of the Appendix for the definitions of the inequality indicators and the corresponding descriptive statistics, respectively.

3.3 Fiscal Adjustment Data

Fiscal adjustment data for the select panel of 16 OECD countries covers more recent period than previously examined in the literature, and spans from 1980 to 2019. It is derived from the 2024 updated adjustment dataset for a panel of 17 OECD countries compiled by authors at the IMF - Gustavo Adler et al. (2024) – and builds on the work of Pete Devries et al. (2011) and Alberto Alesina, Carlo Favero, and Francesco Giavazzi (2018). By utilising the narrative methodology, the authors compile a comprehensive record of 242 identified fiscal consolidation episodes occurring between 1978 and 2020.

From our data, we note that most adjustments implemented are notably multi-year events and composed of mixed instruments (tax hikes and spend cuts). In order to properly categorise the adjustments, since our analysis would necessarily include differentiating distributional effects arising from both instruments, we follow the direction used in the literature (e.g., Ball et al. 2013; Furceri et al. 2016) and classify spend-based adjustments as episodes in which spend cuts have been larger than tax hikes and vice versa for tax-based adjustments. These are referred to as SPEND and TAX respectively in our estimation tables.

In line with our investigation, the select panel of countries is further categorised into two groups – according to the magnitude of fiscal adjustments. Large-sized consolidations are those considered greater than 1.5% of GDP (Alesina and Ardagna 2010; Woo et al. 2013). An overview of the combined adjustment dataset for the select panel of 16 countries is reported in table 3A in Section 1 of the Appendix.

We further introduce three categories of regressors corresponding to the fiscal adjustment regressor in order to assess the distributional consequences of fiscal consolidation: (i) a binary regressor to indicate the fiscal adjustment episodes – with 1 corresponding to the start of an episode and 0 otherwise (ii) a continuous regressor i.e. the adjustment size scaled in magnitude of GDP and (iii) an interaction regressor – with the binary regressor as the slope of the continuous regressor.

3.4 Econometric methodology

The ensuing methodological approach is premised on the empirical framework of Oscar Jorda (2005) in which impulse response functions (IRFs) are estimated using local projections. Although IRFs are traditionally estimated from vector auto regressions (VARs), however, the VAR as a conventional methodology for IRF estimation presents with limitations associated with identification and non-linearity issues: with regards to the first – correlation problems relating to the VAR shocks make it difficult to estimate dynamic responses thereby creating the need to orthogonalise the shocks in order to make them uncorrelated (Jorda 2005; Luca Brugnolini 2018; David Ronayne 2011); and with regards to the second - *non-linearity problems* relating to the time horizon (Ronayne, 2011). In order, therefore, to attenuate the limitations associated with the standard IRF, Jorda (2005) proposed the local projection estimator as an alternative intuitive methodology which estimates new regressions that are peculiar and local for each subsequent time horizon by shifting the endogenous variables used in the regressions forward to their lag values - thereby making each projection local to its time horizons. The advantages for this method include: (a) its robustness to misspecification in the data gathering process; and (b) simplicity for inference purposes without the application of tasking numerical calculations. In view of the above, IRFs are estimated from Local Projections in order to derive dynamic responses of income inequality following the commencement of fiscal adjustment episodes.

In estimating the basic panel regression, four econometric methodologies are *initially* considered: (i) a heterogenous dynamic panel data model i.e. the panel autoregressive distributed lag model (ii) a difference generalized method of moments model (iii) a fixed effects model with Driscoll Kraay standard errors and (iv) a pooled OLS model with cross section SUR – with the latter two serving as robustness checks. A core concern in regression modelling revolves around the issue of endogeneity. Endogeneity arises when an explanatory variable in a regression model is correlated with the error term. This occurs when one or more of the explanatory variables in a regression model is correlated with some random explanatory variable(s) which is (are) not included in the model (Damodar Gujarati 2011). One of the ways in which incidences of endogeneity in regression models can be dealt with is by running a differenced generalised method of moments (GMM) model. However, for instances where *N* is smaller than *T*, the GMM estimators are found to render potentially inconsistent and misleading estimates in dynamic models (Hashem Pesaran and Ron Smith 1995; M. Hashem Pesaran, Yongcheol Shin, and Ron P. Smith 1999; David Roodman 2009). The panel ARDL with the pooled mean group (PMG) and mean group (MG) estimators are also able to assuage endogeneity issues if sufficient lags are applied to the variables. In addition, they are also less sensitive to outliers in data particularly when the cross sections are not large (Hashem Pesaran et al. 1999). Further, by assuming homogenous long-run coefficients among the different cross-sections while allowing short run coefficients, intercepts and error variances to differ, the PMG estimator provides a practical and suitable alternative to estimating separate regressions. In view of these, we adopt the panel ARDL model to estimate our baseline regression since it also captures the short- and long-term dynamics of inequality following the implementation of a fiscal adjustment programme. The generalised model is expressed as follows:

$$Y_{i,t} = \Sigma^{p}_{j=1}\ \partial_{i} Y_{i,t-j} + \Sigma^{q}_{j=0}\, \beta^{'}_{i\,j}\, X_{i,t-j} + \gamma_{i} + \varepsilon_{i\,t} \qquad (1)$$

where $Y_{i,t}$ is the dependent variable and a measure of income inequality for country *i* at time *t*; ∂_{ij} is the coefficient of the lagged dependent variable and also a scalar; $X_{i,t}$ is a k*1 vector of regressors that could be integrated at order 0, order 1 or co-integrated and includes: the fiscal adjustment size and a dummy variable that takes the value 1 (one) to correspond to the start date of each fiscal adjustment episode in country i at time t and zero (0) otherwise; $\beta^{'}_{i\ j}$ are k*1 coefficient vectors of unknown (undetermined) parameters; γ_{i} are the group (country) fixed effects with time invariant properties…..; $_{p,\,q}$ are optimal lag orders and $\varepsilon_{i\,t}$ is the error term.

In order to estimate the long run coefficients of the regressors, Equation (i) is re-parameterised to reflect the long-run (transformation) information for the model – the Error Correction Term (ECT) and is referred to as the *re-parameterised ARDL (p,q,q,…,q)* as seen below:

$$\Delta Y_{i,t} = \Theta_i[Y_{i,t-1} - \lambda'_i X_{i,t-j}] + \Sigma^{p-1}_{j=1} \partial_{ij} \Delta Y_{i,,t-j} + \Sigma^{q-1}_{j=0} \beta'_{ij} \Delta X_{i,t-j} + \gamma_i + \varepsilon_{it} \qquad (2)$$

where $\Theta_i = -(1 - \partial_i)$ is the group-specific speed of adjustment coefficient and is less than 0 (and ranges between -1 and -2); $[Y_{i,t-1} - \lambda'_i X_{i,t-j}]$ is the Error Correction Term (ECT) which represents the Long Run (LR) information for the model and also represents the speed at which any deviation occurring in the system (ignoring any other short-term deviation) will take to return to long run equilibrium ; λ'_i is the vector for LR relationships; and $\partial_{ij;} \beta'_{ij}$ are the Short Run (SR) dynamic coefficients. In selecting the lag structure for the SR components, the automatic optimal lag structure based on the AIC criterion is used.

Control variables

In analysing the effect of austerity on output, Perotti (2011) and Agnello, Castro, and Sousa (2013) in their respective papers, find that the prevailing macroeconomic conditions of a country can impact on fiscal adjustments while Woo et al. (2013) and Heimberger (2020) examine and also maintain the same stance on the side of inequality. Consequently, and in line with the literature, a set of macroeconomic variables which can impact inequality and also influence the outcome of adjustment programmes is introduced in order to mitigate biases arising from omitted variables and endogeneity. This includes *inflation* - because rising prices tend to affect (negatively impact) the incomes of the bottom cadre thereby increasing inequality (Woo et al. 2013, Ball et al. 2013). It also tends to erode the debt stock and can consequently affect the success of an adjustment programme by reducing the duration (Agnello, Castro, and Sousa 2013); *unemployment* - rising and prolonged unemployment rates tend to increase income inequality (Woo et al. 2013; Ball et al. 2013; IMF 2017; WIR 2018) while decreasing rates tend to have the opposite effect by decreasing the effectiveness of fiscal adjustment programmes as a result of positive growth on government revenue; *GDP growth and trade openness* (calculated as the sum of total exports and imports of goods and services scaled to GDP) follow the traditional Kuznets curve trajectory: as the degree of trade openness grows, inequality grows, peaks and is expected to gradually fall (Chancel, Hough, and Voituriez 2017; IMF 2017; WIR 2018). On the other hand, since trade expansion and GDP growth have a linear relationship with government revenue, the gains therefore associated with growing revenues tend to impact and also shorten the duration of fiscal adjustments. *Interest rate* was also initially considered as a control variable, but it was dropped from the model since results indicated there was an issue of multicollinearity occurring between it and inflation. Specifically, the variance inflation factor (VIF) was 6.18, and the correlation coefficient was 0.8123, suggesting a moderately high correlation. Given this, we opted to retain inflation, as it has a more direct impact on inequality - particularly by affecting the disposable income of lower-income households and on fiscal adjustments, as high inflation rates tend to erode the real value of deficits and debt, thereby influencing the duration of adjustment programmes. We limit the number of control variables to four to avoid data proliferation. However, for robustness checks, we introduce four additional control variables further referenced in the literature, which may also influence income distribution dynamics: *Human capital* - relating to the education, skills and health of the labour force (see Robert J. Barro 2000). *Technological change/Skill-biased technological change* – capturing shifts in production techniques and the adoption of new technologies (see Daron Acemoglu 2002). *Demographic factors* - influencing income distribution through structures such as migration patterns, population changes, and dependency ratios (see David E. Bloom, David Canning, and Jaypee Sevilla 2003). *Labour market institutions* – shaping income distribution through mechanisms like collective bargaining, labour protections and wage-setting (see Stephen Nickell and Richard Layard 1999). We use the following proxies for these factors: government expenditure on education as a percentage of GDP (for human capital), individuals using the internet as a percentage of the population (for technological change), dependency ratio (for demographic factors), and the union density rate (percentage of workers in unions, for labour market institutions). The results of these robustness checks are not discussed in the main text but are presented in the appendix.

4. Estimation results

Prior to estimating the baseline panel regression, standard diagnostic tests such as – stationarity, heteroskedasticity, cross correlation and cross-sectional dependency - were performed to ensure the viability (fitness) of the variables used in the model (for economy of space we do not report the test, but they are available upon request). The result showed that all the variables were stationary, and no signs of multicollinearity were observed. The *cross-section dependency* test, - Breusch-Pagan LM (which is usually applied in instances whereby T > N, whereas the Pesaran CD is used in instances when T < N or of the same magnitude) indicated that cross section dependency could not be rejected among some of the panels. To correct for this, the pooled OLS model was estimated with Generalised Least Square (GLS) weights and a cross section seemingly unrelated regression (SUR) applied.

4.1 Long-Term Distributional Effects on Income Inequality - Full Sample

To assess the long-run dynamics of the inequality indicators in response to fiscal adjustment decisions, model selection is based on the default Akaike Information Criterion (AIC) for automatic lag selection using the maximum available lags (4). However, attempts to estimate the model at this lag setting resulted in a *"no singular matrix"* notification due to the large number of variable specifications. Consequently, only a subset of the control variables was used. Nevertheless, we conducted an alternative set of estimations incorporating all control variables at a maximum automatic lag setting of 2. The results are largely similar and, for brevity, are presented only in the appendix. Furthermore, the error correction term (ECT) (i.e. the speed of adjustment) is significant across all estimations. The tables indicated in the discussion show a summary of the results.

Table 1. Summary of the Impact of adjustment size on inequality – significant estimation results for full panel of countries

	Panel ARDL - Full Country Sample							
	Gini		**Labour Share**		**TOP 1**		**Palma Ratio**	
	Coefficient	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
	Long Run Coefficients							
ADJSIZE	-0.0612***	0.0055	-2.4131***	-8.1070	0.0083***	0.0012	0.2546***	0.0622
SPEND	-0.0364***	0.0039	-3.5804***	0.4074	0.0073***	0.0017	0.3496***	0.0592
TAX	-0.0489***	0.0042	-7.0868***	-0.4087	-0.0113	0.0009	-0.3884***	0.1310
INFLATION	0.0025***	0.0005	-01779	0.1088	-0.0002	0.0002	0.0546**	0.0222
UNEMP	0.0025***	0.0003	0.2342*	0.1283	0.0046***	0.0003	-0.0483***	0.0150
TRADE	0.0002*	0.0001	-0.1898***	0.0136	0.0002***	0.00003	0.0136**	0.0054
INTUSERS	0.0003***	0.00003			0.0005***	0.001		
DEPRAT	0.0024***	0.0006					0.1425***	0.0370
	Short Run Coefficients							
ECT	-0.3781***	0.1421	-0.1285***	0.0468	-0.5796**	0.2409	-0.0267**	0.0130
ADJSIZE	0.0148**	0.0060	0.2677	0.2312	-0.0047	0.0030	-0.0146	0.0071
SPEND	0.0146*	0.00756	0.3857	0.4499	-0.0001	0.0029	-0.0195*	0.0102
TAX	0.02477***	0.0074	1.3662**	0.5556	-0.0003	0.0044	0.0007	0.0113
INFLATION	0.0013	0.0058	0.0563	0.0939	0.0015*	0.0009	0.0040	0.0036
UNEMP	-0.0014	0.0015	-0.2317*	0.1370	0.0005	0.0022	0.0005	0.0023
TRADE	-0.0007	0.0003	0.0356	0.0329	-0.0002	-0.0002	-0.0015	0.0011
INTUSERS	0.00001	0.0004			-0.0001	0.0004		
DEPRAT	0.0031	0.0108					-0.0134	0.0237

Notes: ***, **, * denote significance at 1%, 5% and 10% level.

Table 2. Summary of the Impact of adjustment size on inequality – significant estimation results for full panel of countries

	Model 2: Driscoll Kraay Fixed Effects Model					
	Gini		**Labour Share**		**TOP 1**	
	Coefficient	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
ADJSIZE	-0.00004	0.0008	-0.2122**	0.0837	0.0007*	0.0004
SPEND	-0.0012	0.0008	-0.4382***	0.1590	0.00122**	0.0004
TAX	-0.0002	0.0012	-0.0934	0.1141	0.00032	0.0007
INFLATION	0.00042***	0.0002	0.0282	0.0277	-0.0003**	0.0001
UNEMP	0.00029**	0.0001	-0.1344***	0.0293	0.0002*	0.00007
TRADE	0.00006	0.0000	0.0384	0.0297	0.00004	0.00005
GDPG	0.00039*	0.0002	-0.2047***	0.0446	0.0008***	0.0002

Notes: ***, **, * denote significance at 1%, 5% and 10% level.

	Model 3: Pooled OLS					
	Labour Share		**TOP 1**		**MID40**	
	Coefficient	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
ADJSIZE	-0.2636***	0.0441	0.0012***	0.0002	-0.0003**	0.0002
SPEND	-0.5300***	0.0686	0.00180***	0.0003	-0.0006***	0.0002
TAX	-0.1303*	0.0773	0.00085**	0.0004	-0.0002	0.0003
INFLATION	0.0383***	0.0120	-0.0001**	0.0001	0.0001 ***	0.00003
UNEMP	-0.0261***	0.0080	0.0001	0.0001	-0.000001	0.00001
TRADE	0.0021**	0.0008	-0.00003***	0.00001	0.00001***	0.000003
GDPG	-0.1734***	0.0188	0.0008***	0.0002	-0.0003***	0.0001

Notes: *** is 1% significance level; ** is 5% significance level; * is 10% significance level.

The Gini results in Table 1, model 1 suggests a one percent increase in the adjustment size (ADJSIZE) is associated with a short-run increase in inequality (0.015 at the 5% significance level) and a long-run decline of 0.061 at the 1% significance level. Although, this increase manifests through both the spend and tax channels, larger increases (0.024) are observed through the tax channel. These findings align with the austerity and inequality literature (for example Bertola and Drazen 1991; IMF 2010; Alesina, Favero, and Giavazzi 2015, 2018, 2019), which suggests that tax-based debt stabilisation policies tend to be contractionary. On the other hand, while the inequality literature suggests that tax-based instruments tend to have a moderating effect, evidence as seen from a strand of the literature indicates that their impact can be mixed, depending on the type of tax (direct or indirect tax) and its nature (progressive or regressive). For instance, Bova, Kinda, and Woo (2018) find that indirect taxes, such as VAT, tend to have adverse distributional effects on budget-constrained households. Similarly, Ciminelli et al. (2019) show that through the operation of substitution effects, direct taxes tend to cause an increase in inequality. Estimates also indicate a long run increase of 0.730ppt in income disparity through the *Top1 indicator*, however, for transmission via the spend channel. To the extent that cash and in-transfers are more beneficial to those at the bottom of the distribution, spend cuts (including public sector job & wage cuts) targeting these, tend to negatively impact and hurt low-income groups. Consistent with this, the effects of job & wage cuts are further reflected in the estimate for the *unemployment variable* which is also indicative of a long run increase of 0.242. For the *labour share specification*, sharp increases in long-run inequality (up to 3.58 and 7.09ppts) as a result of income share loss are respectively observed via the spend and tax channels. Furthermore, a short-run decline in inequality (up to 1.37 percentage points) is observed through the tax channel; lagged effects weaken only by the third period - suggesting that tax-based adjustments tend to positively impact the labour income share in the short run. Intuitively, if direct tax hikes are targeted towards corporate profits, capital gains, and top earnings, etc., the share of income accruing to labour tends to be positively affected (WIR 2018). However, over time, as firms adjust, labour income share tends to decline (Ball et al. 2013). We note that although a decline in inequality can be observed though the spend channel, it is not statistically significant, suggesting that spend cuts may not have an immediate effect on labour. This could be due to potential lags in the time it takes for the effects of public sector wage cuts and job losses to be reflected in the labour income share. Another possible explanation could be due to the gradual weakening of labour bargaining power over time (Florence Jaumotte and Carolina Osorio Buitron 2015). Consistent with this, the coefficient for union density (UNIONDEN) in our model (see Table 2 in Section IV of the Appendix) *although not significant*, indicates a 0.26 percentage point decline in inequality in the short run. In the same manner, we note that long-run increases in inequality can also be witnessed for the *Palma* indicating that during spend-based adjustments, disparities between the Top10 and Bottom40 widen by as much as 0.349. This result is not surprising since a widening of the income gap can be seen occurring via top income share as well as labour income share in our models.

Alternative models (Driscoll Kraay fixed effects and pooled OLS) used for our robustness checks indicate that the labour share and Top1 results are in line with what was established previously by the long run estimate, i.e. inequality increases significantly with the size of the adjustment. We further introduce other inequality indicators which we do not report for economy of space (but which are available on request) and show that our findings are robust with alternative inequality indicators. For instance, the MID40 (which captures the median income distribution) is also significant for the pooled OLS and is suggestive of adverse distributional consequences with increases in inequality seen operating through both the spending and tax channels – albeit with larger increases occurring via the spending channel. As such, this finding relating to the median class would appear quite intuitive considering the evidence in the extant literature that the median class has also lost earnings in recent years (Anthony B. Atkinson 1999; Richard Dobbs et al. 2016). Consistent with this, the world inequality report notes "…focusing on the bottom 40% alone can miss important dynamics – in part for the middle class, which may be squeezed between increases in both the bottom 40% share and the top 1% share" (WIR2018.widworld, p.283).

4.2 Dynamic Effects of Fiscal Consolidations from IRFs of Local Projections

Since economic variables are prone to fluctuations which could be due to either exogenous or endogenous shocks, economic dynamics reflect fluctuations in the economy which could be sustained or display large oscillations in trend or growth rate (Cars Hommes 2004). In order to estimate the dynamic effects of consolidation programmes on income distribution, impulse response functions are derived from local projections (Jorda 2005) for the cross-sections in the panel data - *"one of the attractions of an impulse response analysis is the ability to graphically convey statistical information about the dynamic behaviour of the system under consideration"* (Jorda 2009, p. 11). Traditionally, IRFs are constructed with marginal error bands; however, due to problems of serial correlation which manifest in the coefficient estimates and so affect the trajectory of the impulse responses, the IRFs for this study are constructed using conditional error bands.

The IRFs are estimated up to the 15th horizon and show the effects of distinct shocks from the total adjustment size as well as the spend- and tax-based measures (since we are also interested in assessing if the composition channels amplify dynamic impacts) on the various inequality indicators. In their paper, Ball et al. (2013) note that IRFs estimated from the coefficients of an ARDL tend to be unstable as a result of lag sensitivity – therefore to avoid this, we estimate a multivariate VAR lagged up to two periods and use the corresponding coefficients to compute IRFs from local projections. The advantage of this approach is that it allows all the variables to be treated as endogenous. In this regard, Jorda (2005) also notes that IRFs from local projections remain robust when estimated using ordinary least squares. Furthermore, to test the robustness of our findings, since the Cholesky decomposition is sensitive to the ordering of variables, we compute several IRFs based on different orderings and the results are not largely different in trend. These can be seen in Section VI of the Appendix.

A visual inspection of the graphs depicts the trajectory of the impulses from the shocks; while the vertical axis measures the divergence (variation) from the pre-shock trajectory, the horizontal axis measures the annual time element, the blue line represents the impulses from local projections, the green line represents the impulses from the traditional VAR while the two red dashed lines are the associated conditional error bands. In analysing the dynamic effects, we follow the direction of the extant literature (e.g., Agnello and Sousa 2012; Ball et al. 2013; Heimberger 2020) which relies on estimations utilising the binary regressors i.e. a dummy variable representing fiscal adjustment episodes. Therefore, to ensure comparability, we estimate IRFs from local projections using binary regressors (denoted as EPISODUM in our graphs) for our full panel of countries and show evidence for persistent dynamic impact up to the 15th horizon. Specifically, we note that point estimates maintain an upward trajectory – reaching 0.0013 by the 2nd period and 0.003 by the 5th period, increasing further to 0.0041 by the 15th period, with conditional error bands remaining well above zero. Since assessing the dynamic effects from the spend and tax channels as well as establishing the effects for the country groups are critical to this discourse, subsequent analysis will be based on the continuous fiscal adjustment variable i.e. the adjustment size (referred to as ADJSIZE in the graphs). This approach aligns with Heimberger (2020), who employs a continuous regressor for robustness checks and finds that the observed inequality effects remain consistent regardless of regressor choice. Similarly, our results confirm the persistence of inequality effects. While conditional error bands are wider with the continuous variable, joint significance and cumulative tests support the statistical robustness of our findings.

A look at the Gini graphs, (see Section III of the Appendix, figures 1 - 4 in panel 1) suggest that a one standard deviation shock (innovation) emanating from the total adjustment size causes inequality to rise on impact with resulting persistent effects till the 15th year. Specifically, by the 2nd and 5th year of adjustment, the observed impact is 0.001 and 0.0015 respectively. However, by the 15th period the prevailing impact (0.0018) is greater than the hitherto peak period (year 5). We test the robustness of this by estimating with different lags and note that the results do not appear significantly different. Specifically, impact for the short term i.e. 1st period for lag 1 to 4 ranges between 0.0005 to 0.0006; for the medium term i.e. 6th period, it ranges between 0.0011 to 0.0015 and for the long term i.e. 15th period, it ranges between 0.0017 to 0.0029. We additionally observe that when a univariate model is estimated, the impact on inequality is similar up till the 9th period; however, by the 14th year, the estimated IRFs are at the zero-bound threshold (see Section III of the Appendix, figures 5 - 9 in panel 1). Since the multivariate model (the baseline model) includes the control variables, we believe the IRFs produced to be more robust since other drivers for inequality have been controlled.

To assess the adjustment channel for pervasive inequality effects, we consider the impact from the two types of adjustment and observe that although the dynamic impact is replicated in both the spend and tax channels, increases in inequality appear to be steeper from spend shocks – with peak point estimates at 0.003 (by the 7th period) and 0.0019 by the 15th year (tax measures are indicative at 0.001 & 0.0015 by 5th & 15th year respectively). Intuitively persistent dynamic effects might not be surprising if one considers that most adjustment episodes are typically multi-year events (average duration as seen from our sample is 6 years. Canada is the longest at 14 years, followed by the US and Ireland at 9 and 7 years respectively) - since evidence as seen in the extant literature (e.g. Bova, Kinda, and Woo 2018; Heimberger 2020) is indicative that adjustments which are long in duration tend to worsen inequality. Furthermore, Bova, Kinda, and Woo (2018) maintain that most spend-based adjustments tend to be longer in duration with cumulative impact from the adjustment peaking between years five and six before it gradually starts fading by year 10 - which could account for why the magnitudinal effect on inequality is more pronounced compared to tax-based instruments. The *top income share*, and the *Bottom 40* follow the same trend as the Gini – however, peak point estimates for both specifications are 0.105ppt & -0.007ppt at the peak period (7th & 10th year) and 0.08ppt & -0.10ppt by the 15th year respectively. Similarly, adjustment size shocks on the labour share are long-lasting and tend to persist for 11years – with point estimates at -0.85 and -0.09 for the spend and tax channels respectively. (See Section IV of the Appendix, figures 1 - 9 in panel 2).

5. Large adjustment-sized and small adjustment-sized countries

To assess whether the long run effects of fiscal adjustment programmes are influenced by the magnitude of adjustment, period-wise country averages were first of all obtained for the countries in the data set; thereafter the countries were then categorised into two groups based on adjustment size - with large adjustments defined as those exceeding 1.5% of GDP (Woo et al. 2013). Accordingly, four countries (Ireland, Italy, Portugal and Sweden) fall into the large adjustment group, while twelve countries (Australia, Austria, Belgium, Canada, Denmark, Germany, Finland, France, Japan, Spain, the United Kingdom and the United States) fall into the small adjustment group. The maximum adjustment size observed in the large group is 5.230% of GDP, while the average adjustment size is 1.941% (compared to *0.841% for the small group*). Since we make use of the *most recently updated* dataset on fiscal adjustment episodes, some countries (Austria, Belgium, Denmark, Finland, Spain) that have historically implemented large adjustments are not classified as such in our grouping based on their period-wise country averages. A summary of the number of large episodes and their sizes can be found in Table 5A in Section I of the Appendix.

5.1 Comparison between large adjustment sized and small adjustment sized countries

One approach to estimating the baseline panel regression would have been to generate dummy variables to represent both country categories, but this would have resulted in an inability to properly distinguish the effects of the control variable for each country group. As a result, we decided to conduct separate estimations. In estimating our model, we encountered the same *"no singular matrix"* notification observed in the full sample due to the large number of variable specifications. Consequently, we adopted the same approach, using only a subset of control variables in our estimation with a maximum lag setting of four. Estimation results incorporating the full set of control variables at a maximum lag setting of two are provided in the appendix. Tables 1 to 4 in Section III of the Appendix report the short and the long-run specifications. A review of the results for large adjustment size countries indicates that while the speed of adjustment to long-run equilibrium is faster for expenditure-based adjustments, tax-based adjustments tend to exhibit sluggishness in large adjustment countries. In contrast, for small-adjustment countries, the speed of both revenue-and expenditure-based adjustments is comparable. Specifically, findings for large-adjustment countries indicate long-run effects via both the spend and tax channels for both the Gini and labour share. A one percent increase in adjustment is associated with a long-run increase in the *Gini* via both the spend (0.034) and tax (0.041) channels, *albeit* more disproportionately through the latter. Interestingly, the error correction term (i.e. the speed of adjustment to long-run equilibrium) suggests adjustment rates of 41.44% and 23.58% for both spend and tax-based adjustments respectively. This seemingly implies that corrections from deviations in the system towards long-run equilibrium are more sluggish with tax-based adjustments. Similarly, though the *labour share* is significant for both short-run increase (-2.19) and long-run decline (2.64) through the tax channel, it is additionally significant for long-run inequality via the spend channel (-2.39). Furthermore, the speed of adjustment towards long-run equilibrium appears to be slower at 27.74% via the tax channel (compared to 57.25% via the spend channel). *Top income share* is also indicative of a long-run inequality increase through the spend channel (2.73ppt). Additionally, we note that although the short run coefficients are mostly not significant, they indicate the expected sign (i.e., an increase in inequality). A closer examination of the composition of adjustments in this category reveals that most implemented measures have been predominantly expenditure-based. The findings for persistent long-term inequality are therefore not surprising and consistent with the literature since the inequality literature (see for instance Agnello and Sousa 2011, 2012; Jaejoon Woo et al. 2013) finds that expenditure-based adjustments tend to negatively impact inequality.

On the other hand, results for the *small-adjustment countries* are significant for a long run decline in inequality for all the inequality specifications under consideration (via both the expenditure and revenue channels) with the exception of labour share which is only significant via the spend channel *albeit for an increase* in inequality. Furthermore, although the short-run results are largely insignificant, the respective point estimates and their lags exhibit the expected sign for an increase in inequality. Specifically, for the Gini, a long-run decline of 0.017 and 0.024 is observed via the spend and tax channels, respectively. In contrast, the labour share specification is significant for a long-run increase (-5.86) through the spend channel. On the other hand, although short-run increases in inequality are observed via the tax channel (0.921ppt) for the top income share, the long run point estimates are also significant for a reduction via both the spend (5.501ppts) and tax channels (15.33ppts) – this is more so in the tax channel and could allude to the more redistributive qualities of tax instruments (Boris Cournede et al. 2013; Alari Paulus et al. 2017). The Bottom 40

(BOT40) and Palma ratio (PALMA) further reflect the findings in the top income share: point estimates of the *Bottom 40* are suggestive of a long-run increase in income share by up to 1.251ppt and 3.72ppts via both the spend and tax channels while point estimates of the *Palma ratio* are suggestive of a reduction in the gap between top income and bottom income via both the spend (-0.167) and tax channel (-0.127). These results for the Bottom 40 and Palma ratio are not surprising – to the extent that the top income share declines, this translates into a reduction in the inequality gap and an increase in the share accruing to the lower income distribution. These results for the country categories are equally robust to the alternative models' specifications used as robustness checks for the full country sample.

5.2 Dynamic Effects from IRFs of Local Projections: Large adjustment sized countries vis-à-vis small adjustment sized countries

Dynamic adverse impacts in large sized countries appear to be associated with a short to medium term increase in inequality, followed by a decline in the long run. A scrutiny of the graphs depicting the dynamic effects from IRFs reveals that income disparities persist for approximately six years for the inequality specifications under consideration – with peak impact occurring by the fifth year. Additionally, findings indicate that adverse effects resulting from tax measures (with the exception of the labour share) are less severe than those arising from spend-based measures. Specifically, for the Gini, a one standard deviation shock emanating from the adjustment size variable is associated with adverse effects which manifest on impact and last till the medium term (spend 0.005; tax 0.003). In contrast, for the labour share, inequality decline (up to 0.18 from both spend and tax channels) is seen from the 2nd to the 6th period, while increases (up to -0.45) tend to manifest in the long run i.e. from the 7th period to the 15th period. Top income share and bottom share likewise follow after the same direction as the Gini. Initial estimates for the small adjustment countries depict dynamic distributional effects appear to be persistent till the 15th period for the inequality specifications under consideration. Specifically, for the Gini, point estimates at the 2nd and 7th periods are 0.002 and 0.0024 respectively with peak estimate (0.0032) only observed by the 15th period; additionally, adverse effects appear to be pervasive through the spend channel. On average, for the labour share, although adverse effects peak at the 2nd period (-0.17), they appear to be persistent till the 11th period (-0.1). While adverse effects for the top income share appear to be persistent till the 15th horizon, the impulse peaks at the 7th period (0.28ppt) via the spend channel. Impulses from the tax channel appear to be short-termed lasting only till the 6th period (0.05ppt) with peak point estimates (0.07ppt) observed by the 5th period. Adverse effects for the bottom share follow the same direction as that observed for the labour share; observed effects appear to peak at the 11th horizon (-0.13ppt) via the spend channel. These results can be seen in panels 4 to 6 in Section IV of the Appendix.

At first glance, these results for the small adjustment countries appear to be outliers. To rule out the possibility of biased estimates - given that some of the countries (Austria, Belgium, Denmark, Finland and Spain) have previously implemented large adjustments, we exclude them from our sample and re-estimate our model. The results are largely the same and suggestive of the following: *Gini*: a one standard deviation shock from the adjustment size variable appears to be indicative of a persistent increase in inequality via the spend channel with a peak estimate of 0.0065. In contrast, the tax channel follows the opposite direction and is associated with inequality decline at impact until the 15th period – with trough response occurring in the 6th period. Likewise, results for the top income and bottom share follow the same direction. These findings for persistent adverse effects for the small adjustment countries category might not be surprising if one considers that the extant literature (see for instance Bova, Kinda, and Woo 2018; WIR 2022) finds that adjustments that are multi-year, mixed and long in duration tend to worsen distributional outcomes. Consistent with this, we observe that countries in this category exhibit all three characteristics. Notably, within our full panel of countries, the longest adjustment duration was implemented by Canada (14 years) and the USA (9 years).

5.3 Discussion

In analysing the dynamic effects of fiscal consolidations, the extant literature relies on estimations based on the binary regressors (see Agnello and Sousa 2012; Laurence Ball et al. 2013; Heimberger 2020). Additionally, Heimberger (2020) employs the continuous regressor for robustness checks and finds that the dynamic effects for inequality *increase* are not sensitive to the choice of regressor. Since we want to establish the dynamic effects emitted from the different fiscal adjustment measures, as well as explore the severity of the dynamic consequences of fiscal adjustments for country groups categorised according to adjustment size, the impulses from shocks to the continuous variable for these groups cannot be neglected and are key to this investigation; therefore, discussion of our findings will be based on the continuous regressor (i.e. the adjustment size). Therefore, based on the underlying hypotheses driving this research, the synopsis of the key findings are as follows: (i) income inequality tends to rise during instances of fiscal consolidation not just in the short and medium term but also in the long term (ii) adverse effects for the Bottom 40 are long-lasting with point estimates for the 15th year higher than previous peak periods (iii) spend-based shocks tend to be steeper than tax-based shocks.

Specifically, our results suggest that in the short and medium-term (i.e. years 2 and 5), the Gini of inequality tends to increase by 0.001 and 0.0015 respectively. These results are consistent with the findings in the literature: Ball et al. (2013) find that an adjustment of one percent of GDP tends to lead to an increase in short and medium-term inequality by 0.1 and 0.9 ppts in years 1 and 8 respectively, Furceri, Jalles, and Loungani (2015) similarly find for 0.1 and 0.9 ppts, Woo et al. (2013) find for 0.13 (year 2) and 0.4 ppts (year 5) and Heimberger (2020) similarly reports an increase of 0.35 and 0.6 ppts respectively for years 3 (short) and 5 (medium) following the implementation of an adjustment episode. We also find for long-term inequality at 0.0018 by year 15 indicating a sustained persistence in long-term inequality. Specifically, we note that adverse effects are present for the Gini and Bottom 40 from the 1st year till the 15th horizon with inequality increases at the 15th year higher for the Bottom 40 than previously established peak levels. Furthermore, since the average Gini in our panel is 0.3902, our results are comparative to a growth in inequality by 0.26%, 0.38% and 0.46% in the short, medium and long-term respectively. The finding for long-term inequality is also consistent with results from the baseline panel regressions as evidenced from the distributional outcomes pertaining to the inequality indicators of the Gini *as well as* top income share and labour income share. Correspondingly, Agnello and Sousa (2011) find that income share of the Top 1 increase during and more significantly post consolidation. Findings for labour income share loss is also consistent with literature which finds up to 20% of increases in inequality as occurring via the Labour income share and unemployment channels (Ball et al., 2013; IMF, 2014; Bova, Kinda, and Woo 2018; Vitor Castro 2018; Heimberger, 2020). Notably, the finding that during instances of fiscal adjustments, income share increases for top income share and income loss is suffered by labour is sustained across the methodologies considered for the panel regression.

With regards to the dynamic effects from the adjustment channels, adverse distributional effects appear to persist via both the tax and spend channels. This in itself is not surprising and could allude to the fact that since most of the adjustment episodes seen for our panel are mostly mixed (i.e. a combination of revenue and spend measures) this could therefore account for the persistence since as noted by the WIR (2022), a mix of instruments tend to amplify the adverse distributional consequences and therefore inadvertently and disproportionately hurt lower income groups. In this light, the obtained results showing persistent distributional disparities for the Bottom 40 would therefore appear consistent with literature. Furthermore, findings show that adverse effects emanating from spend-based shocks on average tend to be steeper and longer-lasting than tax-based. In particular, findings for the Gini and Bottom 40 are significant for being persistent to the 15th horizon.

As for the dynamic consequences arising for countries with large-sized consolidations the findings for the inequality indicators under consideration are indicative for adverse dynamic consequences which are immediate (i.e. commence on impact), steep and persist averagely till the medium-term (6 years from impact). One could infer that this medium-termed duration could be attributed to its distortionary costs on inequality especially as seen that the effects from the spend channel are steeper than those from the tax channel. Such an argument would seem to be consistent with equity concerns regarding the implementation of austerity measures, as the literature (see for instance IMF 2014; Bova, Kinda, and Woo 2018) demonstrates that adjustments that are perceived as fundamentally unfair may be counterproductive. On the other hand, findings for the small-sized consolidation countries point to adverse dynamic consequences as both the Gini and Bottom 40 are longer lasting than observed for the large-sized adjustment countries with peak point estimates by the 15th period range between 0.15 and 0.32ppt. In addition, findings are also suggestive of steeper adverse effects from the spend channel. While the findings of longer-lasting adverse effects for small adjustment countries might seem contrary to the evidence shown by the literature (see for e.g. Bova, Kinda, and Woo 2018) that the effects of large-sized consolidations are larger than small-sized consolidations, Alesina and Ardagna (2012) note that *"..there might be nothing special around large fiscal adjustments in terms of the reaction of expectations but that the composition of the adjustment and its effects on the labour markets can explain the different outcomes*" (p 21). Interestingly, a look at the composition of countries under this category indicates that four – notably Australia, Canada, Japan and the US - out of the twelve countries under consideration are ranked as highly unequal countries (World inequality report 2022) based on the Gini ranking and so it could therefore be the case that the dynamic effects on inequality are being magnified by the pre-existing high inequality levels.

5. Concluding remarks

While the empirical literature provides evidence pertaining to the short and medium term dynamic effects of fiscal consolidation on income equality, this contributes to the literature by investigating the long-term dynamic consequences of fiscal adjustments for a select panel of 16 OECD countries by using more recent fiscal adjustment and income inequality data (including an encompassing set of alternate inequality indicators); as well as establishing the extent of dynamic effects via the adjustment channels and finally by exploring whether differences in dynamic effects arise when countries are categorised based on the magnitude of the adjustment size.

By using various models for the baseline panel regression model and deriving impulse response functions from Local Projections based on Jorda's (2005, 2009) methodology to estimate the dynamic distributional effects, the findings that emerge are indicative of persistent upward trending long-term income inequality with adverse dynamic effects lasting up to 15 years following the implementation of a fiscal adjustment programme. This paper also finds evidence that the adverse dynamic effects occurring through the Bottom 40 share inequality indicators are not only persistent but peak estimates only present at the 14th horizon whilst point estimates for the Gini, at the 15th horizon are approximately at the same level as peak levels. Additionally, findings are indicative that dynamic effects occurring through the spend channel are more persistent and steeper than those observed from the revenue channel.

Furthermore, when countries are grouped based on adjustment size, the dynamic impact for small adjustment sized countries (emitted from the Gini and Bottom 40 specifications) tend to be long-lasting up to the 15th period. In contrast, dynamic effects for large-sized countries tend to be steeper but persist on average till the 6th period.

Questions which tend to arise when decisions are undertaken to improve the fiscal stance revolve around which side to act on: expenditure, revenue or a combination of both? While the broad literature finds that spend cuts (especially those geared towards public wage cuts, social benefits and transfers) are more likely to render an improvement to the fiscal stance, extant literature also provides evidence to show that these kind of cuts are detrimental on the side of inequality.

For policy considerations, there is therefore a need for an efficient mix of adjustment measures in order to address distributional issues since high-and-rising-income inequality not only raises equity concerns (IMF 2013) but also has an implication on long-term economic growth. Additionally, it impacts on the sustainability of the adjustment programme since most adjustments tend to be multi-year events. Given the differences in distributional effects across country groups, it is essential to consider distinct policy directions for each. However, a common priority for all should be the strengthening of labour market policies, as our findings indicate that higher union density tends to have a positive impact on reducing inequality. Policies that promote fair wages, collective bargaining, and job security are crucial in protecting labour income share over time.

For large adjustment countries, where fiscal consolidation leads to a sharp but medium-term increase in inequality, a phased approach to fiscal adjustments is recommended. Gradually implementing fiscal adjustments would help distribute the economic impact over time, reducing immediate shocks to low-income groups. Additionally, expanding the reach of targeted social programmes or introducing new ones would provide critical support to vulnerable populations during the adjustment period.

For small adjustment countries, where the impact on inequality tends to be prolonged, structural reforms should be a key priority. One crucial policy consideration is enhancing access to quality education, which can help reduce inequality of outcomes and mitigate intergenerational inequality, particularly for the Bottom 40% of the income distribution. Investing in education not only improves long-term economic mobility but also strengthens the resilience of disadvantaged groups. Additionally, ensuring that tax systems remain progressive, by placing a greater burden on those with a higher ability to pay, is essential for mitigating long-term inequality effects. A fairer distribution of the fiscal consolidation burden would help prevent disproportionate hardship on lower-income groups. As noted by Bruno Martorano (2015), *"...participation in the adjustment process should be progressive, reflecting the ability-to-pay rule. In other words, it is difficult to ask people who received less during the good times to participate more in the bad times"* (p. 20). In view of these findings and in consideration of the persistence of dynamic effects which result from austerity implementation, there might be a need for policymakers to also consider the rigid aspects of the budget i.e. non-current budgetary items as alternatives to austerity. By implementing these measures, governments can balance fiscal consolidation with equity, ensuring that economic stability does not come at the expense of social cohesion.

Finally, the findings of this paper come with certain limitations. Notably, several countries within the small adjustment group exhibit high levels of inequality. This raises the question of whether the persistent dynamic effects observed are primarily driven by pre-existing inequality levels. Future research could explore this further to better understand the underlying mechanisms at play.

References

Acemoglu, Daron. 2002. "Technical Change, Inequality, and the Labor Market." *Journal of Economic Literature* 40 (1): 7–72.DOI: 10.1257/0022051026976

Agnello, Luca, and Ricardo M. Sousa. 2011. "Fiscal Consolidation and Income Inequality." *IDEAS Working Paper Series* from RePEc. St. Louis: Federal Reserve Bank of St Louis. Available at: https://search.proquest.com/working-papers/fiscal-consolidation-income-inequality/docview/1698807418/se-2?accountid=10297.

Agnello, Luca, and Ricardo M. Sousa. 2012. "Fiscal Adjustments and Income Inequality: A First Assessment." *IDEAS Working Paper Series* from RePEc. St. Louis: Federal Reserve Bank of St Louis.
doi: 10.1080/13504851.2011.648315.

Agnello, Luca, Vitor Castro, and Ricardo M. Sousa. 2013. "What Determines the Duration of a Fiscal Consolidation Program?" *Journal of International Money and Finance*, 37, pp. 113–134.
doi: 10.1016/j.jimonfin.2013.05.012.

Alesina, Alberto, and Allan Drazen. 1991. "Why Are Stabilisations Delayed?" *American Economic Review*. 81(5) pp 1170-1188.

Alesina, Alberto, and Sylvia Ardagna. 1998. "Tales of Fiscal Adjustment." *Economic Policy*, (27), pp. 487–545. doi: 10.1111/1468-0327.00039.

Alesina, Alberto, Carlo Favero, and Francesco Giavazzi. 2015. "The Output Effect of Fiscal Consolidation plans." *Journal of International Economics*, 96(S1), pp. S19–S42.
doi: 10.1016/j.jinteco.2014.11.003.

Alexiou, Constantinos, and Joseph Nellis. 2016. "A Post-Mortem of Austerity: The Greek Experience." *Economic Issues*, Vol. 21, Part 2, 2016, 21(2), p. 3. doi: 10.2307/4344111

Amitrano, Claudio Roberto, and Lucas Vasconcelos 2019. "Income Distribution, Inflation and Economic Growth: A Post-Keynesian Approach." Panoeconomicus, 66(3), 277–306. https://doi.org/10.2298/PAN1903277A

Arestis, Philips, Jesús Ferreiro, and Carmen Gómez. 2021. "Labour Market Flexibilization and Income Distribution in Europe." *Panoeconomicus*, *68*(2), 167–185. https://doi.org/10.2298/PAN2102167A

Atkinson, Anthony. 1999. "Is Rising Inequality Inevitable? A Critique of the Transatlantic Consensus." *WIDER Annual Lectures 3*. http://dx.doi.org/10.1057/9780230501850_3

Ball, Laurence M., Davide Furceri, Leigh Daniel, and Prakash Loungani. 2013. "The Distributional Effects of Fiscal Consolidation." *IMF Working Papers*, 13(151), p. 1. doi: 10.5089/9781475551945.001.

Bova, Elva, Tidiane Kinda, and Jaejoon Woo. 2018. "Austerity and inequality: The size and composition of fiscal adjustment matter." Available at:

http://crisisobs.gr/2018/02/austerity-inequality-size-composition-fiscal-adjustment-matter/.

Brinca, Pedro, Miguel H. Ferreira, Francesco Franco, Hans A. Holter, and Laurence Malafry. 2021. "Fiscal Consolidation Programs and Income Inequality." *International Economic Review*, 62(1), pp. 405–460.
doi: 10.1111/iere.12482

Brugnolini, Luca. 2018. "About Local Projection Impulse Response Function Reliability." *Tor Vergata University*, CEIS Research Paper 440. http://dx.doi.org/10.2139/ssrn.3229218

Calcagno, Alfredo. 2012. "Can Austerity Work?" *Review of Keynesian Economics*, (1), pp. 24–36.
doi: 10.4337/roke.2012.01.02.

Castro, Vitor. 2018. "Functional Components of Public Expenditure, Fiscal Consolidations, and Economic Activity." *Economics & Politics*, 30(1), pp. 124–150. doi: http://dx.doi.org/10.1111/ecpo.12104.

Chancel, Lucas, Alex Hough, and Tancrède Voituriez. 2017. "Reducing Inequalities within Countries: Converting the Global Debate into Action." *Institut du développement durable et des relations internationales*. (January). Available at: www.iddri.org.

Ciminelli, Gabriele, Ekkehard Ernst, Rossana Merola, and Massimo Giuliodori. 2019. "The Composition Effects of Tax-Based Consolidation on Income Inequality." *European Journal of Political Economy*, 57, pp. 107–124. doi: 10.1016/j.ejpoleco.2018.08.009.

Clements, Benedict J., Ruud A. de Mooij, Sanjeev Gupta and Michael Keen. 2015. "Inequality and Fiscal Policy." International Monetary Fund.

David E., Bloom David, and Canning Jaypee Sevilla 2001. "Economic Growth and the Demographic Transition" Working Paper 8685 http://www.nber.org/papers/w8685

Devries, Pete, Jaime Guajardo, Daniel Leigh, and Andrea Pescatori. 2011. "A New Action-based Dataset of Fiscal Consolidation." *IMF Staff Papers*. Available at: https://www.imf.org/external/pubs/ft/wp/2011/wp11128.pdf.

Dobbs, Richard, Anu Madgavkar, James Manyika, Jonathan Woetzel, Jacques Bughin, Eric Labaye, and Pranav Kashyap. 2016. "Poorer Than Their Parents? A New Perspective on Income Inequality." *McKinsey Global Institute.*

Dolls, Mathias., Fuest, Clemens. , and Peichl Andreas "Automatic stabilization and discretionary fiscal policy in the financial crisis" in: IZA Journal of Labor Policy, 2012, 1:4

Elson, Diane. 2013. "Austerity Policies Increase Unemployment and Inequality - but Don't Reduce Budget Deficits And Government Borrowing." *The Journal of Australian Political Economy*, (71), pp. 130–133.

Furceri, Davide, and Prakash Loungani. 2013. ''Who Let the Gini Out ?'' *IMF Finance and Development*, (December), pp. 25–27.

Furceri, Davide, João T. Jalles, and Prakash Loungani. 2015. "Fiscal Consolidation and Inequality in Advanced Economies: How Robust is the Link?" Income Inequality and Fiscal Policy (2nd Edition), *IMF Staff Discussion Notes*, 12(08), p. 1. doi: 10.5089/9781475510850.006.

Gujarati, Damodar 2011. "Stochastic Regressors and the Method of Instrumental Variables" In *Econometrics by Example*, 310-338. Basingstoke: Palgrave Macmillan.

Heimberger, Phillip. 2020. "The Dynamic Effects of Fiscal Consolidation Episodes on Income Inequality: Evidence for 17 OECD Countries over 1978-2013." *Empirica*, 47, pp. 53–81. doi: 10.1007/s10663-018-9404-z.

International Monetary Fund. 2010. "Will it Hurt? Macroeconomic Effects of Fiscal Consolidation."

International Monetary Fund. 2014. "Fiscal Policy and Income Inequality." *Policy Papers*, 14.
doi: 10.5089/9781498343671.007.

International Monetary Fund. 2017. "Tackling Inequality." *Fiscal Monitor*.

Jalles, Joao. 2017. "How do Fiscal Adjustments Change the Income Distribution in Emerging Market Economies?" *International Journal of Emerging Markets*, 12(2), pp. 310–334.
doi: 10.1108/IJoEM-10-2015-0219.

Jaumotte, Florence, and Buitron Carolina Osorio. 2015 "Inequality and Labor Market Institutions" IMF Staff Discussion Notes No. 2015/014

Jorda, Oscar. 2005. "Estimation and Inference of Impulse Responses by Local Projections." *American Economic Review*, Vol. 95, No. 1, pp. 161–82. http://dx.doi.org/10.1257/0002828053828518

Jorda, Oscar. 2009. "Simultaneous Confidence Regions for Impulse Responses." *The Review of Economics and Statistics*, Vol. 91, Issue 3, 629-647. http://dx.doi.org/10.1162/rest.91.3.629

Kumhof, Michael, and Romain Rancière. 2010. "Inequality, Leverage and Crises." *IMF, Working Paper*. WP/10/268.

Martorano, Bruno. 2015. "Is It Possible to Adjust ''With a Human Face'? Differences in Fiscal Consolidation Strategies between Hungary and Iceland." *Comparative Economic Studies*, 57(4), pp. 623–654. doi: http://dx.doi.org/10.1057/ces.2015.22

Mulas Granados, Carlos. 2005. "Fiscal Adjustments and the Short-Term Trade-Off between Economic Growth and Equality." *Hacienda Pública Española / Revista de Economía Pública*, 172(1), pp. 61–92.

Nickell, Stephen, and Richard Layard 1999. Chapter 46 "Labor market institutions and economic performance", Handbook of Labor Economics, Elsevier, Volume 3, Part C,1999, Pages 3029-3084, ISSN 1573-4463, ISBN 9780444501899, https://doi.org/10.1016/S1573-4463(99)30037-7

Okeke, Angela, and **Constantinos Alexiou**. (2025). Public debt and income inequality in times of austerity: Dynamic panel evidence. *Forum for Social Economics*, 1–23. https://doi.org/10.1080/07360932.2025.2464599

Okeke, Angela, Constantinos Alexiou, and Joseph Nellis. 2021. "Austerity Effects on National Output and Income Inequality: A Systematic Literature Review." *Review of Economics*, 72(2): pp. 97–148 doi:10.1515/ROE-2021-0012

Perotti, Roberto. 2011. "The "Austerity Myth": Gain Without pain?', *NBER Working Paper Series,* Working Pa, pp. 1–58.

Pesaran, M. Hashem and Ron Smith. 1995. "Estimating Long-run Relationships from Dynamic Heterogeneous Panels." *Journal of Econometrics*, Volume 68, Issue 1, Pages 79-113. http://dx.doi.org/10.1016/0304-4076(94)01644-F

Pesaran, M. Hashem, Yongcheol Shin, and Ron P. Smith. 1999. "Pooled Mean Group Estimation of Dynamic Heterogenous Panels." *Journal of the American Statistical Association*, 94:446, 621-634,
doi: 10.1080/01621459.1999.10474156

Prante, Franz. J. 2018. "Macroeconomic Effects of Personal and Functional Income Inequality: Theory and Empirical Evidence for the US and Germany." *Panoeconomicus*, 65(3), 289–318. https://doi.org/10.2298/PAN1803289P

Roodman, David. 2009. "How to Do Xtabond2: An Introduction to Difference and System GMM in Stata." *The Stata Journal*, 9(1), pp. 86–136. http://dx.doi.org/10.1177/1536867X0900900106

Ronayne, David. 2011. "Which Impulse Response Function?" *Warwick Economic Research Papers,* (No. 971), pp. 1–46. Available at: http://www2.warwick.ac.uk/fac/soc/economics/staff/phd_students/dronayne.

van Treeck, Till, and Simon Sturn. 2012. "Income inequality as a cause of the Great Recession? A survey of current debates." *ILO Working Papers*, 470934(39).

Woo, Jaejoon, Elva Bova, Tidiane Kinda, and Y. Sophia Zhang. 2013. Distributional Consequences of Fiscal Adjustments: What Do the Data Say?" *IMF Working Paper*, WP/13/195.
http://dx.doi.org/10.1057/s41308-016-0021-1

World Inequality Report. 2018. Available at https://wir2018.wid.world

World Inequality Report. 2022. Available at https://wir2022.wid.world/

APPENDIX

SECTION I

Table 1A. Definition of variables

Variables	Definition	Source
GINI	The Gini coefficient measures the distribution of income in a population. It ranges between 0 and 1; where 0 denotes perfect equality and 1 perfect inequality	OECD
LABOUR SHARE	It is that part of national income which is allocated for labour compensation.	OECD
TOP1	This refers to the share of all income received by the 1% with the highest income in the population.	https://wid.world
TOP10	This refers to the share of all income received by the 10% with the highest income in the population.	https://wid.world
MID40	This refers to the share of income received by the people in the middle of the income distribution ladder.	https://wid.world
BOTTOM40	This is the share of all income received by the bottom 40% in the income distribution ladder i.e. the 40% with the lowest income in the population. It is measured in percentages.	https://wid.world
BOTTOM50	This is the share of all income received by the bottom 50% in the income distribution ladder i.e. the 50% with the lowest income in the population. It is measured in percentages.	https://wid.world
PALMA RATIO	The Palma ratio is the share of all income received by the 10% people with highest disposable income divided by the share of all income received by the 40% people with the lowest disposable income. In other words, the Palma ratio	OECD

	indicator measures the income share of the top decile relative to the bottom 40.	
TOP10BOT50	This is the ratio of the top decile to the bottom 50 in the income distribution i.e. the income share of the richest 10% in the population divided by the income share of the poorest 50%.	https://wid.world
INFLATION	This refers to the inflation rate and is the annual percentage change in the cost of living and is measured by the consumer price index. In other words, it measures the changes in price level (activity in goods and services); an increase in inflation rate therefore corresponds to a decrease in purchasing power.	OECD
UNEMPLOYMENT	The annual unemployment rate measures the numbers of unemployed people as a percentage of the labour force.	OECD
TRADE	Trade refers to trade openness and captures the sum of total exports and imports as a percentage of GDP.	OECD
GDPG	This refers to the gross domestic product growth rate and it measures the total annual income earned from productive capacities (i.e. economic activities) less imports.	OECD
EDUEXP	This is government expenditure on education as a percentage of GDP. It is used as a proxy for human capital.	World Bank
DEPRAT	This refers to the dependency ratio. It is used as a proxy for demographic factors.	World Bank
UNIONDEN	This refers to trade union density rate (measured as a percentage of workers in unions). It is used as a proxy for labour market institutions.	World Bank

INTUSERS	This is the number of individuals using the internet as a percentage of the population. It is used as a proxy for skill biased technology change.	World Bank
EPISODE DUMMY	This is a dummy variable which represents the fiscal adjustment episodes - with 1 corresponding to the start of an episode and 0 otherwise.	Agnello et al. (2013); Ball et al. (2013); Furceri et al. (2013); Heimberger (2020)
ADJUSTMENT SIZE	This is the budgetary impact of the fiscal adjustments scaled relative to GDP i.e. the fiscal adjustment size measured as a percentage of GDP.	Devries et al. (2011); Alesina et al. (2015)
EPISODE-ADJUSTMENT SIZE	This is the interaction variable i.e., the episode dummy as the slope of the adjustment size variable and is represented as Di,tXi,t where D denotes the dummy of adjustment episode for the *ith* country at time *t* and X denotes the adjustment size for the *ith* country at time *t.*	Ball et al. (2013); Furceri et al. (2013); Heimberger (2020)
SPEND	This refers to adjustments implemented on the expenditure side (also referred to as spend-based adjustments); they are measured as a percentage of GDP.	Devries et al. (2011); Alesina et al. (2015)
TAX	This refers to adjustments implemented on the revenue side (also referred to as tax-based adjustments); they are measured as a percentage of GDP.	Devries et al. (2011); Alesina et al. (2015)

Table 2A. Descriptive Statistics

Variables	Mean	Maximum	Minimum	Std. Dev.
ADJSIZE	0.47	9.75	-0.75	1.08
SPEND	0.28	6.24	-0.29	0.68
TAX	0.19	3.87	-0.75	0.51
GINI	0.39	0.56	0.26	0.07
LABOUR SHARE	75.35	97.65	50.83	6.02
TOP1	0.09	0.19	0.03	0.03
TOP10	0.30	0.46	0.21	0.06
BOT40	0.17	0.26	0.09	0.04
BOT50	0.24	0.34	0.13	0.05
PALMA RATIO	1.29	4.04	-1.56	0.75
TOP10BOT50	6.90	18.00	3.00	3.12
INFLATION	3.45	28.38	-4.48	3.77
UNEMP RATE	8.04	26.09	1.46	4.00
TRADE	66.63	252.34	15.81	36.71
GDPG	2.28	25.18	-8.07	2.41
EDUEXP	5.16	8.56	1.73	1.15
DEPRAT	51.28	69.89	42.89	4.5
UNIONDEN	37.57	86.60	9.90	21.40
INTUSERS	35.95	98.05	-9.562	0.30

Table 3A: Fiscal Adjustment Episodes (1978 – 2020)

Fiscal Adjustment Data Set (narrative methodology): Adler et al. (2024)

16 OECD COUNTRIES	***1978 - 2020***
Countries	**Fiscal Adjustment Episodes (Years**
Australia	1985-88;1994-99
Austria	1980-81;84;1996-97;2001-02;2011-14
Belgium	1982-85;1987;1990;1992-94;1996-97;2010-14
Canada	1984-97;2010-14
Denmark	1983-86;1995;2011-13
Finland	1992-97;2011-16
France	1979;1987;1989;1991-92;1995-97;1999-00;2011-2015;2018
Germany	1982-84;1991-95;1997-00;2003-04; 2006-07;2011-13
Ireland	1982-88;2009-14
Italy	1991-98;2004-07;2010-14
Japan	1979-83;1997-98;2003-07;2014-15;2019-20
Portugal	1983;2000;2002-03;2005-07;2010-14
Spain	1983-84;1989-90;1992-97;2010-14;2017
Sweden	1984;1993-98
United Kingdom	1979-82;1994-99;2010-15
United States	1978;1980-81;1985-86;1988;1990-98;2011-13

Source: Adler et al. (2024) An Updated Action-based Dataset of Fiscal Consolidation

Table 4A: Large Adjustment & Small Adjustment countries

Countries by Group				
S/N	**Small Adjustment Countries**	**Average Adjustment Size**	**Large Adjustment Countries**	**Average Adjustment Size**
1	Australia	0.495	Ireland	2.238
2	Austria	1.176	Italy	1.876
3	Belgium	1.360	Portugal	2.009
4	Canada	0.476	Sweden	1.641
5	Denmark	1.161		
6	Finland	1.297		
7	France	0.707		
8	Germany	0.618		
9	Japan	0.560		
10	Spain	1.388		
11	United Kingdom	0.620		
12	United States	0.359		

Table 5A: Large episodes summary

S/N	Large Adjustment Countries	Total Adjustment Episodes	Ave Adjustment Size (% GDP)	Total Large Episodes	Large Episode Ave Adjustment Size (% GDP)
1	Ireland	13	2.24	10	2.8
2	Italy	17	1.88	7	3.21
3	Portugal	12	2.01	7	3.03
4	Sweden	7	1.64	4	2.2
	Others**				
1	Austria	10	1.18	3	2.003
2	Belgium	16	1.36	6	2.03
3	Denmark	8	1.16	3	2.23
4	Finland	12	1.3	3	2.94
5	Spain	16	1.35	7	2.08

** Countries grouped as small but have also implemented some large adjustments

SECTION II

Table 1. Summary of the Impact of adjustment size on inequality – significant estimation results for full panel of countries

Panel ARDL - Full Country Sample								
	Gini		**Labour Share**		**TOP 1**		**Palma Ratio**	
	Coefficient	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
	Long Run Coefficients							
ADJSIZE	-0.0612***	0.0055	-2.4131***	- 8.1070	0.0083***	0.0012	0.2546***	0.0622
SPEND	-0.0364***	0.0039	-3.5804***	0.4074	0.0073***	0.0017	0.3496***	0.0592
TAX	-0.0489***	0.0042	-7.0868***	- 0.4087	-0.0113	0.0009	-0.3884***	0.1310
INFLATION	0.0025***	0.0005	-01779	0.1088	-0.0002	0.0002	0.0546**	0.0222
UNEMP	0.0025***	0.0003	0.2342*	0.1283	0.0046***	0.0003	-0.0483***	0.0150
TRADE	0.0002*	0.0001	-0.1898***	0.0136	0.0002***	0.00003	0.0136**	0.0054
INTUSERS	0.0003***	0.00003			0.0005***	0.001		
DEPRAT	0.0024***	0.0006					0.1425***	0.0370
	Short Run Coefficients							
ECT	-0.3781***	0.1421	-0.1285***	0.0468	-0.5796**	0.2409	-0.0267**	0.0130
ADJSIZE	0.0148**	0.0060	0.2677	0.2312	-0.0047	0.0030	-0.0146	0.0071
SPEND	0.0146*	0.00756	0.3857	0.4499	-0.0001	0.0029	-0.0195*	0.0102
TAX	0.02477***	0.0074	1.3662**	0.5556	-0.0003	0.0044	0.0007	0.0113
INFLATION	0.0013	0.0058	0.0563	0.0939	0.0015*	0.0009	0.0040	0.0036
UNEMP	-0.0014	0.0015	-0.2317*	0.1370	0.0005	0.0022	0.0005	0.0023
TRADE	-0.0007	0.0003	0.0356	0.0329	-0.0002	-0.0002	-0.0015	0.0011
INTUSERS	0.00001	0.0004			-0.0001	0.0004		
DEPRAT	0.0031	0.0108					-0.0134	0.0237

Notes: ***, **, * denotes significance at 1%, 5% and 10% level

Table 2. Summary of the Impact of adjustment size on inequality – significant estimation results for full panel of countries

	Model 2: Driscoll Kraay Fixed Effects Model					
	Gini		**Labour Share**		**TOP 1**	
	Coefficient	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
ADJSIZE	-0.00004	0.0008	-0.2122**	0.0837	0.0007*	0.0004
SPEND	-0.0012	0.0008	-0.4382***	0.1590	0.00122**	0.0004
TAX	-0.0002	0.0012	-0.0934	0.1141	0.00032	0.0007
INFLATION	-0.00042***	0.0002	0.0282	0.0277	-0.0003**	0.0001
UNEMP	0.00029**	0.0001	-0.1344***	0.0293	0.0002*	0.00007
TRADE	0.00006	0.0000	0.0384	0.0297	0.00004	0.00005
GDPG	0.00039*	0.0002	-0.2047***	0.0446	0.0008***	0.0002

Notes: ***, **, * denotes significance at 1%, 5% and 10% level

	Model 3: Pooled OLS					
	Labour Share		**TOP 1**		**MID40**	
	Coefficient	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
ADJSIZE	-0.2636***	0.0441	0.0012***	0.0002	-0.0003**	0.0002
SPEND	-0.5300***	0.0686	0.00180***	0.0003	-0.0006***	0.0002
TAX	-0.1303*	0.0773	0.00085**	0.0004	-0.0002	0.0003
INFLATION	0.0383***	0.0120	-0.0001**	0.0001	0.0001 ***	0.00003
UNEMP	-0.0261***	0.0080	0.0001	0.0001	-0.000001	0.00001
TRADE	0.0021**	0.0008	-0.00003***	0.00001	0.00001***	0.000003
GDPG	-0.1734***	0.0188	0.0008***	0.0002	-0.0003***	0.0001

Notes: ***, **, * denotes significance at 1%, 5% and 10% level

SECTION III

TABLE 1. Summary of the Impact of adjustment size on inequality – significant estimation results for large adjustment sized countries

	Panel ARDL - Large Adjustment Sized Countries					
	Gini		**Labour Share**		**TOP 1**	
	Coefficient	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
	Long Run Coefficients					
ADJSIZE	0.0123***	0.0045	-2.1760***	0.4519	0.0146**	0.0060
SPEND	0.0341***	0.0111	-2.3903***	0.3912	0.0273**	0.0111
TAX	0.0413**	0.0189	2.6421**	1.0963	0.0091*	0.0052
INFLATION	0.0027	0.0020	-1.7283***	0.0737	0.0050	0.0031
UNEMP	0.0036*	0.0019	-0.4454**	0.1693	0.0061**	0.0028
TRADE	0.0003	0.0002	0.0311	0.0375	0.0013***	0.0002
GDPG	0.0272***	0.0062	-	-	0.0249***	0.0091
	Short Run Coefficients					
COINTEQO1	-0.3362***	0.1060	-0.3978***	0.1193	-0.2962**	0.1196
ADJSIZE	0.0010	0.0021	0.2156	0.2334	0.00070	0.0016
SPEND	-0.0155*	0.0089	-0.3843	0.8263	0.0002	0.0012
TAX	-0.0041	0.0055	-2.1934**	0.9502	0.0020	0.0027
INFLATION	0.0031*	0.0016	0.5397***	0.1150	0.0003	0.0014
UNEMP	-0.0018	0.0020	0.6383**	0.3150	-0.0004	0.0008
TRADE	-0.0007	0.0003	-0.0282	0.0682	-0.0007**	0.0001
GDPG	-0.0085***	0.0029	-	-	0.0055**	0.0025

Notes: ***, **, * denotes significance at 1%, 5% and 10% level

Table 2. Summary of the Impact of adjustment size on inequality – significant estimation results for small adjustment sized countries

	Panel ARDL - Small Adjustment Sized Countries							
	Gini		LABOUR		TOP 1		BOT40	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
	Long-Run Coefficients							
ADJSIZE	-0.0794***	0.0068	-1.1182***	0.4180	-0.0166***	0.0018	0.0186***	0.0019
SPEND	0.0165***	0.0039	-5.8612***	1.2885	-0.0550***	0.0083	0.0125***	0.0008
TAX	-0.0242***	0.0077			-0.1533***	0.0156	0.0372***	0.0027
INFLATION	-0.0020**	0.0008	-1.7128***	0.4173	0.0031***	0.0004	0.0009**	0.0004
UNEMP	-0.0049***	0.0007	0.6029**	0.2763	0.0063***	0.0002	-0.0003	0.0004
TRADE	0.0009***	0.0001	0.2822***	0.0432	0.0001	0.0001	-0.0008***	0.0001
GDPG	-0.0073***	0.0009	-3.0687***	0.5195	0.0066***	0.0008	0.0009*	0.0005
	Short-Run Coefficients							
ECT	-02342**	0.0908	-0.1012**	0.0506	-0.3252**	0.1319	-0.2074***	0.0655
ADJSIZE	0.0099	0.0065	0.4465*	0.2558	0.0006	0.0029	-0.0016	0.0012
SPEND	-0.0010	0.0040	0.9052	0.6652	0.0051	0.0042	-0.0025	0.0027
TAX	-0.0042	0.0044	-	-	0.0092**	0.0042	-0.0044*	0.0024
INFLATION	0.0024	0.0017	0.0229	0.1616	0.0010	0.0009	-0.0001	0.0005
UNEMP	-0.0008	0.0019	-0.3425**	0.1503	-0.0026***	0.0009	0.0002	0.0006
TRADE	-0.0012	0.0007	0.0068	0.0511	-0.0006	0.0003	0.0002	0.0002
GDPG	0.0021**	0.0009	-0.0928	0.1744	-0.0004	0.0011	-0.0001	0.0004

Notes: ***, **, * denotes significance at 1%, 5% and 10% level

SECTION IV

Impulse Response Function from Local Projections – Full Country Panel

Gini - Response to Cholesky One S.D 95% Conditional Confidence Bands

PANEL 1

FIGURE 1

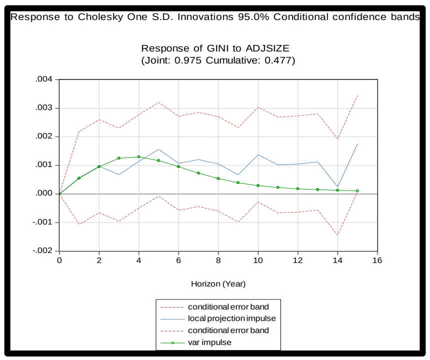


FIGURE 2

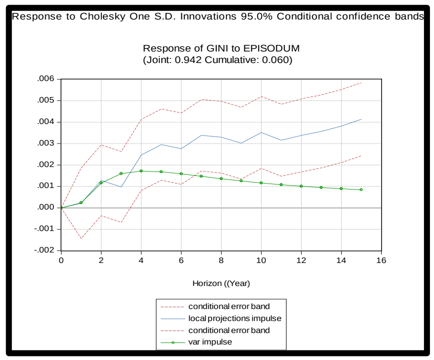


FIGURE 3

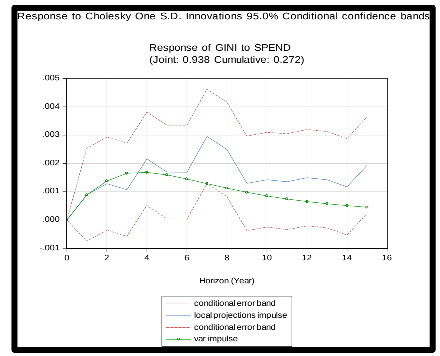


FIGURE 4

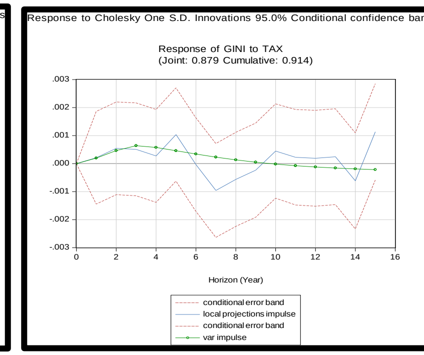


FIGURE 5

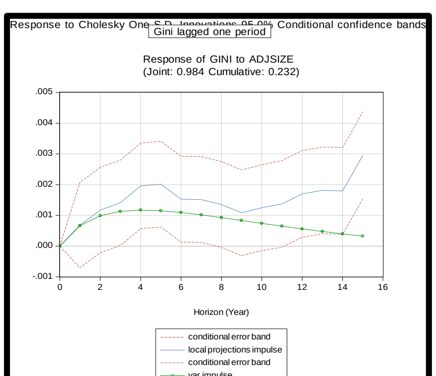


FIGURE 6

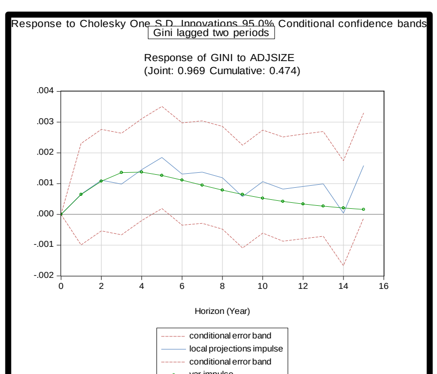


FIGURE 7

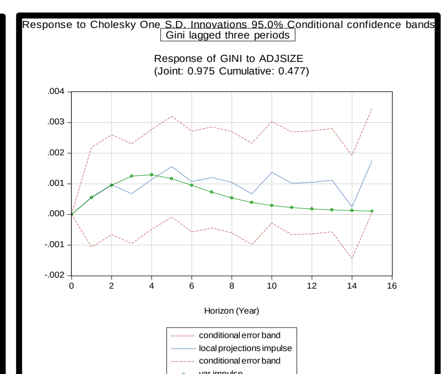
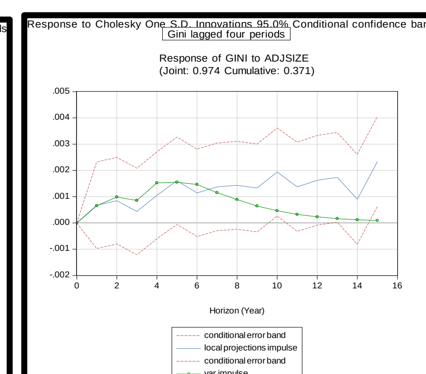


FIGURE 8



Labour Income Share - Response to Cholesky One S.D 95% Conditional Confidence Bands

PANEL 1

PANEL 2

FIGURE 9

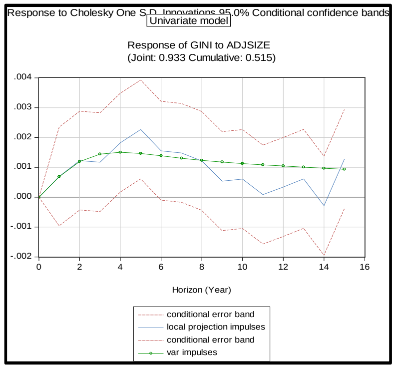


FIGURE 1

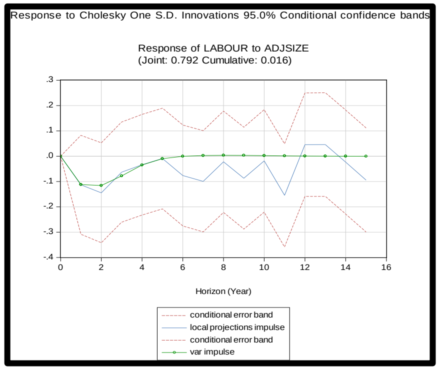


FIGURE 2

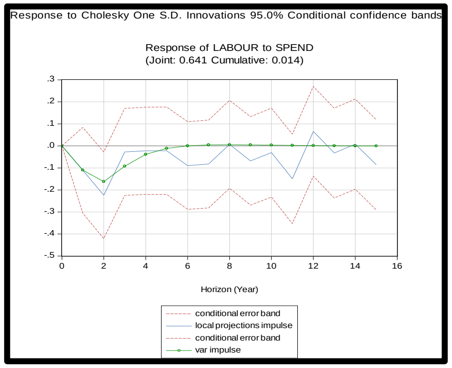
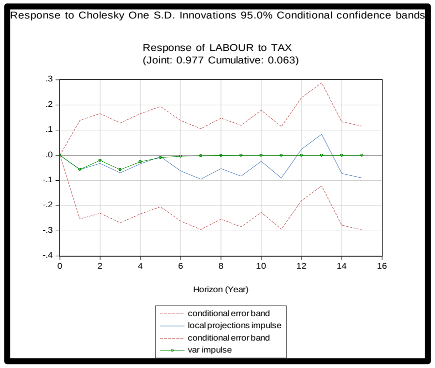


FIGURE 3



TOP 1 Income Share - Response to Cholesky One S.D 95% Conditional Confidence Bands

FIGURE 4

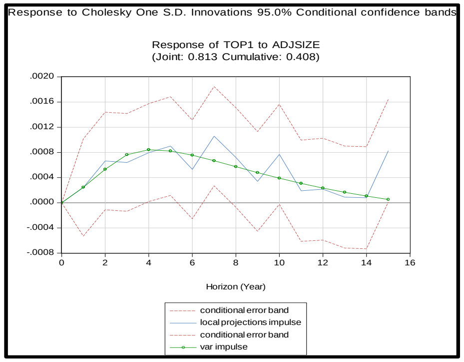


FIGURE 5

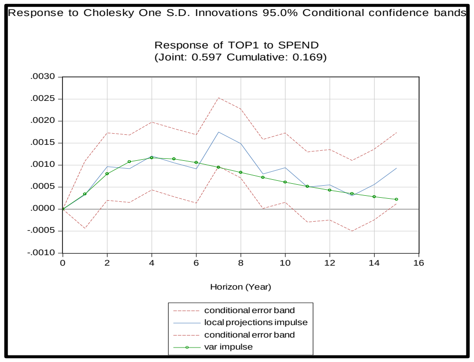
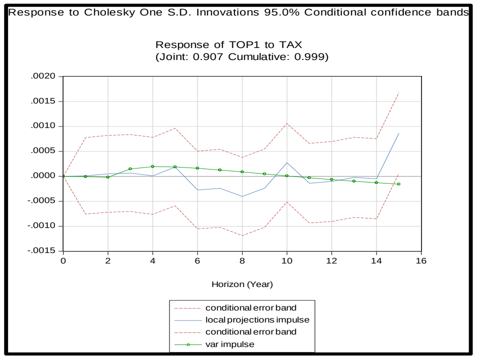


FIGURE 6



BOTTOM40 Income Share - Response to Cholesky One S.D 95% Conditional Confidence Bands

FIGURE 7

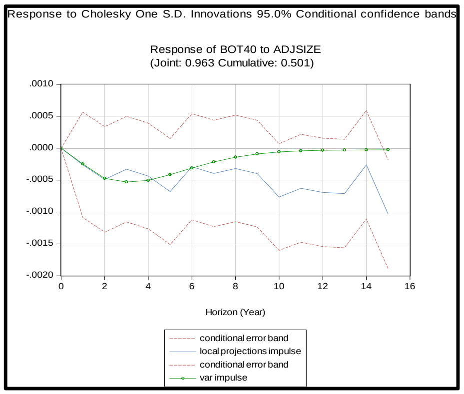


FIGURE 8

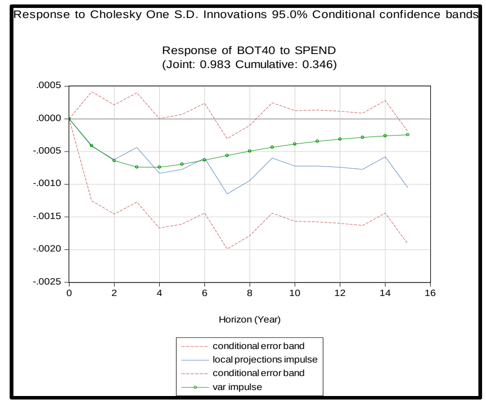
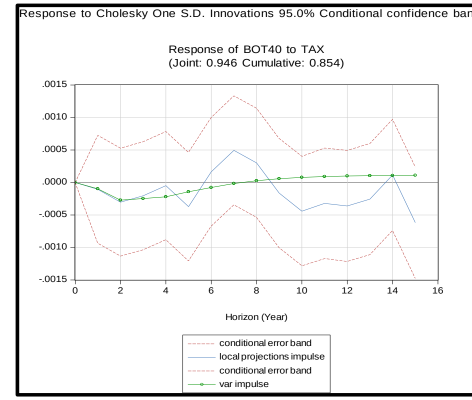


FIGURE 9



LARGE ADJUSTMENT-SIZED COUNTRIES

Gini & Labour Share - Response to Cholesky One S.D 95% Conditional Confidence Bands

PANEL 4

FIGURE 1

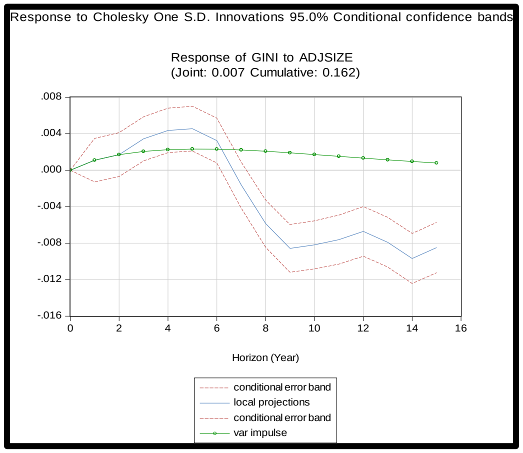


FIGURE 2

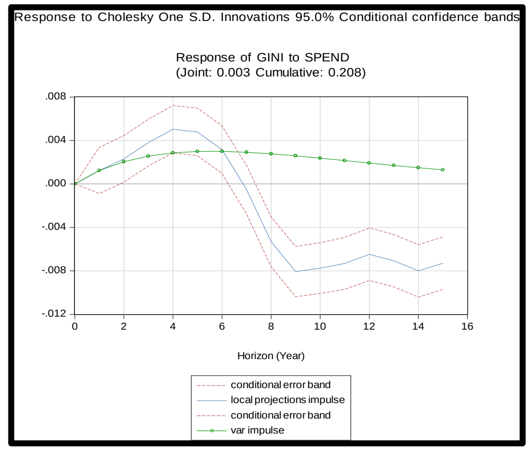


FIGURE 3

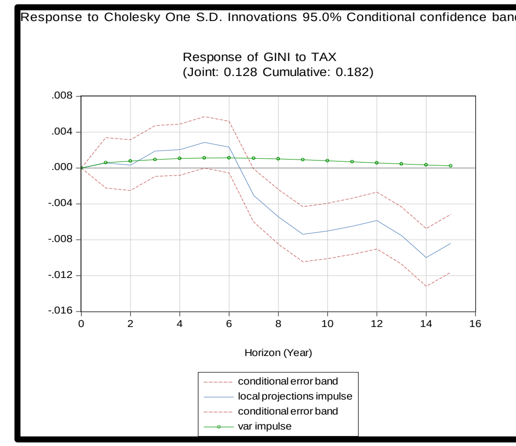


FIGURE 4

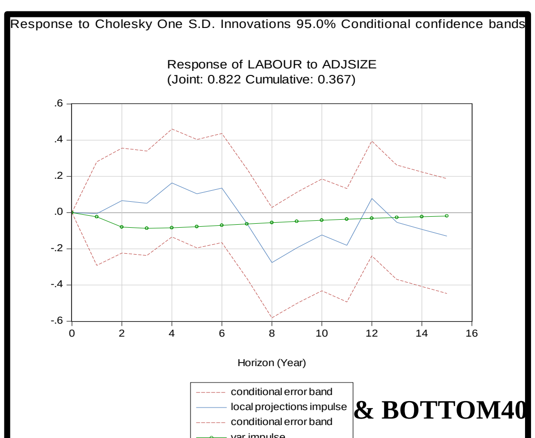


FIGURE 5

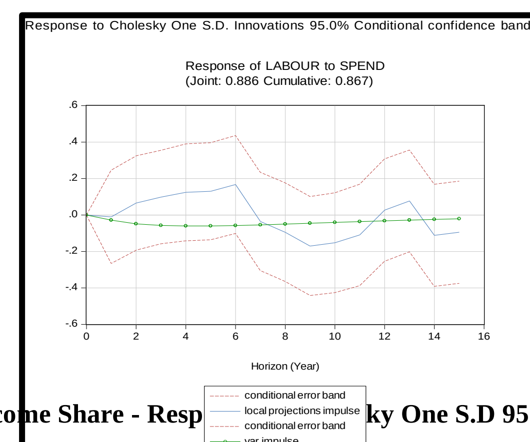
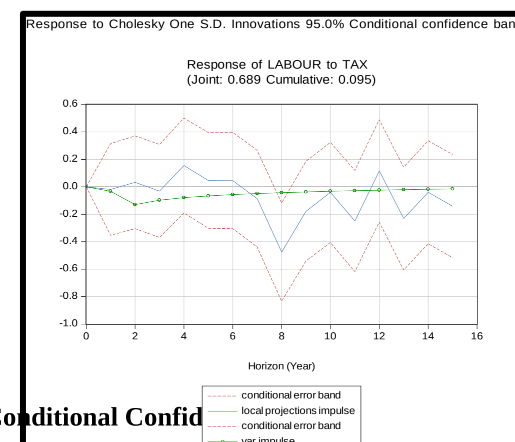


FIGURE 6



& BOTTOM40 Income Share - Resp ky One S.D 95% Conditional Confid

FIGURE 7

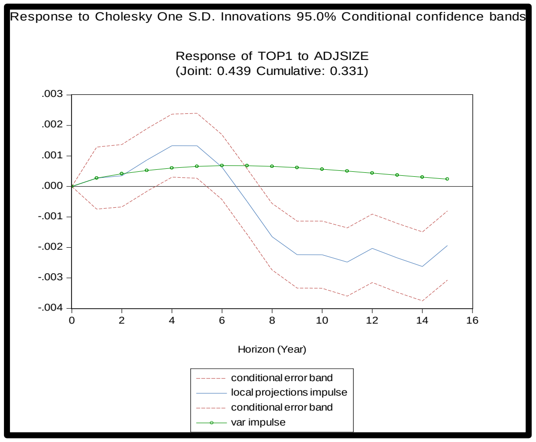


FIGURE 8

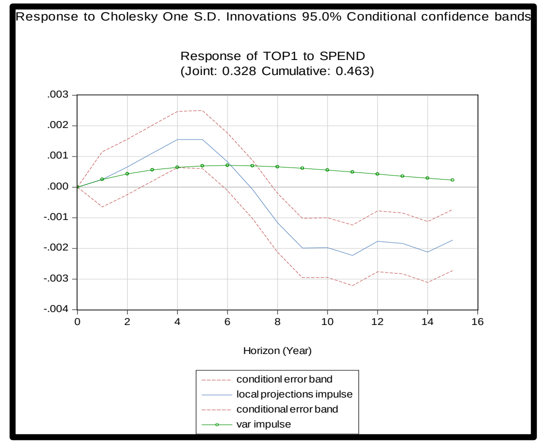


FIGURE 9

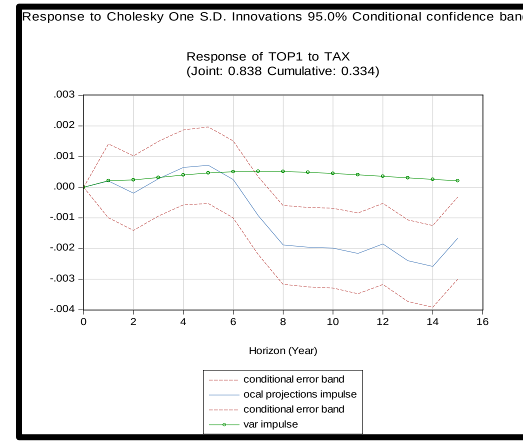


FIGURE 10

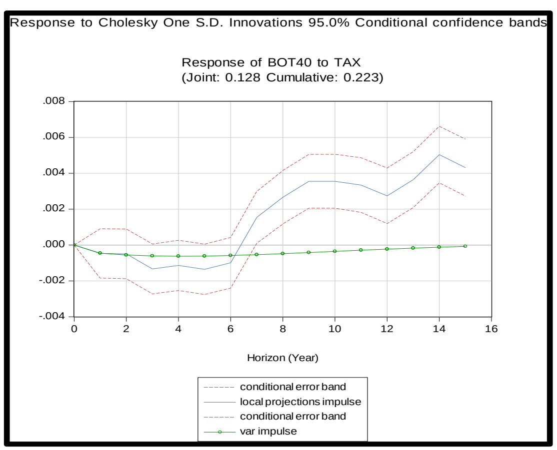


FIGURE 11

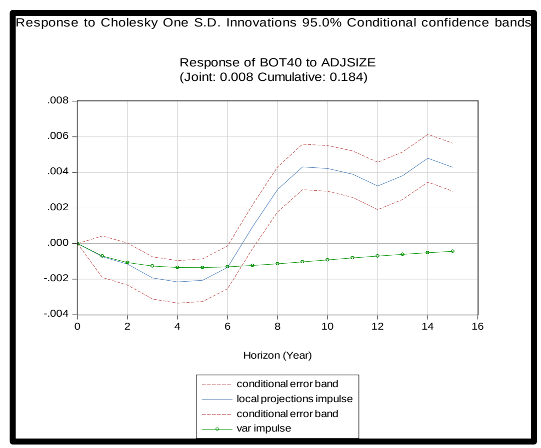
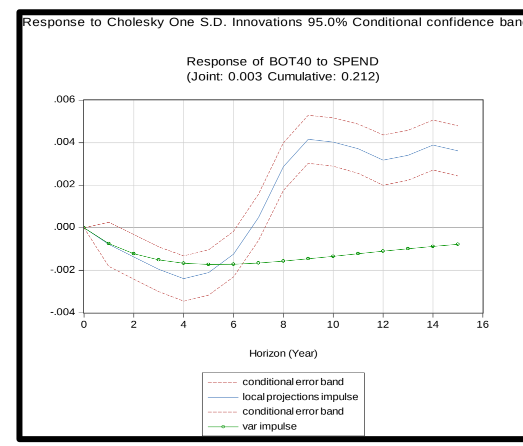


FIGURE 12



SMALL ADJUSTMENT-SIZED COUNTRIES

Gini & Labour Income Share - Response to Cholesky One S.D 95% Conditional Confidence Bands

PANEL 5

FIGURE 1

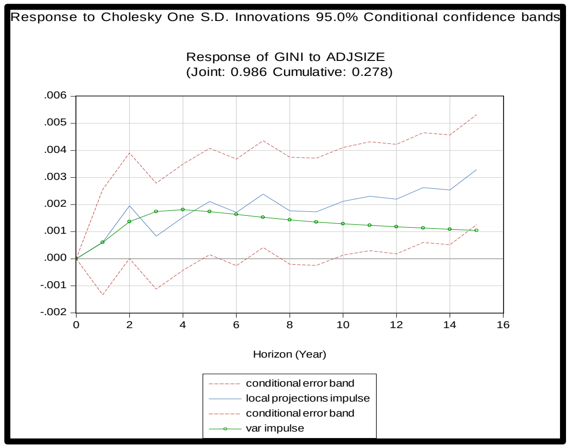


FIGURE 2

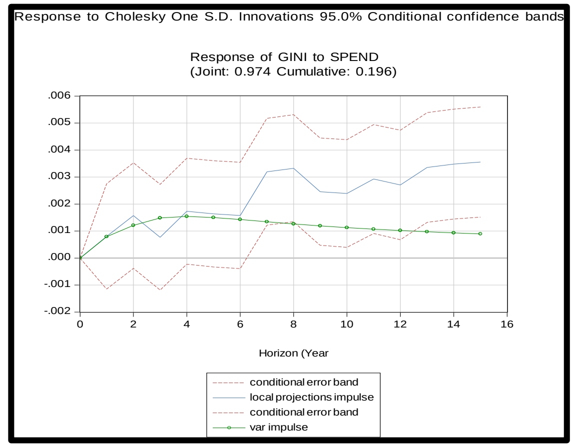


FIGURE 3

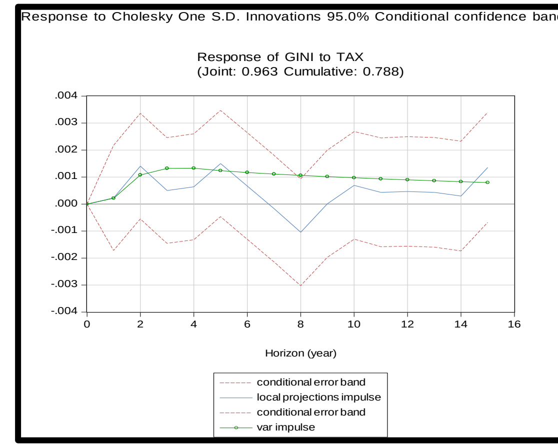


FIGURE 4

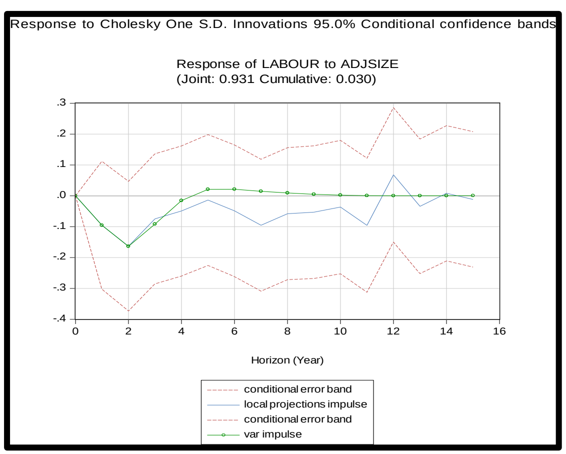


FIGURE 5

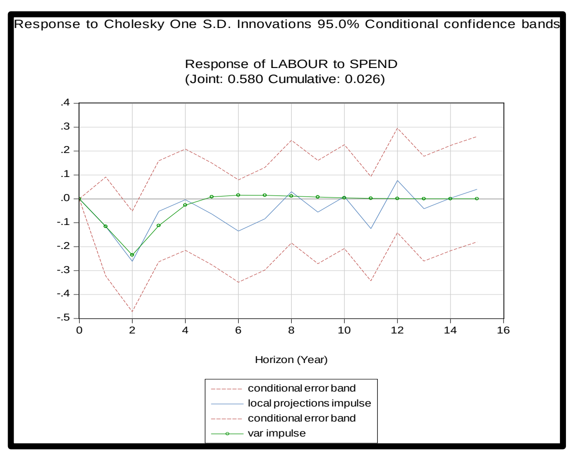
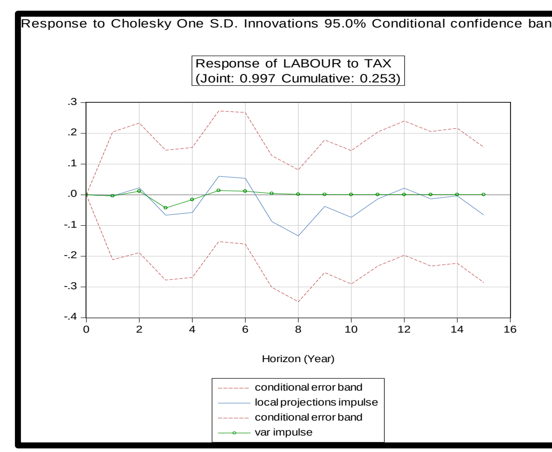


FIGURE 6



TOP 1 & BOTTOM40 Income Share - Response to Cholesky One S.D 95% Conditional Confidence Bands

FIGURE 7

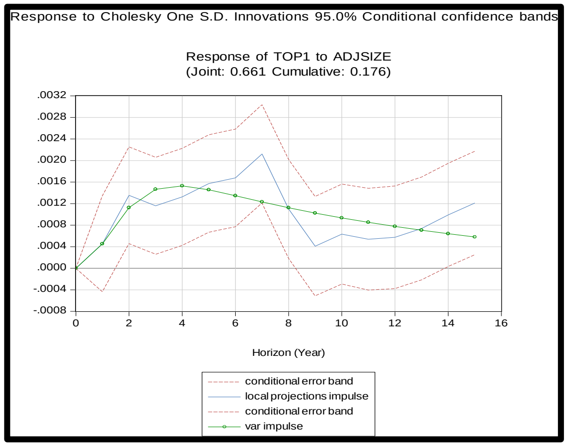


FIGURE 8

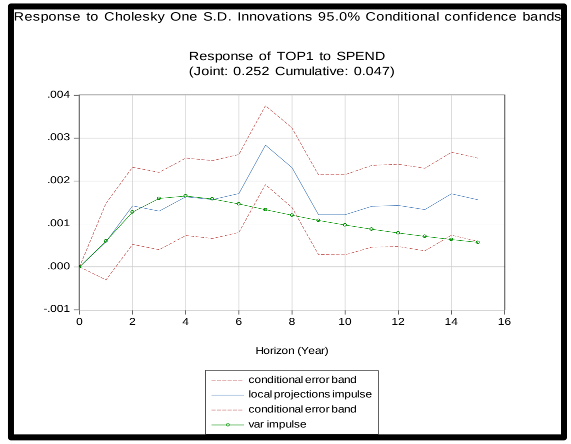


FIGURE 9

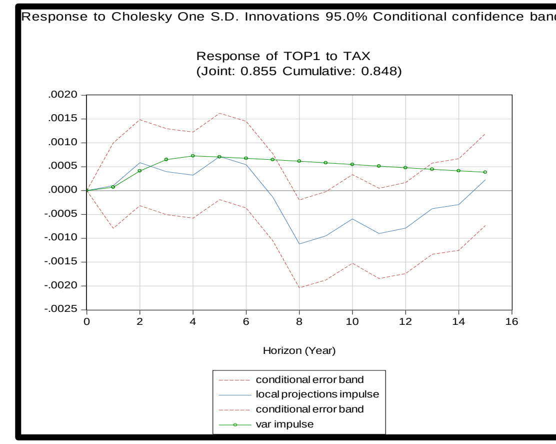


FIGURE 10

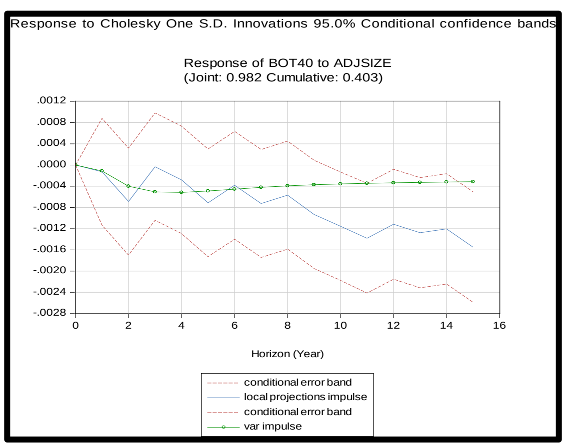
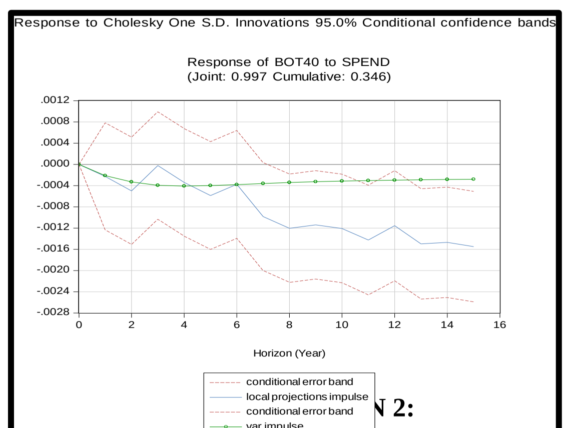
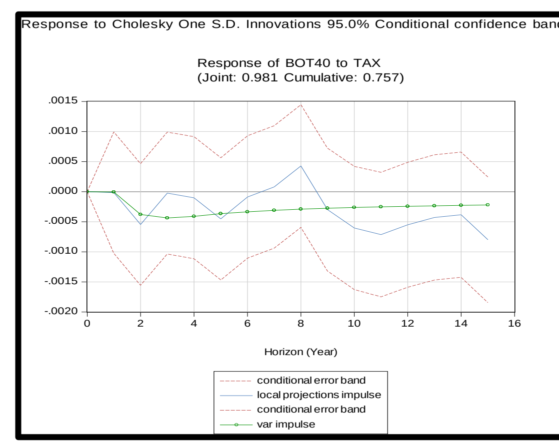


FIGURE 11



N 2:

FIGURE 12



ESTIMATION 2:

SMALL ADJUSTMENT-SIZED COUNTRIES

Gini & Labour Income Share - Response to Cholesky One S.D 95% Conditional Confidence Bands

PANEL 6

FIGURE 1

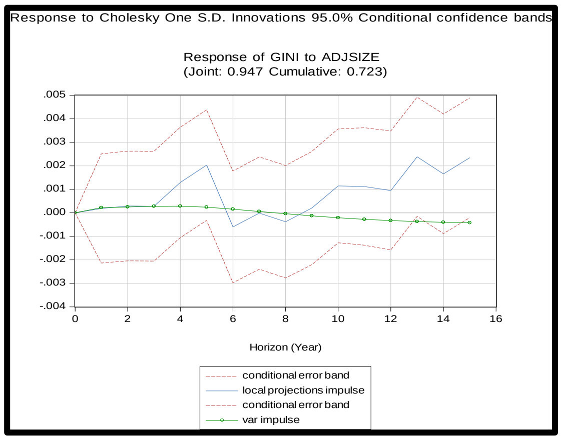


FIGURE 2

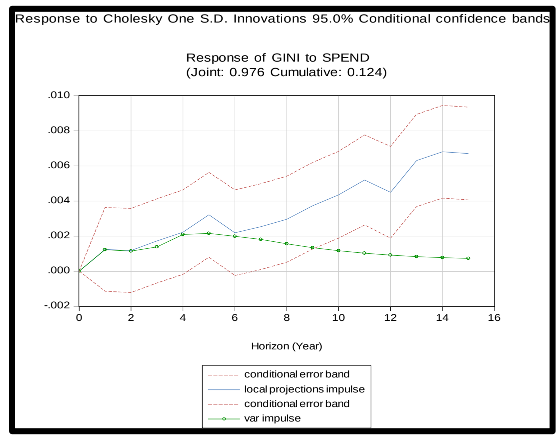


FIGURE 3

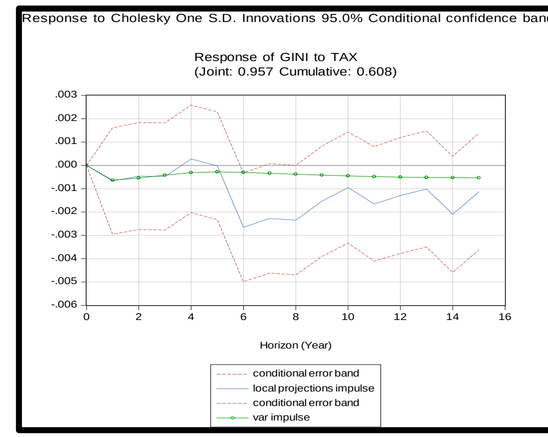


FIGURE 4

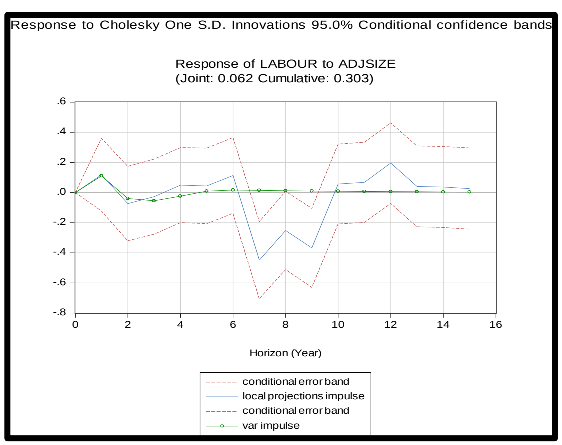


FIGURE 5

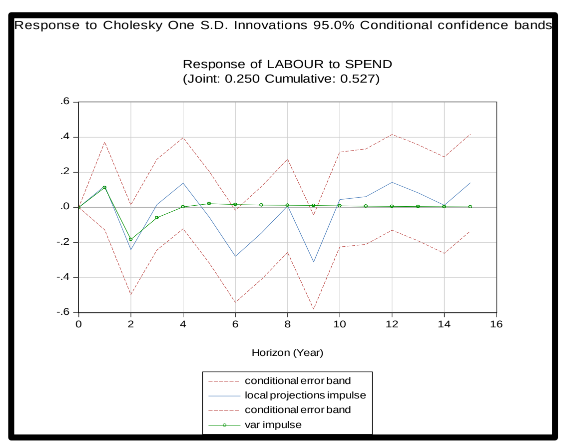
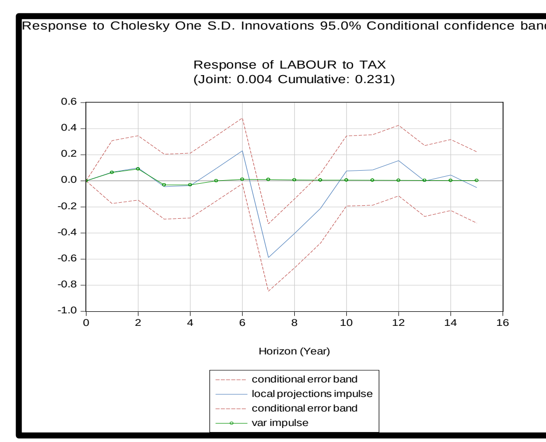


FIGURE 6



TOP 1 & BOTTOM40 Income Share - Response to Cholesky One S.D 95% Conditional Confidence Bands

FIGURE 7

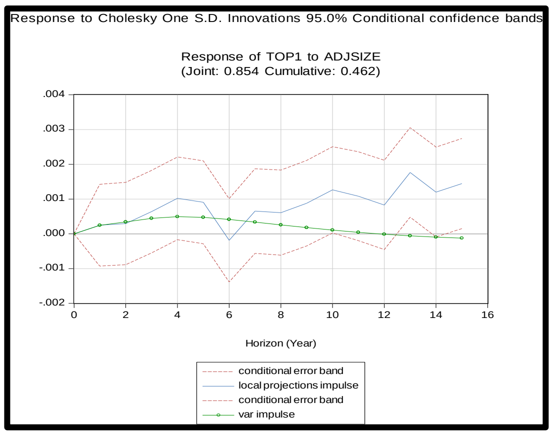


FIGURE 8

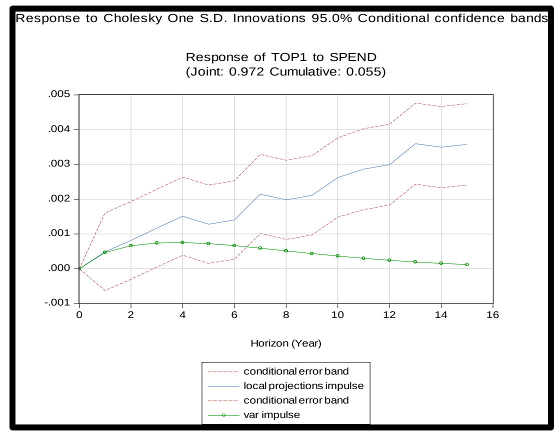


FIGURE 9

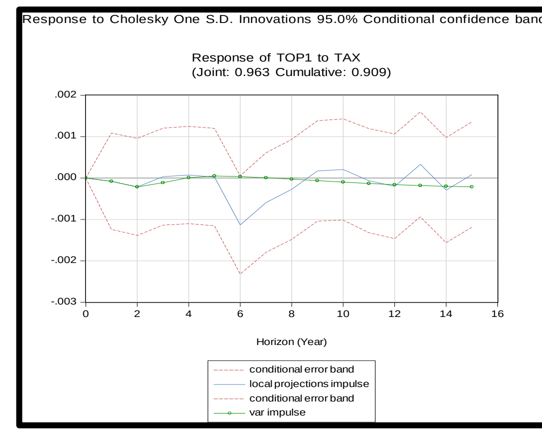


FIGURE 10

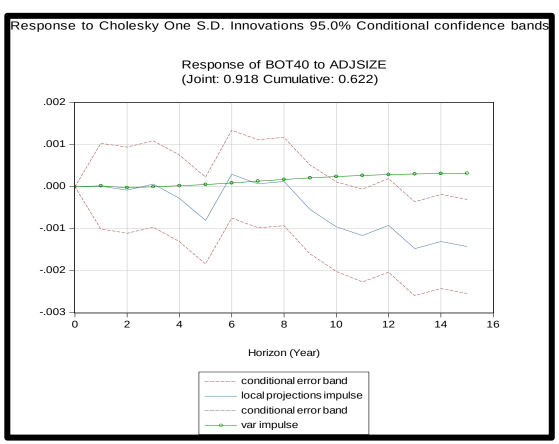


FIGURE 11

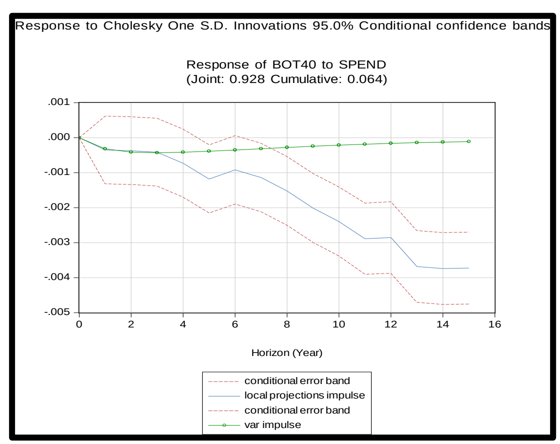
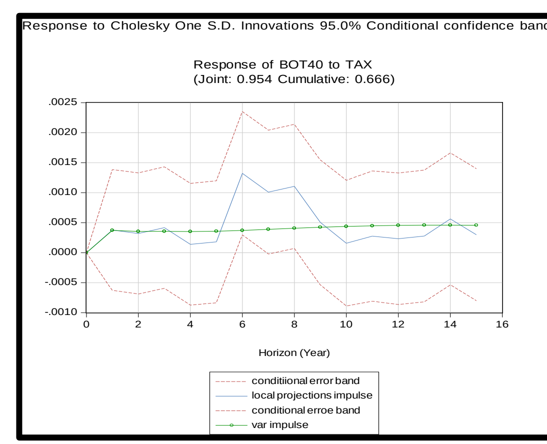


FIGURE 12



SECTION V

Table 1: **Panel ARDL: Full Sample + Control Variables**

Dependent Variable: D(GINI)
Method: ARDL
Included observations: 608
Selected Model: ARDL (2, 1, 1, 1, 1, 1, 1, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long Run Equation				
ADJSIZE	0.00651	0.00294	2.21686	0.0271
INFLATION	-0.00180	0.00102	-1.76061	0.0790
UNEMP	0.00615	0.00125	4.89925	0.0000
TRADE	-0.00148	0.00029	-5.18197	0.0000
GDPG	0.00664	0.00177	3.74560	0.0002
INTUSERS	0.00086	0.00012	7.04976	0.0000
DEPRAT	0.00035	0.00051	0.67693	0.4988
UNIONDEN	-0.00038	0.00038	-1.00848	0.3138
EDUEXP	-0.00326	0.00246	-1.32408	0.1862
Short Run Equation				
COINTEQ01	-0.23022	0.04708	-4.89026	0.0000
D(GINI(-1))	-0.24897	0.04822	-5.16334	0.0000
D(ADJSIZE)	-0.00347	0.00138	-2.52007	0.0121
D(INFLATION)	0.00104	0.00045	2.31043	0.0213
D(UNEMP)	-0.00015	0.00056	-0.26204	0.7934
D(TRADE)	-0.00013	0.00025	-0.50831	0.6115
D(GDPG)	-0.00023	0.00031	-0.73302	0.4639
D(INTUSERS)	0.00007	0.00020	0.35862	0.7200
D(DEPRAT)	-0.00097	0.00151	-0.64257	0.5208
D(UNIONDEN)	-0.00081	0.00105	-0.76999	0.4417
D(EDUEXP)	0.00188	0.00329	0.57199	0.5676
C	0.09974	0.02089	4.77574	0.0000
Mean dependent var	0.00140	S.D. dependent var		0.0120
S.E. of regression	0.01052	Akaike info criterion		-5.8746
Sum squared resid	0.04859	Schwarz criterion		-4.4734
Log likelihood	2080.86300	Hannan-Quinn criter.		-5.3307

Dependent Variable: D(GINI)
Method: ARDL
Included observations: 608
Selected Model: ARDL (2, 1, 1, 1, 1, 1, 1, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long Run Equation				
SPEND	0.01393	0.00379	3.67475	0.0003
INFLATION	-0.00201	0.00082	-2.46130	0.0142
UNEMP	0.00379	0.00091	4.15542	0.0000
TRADE	-0.00085	0.00026	-3.27491	0.0011
GDPG	0.00454	0.00139	3.26991	0.0012
INTUSERS	0.00054	0.00009	5.90357	0.0000
DEPRAT	0.00137	0.00053	2.58498	0.0101
UNIONDEN	-0.00093	0.00032	-2.90659	0.0038
EDUEXP	-0.00817	0.00234	-3.48329	0.0005
Short Run Equation				
COINTEQ01	-0.27524	0.05839	-4.71400	0.0000
D(GINI (-1))	-0.20948	0.05351	-3.91447	0.0001
D(SPEND)	-0.00377	0.00170	-2.21616	0.0272
D(INFLATION)	0.00097	0.00050	1.95181	0.0516
D(UNEMP)	-0.00008	0.00052	-0.15274	0.8787
D(TRADE)	-0.00021	0.00025	-0.85643	0.3922
D(GDPG)	0.00003	0.00031	0.08682	0.9309
D(INTUSERS)	0.00007	0.00022	0.33577	0.7372
D(DEPRAT)	-0.00176	0.00163	-1.07758	0.2818
D(UNIONDEN)	-0.00102	0.00125	-0.80950	0.4187
D(EDUEXP)	0.00388	0.00370	1.04841	0.2950
C	0.11536	0.02622	4.39990	0.0000
Mean dependent var	0.00140	S.D. dependent var		0.0120
S.E. of regression	0.01044	Akaike info criterion		-5.8646
Sum squared resid	0.04786	Schwarz criterion		-4.4634
Log likelihood	2077.68000	Hannan-Quinn criter.		-5.3208

Table 1: **Panel ARDL: Full Sample + Control Variables Contd.**

Dependent Variable: D(GINI)				
Method: ARDL				
Included observations: 608				
Selected Model: ARDL (2, 1, 1, 1, 1, 1, 1, 1, 1)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
	Long Run Equation			
TAX	0.00576	0.00353	1.63386	0.1030
INFLATION	-0.00067	0.00051	-1.30189	0.1936
UNEMP	-0.00184	0.00053	-3.47932	0.0006
TRADE	-0.00005	0.00008	-0.61251	0.5405
GDPG	0.00134	0.00055	2.42741	0.0156
INTUSERS	0.00048	0.00005	9.91495	0.0000
DEPRAT	-0.00023	0.00033	-0.70392	0.4819
UNIONDEN	0.00038	0.00033	1.15288	0.2496
EDUEXP	0.00580	0.00115	5.02791	0.0000
	Short Run Equation			
COINTEQ01	-0.30591	0.09133	-3.34947	0.0009
D(GINI (-1))	-0.17171	0.05530	-3.10524	0.0020
D(TAX)	-0.00482	0.00236	-2.04304	0.0416
D(INFLATION)	0.00063	0.00051	1.21545	0.2248
D(UNEMP)	-0.00035	0.00057	-0.61106	0.5415
D(TRADE)	-0.00021	0.00023	-0.90618	0.3653
D(GDPG)	0.00055	0.00034	1.60917	0.1083
D(INTUSERS)	0.00011	0.00013	0.87327	0.3830
D(DEPRAT)	0.00085	0.00221	0.38235	0.7024
D(UNIONDEN)	-0.00160	0.00111	-1.43502	0.1520
D(EDUEXP)	0.00488	0.00421	1.15933	0.2470
C	0.11257	0.03328	3.38312	0.0008
Mean dependent var	0.00140	S.D. dependent var		0.0120
S.E. of regression	0.01036	Akaike info criterion		-5.8799
Sum squared resid	0.04709	Schwarz criterion		-4.4787
Log likelihood	2082.55800	Hannan-Quinn criter.		-5.3360

Table 2. Labour Share

Dependent Variable: D(LABOUR)
Method: ARDL
Included observations: 608
Selected Model: ARDL (2, 2, 2, 2, 2, 2, 2, 2, 2, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
		Long Run Equation		
ADJSIZE	-1.88943	0.46217	-4.08815	0.0001
INFLATION	-0.64255	0.13713	-4.68560	0.0000
UNEMP	-1.02209	0.15392	-6.64032	0.0000
TRADE	0.18929	0.04872	3.88515	0.0001
GDPG	-0.79946	0.21640	-3.69443	0.0003
INTUSERS	-0.13578	0.01441	-9.42541	0.0000
DEPRAT	0.22952	0.05846	3.92636	0.0001
EDUEXP	0.70560	0.30925	2.28166	0.0232
UNIONDEN	-0.09729	0.07535	-1.29117	0.1977
		Short Run Equation		
COINTEQ01	-0.16008	0.05372	-2.98007	0.0031
D(LABOUR(-1))	0.04382	0.09399	0.46619	0.6414
D(ADJSIZE)	0.16941	0.13842	1.22388	0.2220
D(ADJSIZE(-1))	0.12087	0.11497	1.05128	0.2940
D(INFLATION)	0.07579	0.06112	1.23998	0.2160
D(INFLATION(-1))	0.03382	0.05611	0.60269	0.5472
D(UNEMP)	-0.02355	0.11680	-0.20165	0.8403
D(UNEMP(-1))	0.04751	0.13827	0.34359	0.7314
D(TRADE)	-0.03013	0.03521	-0.85573	0.3928
D(TRADE(-1))	-0.01175	0.01870	-0.62835	0.5303
D(GDPG)	-0.15671	0.04025	-3.89290	0.0001
D(GDPG(-1))	-0.01724	0.03235	-0.53283	0.5946
D(INTUSERS)	-0.01455	0.02076	-0.70086	0.4839
D(INTUSERS(-1))	0.00831	0.01888	0.44015	0.6601
D(DEPRAT)	0.66717	0.53812	1.23983	0.2160
D(DEPRAT(-1))	-0.49893	0.50512	-0.98776	0.3241
D(EDUEXP)	0.62590	0.28636	2.18570	0.0296
D(EDUEXP(-1))	0.15077	0.30333	0.49705	0.6195
D(UNIONDEN)	0.25629	0.14802	1.73143	0.0844
D(UNIONDEN(-1))	-0.01518	0.13455	-0.11284	0.9102
C	11.1524	3.88017	2.87421	0.0043
Mean dependent var	-0.0582	S.D. dependent var		1.40434
S.E. of regression	0.8181	Akaike info criterion		2.55524
Sum squared resid	197.4221	Schwarz criterion		4.96025
Log likelihood	-472.6771	Hannan-Quinn criter.		3.48874

Dependent Variable: D(LABOUR)
Method: ARDL
Included observations: 608
Selected Model: ARDL (2, 2, 2, 2, 2, 2, 2, 2, 2, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
		Long Run Equation		
SPEND	-3.81133	0.46145	-8.25947	0.0000
INFLATION	-0.39831	0.07693	-5.17778	0.0000
UNEMP	-0.56619	0.09187	-6.16274	0.0000
TRADE	-0.07559	0.00856	-8.83545	0.0000
GDPG	-1.05509	0.13702	-7.70021	0.0000
INTUSERS	-0.04161	0.00721	-5.77141	0.0000
DEPRAT	0.55840	0.04334	12.88368	0.0000
EDUEXP	1.32256	0.28351	4.66492	0.0000
UNIONDEN	-0.02432	0.05871	-0.41428	0.6790
		Short Run Equation		
COINTEQ01	-0.20374	0.07377	-2.76190	0.0061
D(LABOUR(-1))	0.12306	0.07324	1.68026	0.0940
D(SPEND)	0.24353	0.29613	0.82238	0.4115
D(SPEND(-1))	0.12699	0.14999	0.84668	0.3979
D(INFLATION)	0.12078	0.06356	1.90020	0.0584
D(INFLATION(-1))	0.04754	0.06765	0.70277	0.4828
D(UNEMP)	0.10591	0.13112	0.80772	0.4199
D(UNEMP(-1))	-0.07896	0.07892	-1.00059	0.3178
D(TRADE)	0.00692	0.03558	0.19440	0.8460
D(TRADE(-1))	0.01228	0.01850	0.66362	0.5075
D(GDPG)	-0.09372	0.06604	-1.41907	0.1569
D(GDPG(-1))	-0.01017	0.03940	-0.25817	0.7965
D(INTUSERS)	-0.03662	0.02088	-1.75374	0.0805
D(INTUSERS(-1))	0.00594	0.01428	0.41563	0.6780
D(DEPRAT)	0.67513	0.32610	2.07031	0.0393
D(DEPRAT(-1))	-0.83655	0.31227	-2.67889	0.0078
D(EDUEXP)	-0.29630	0.72903	-0.40643	0.6847
D(EDUEXP(-1))	-0.85668	0.39164	-2.18745	0.0295
D(UNIONDEN)	0.26226	0.17780	1.47505	0.1413
D(UNIONDEN(-1))	-0.02983	0.13962	-0.21368	0.8309
C	12.7516	4.96820	2.56664	0.0108
Mean dependent var	-0.0582	S.D. dependent var		1.40434
S.E. of regression	0.7878	Akaike info criterion		2.49283
Sum squared resid	183.0797	Schwarz criterion		4.89784
Log likelihood	-452.7066	Hannan-Quinn criter.		3.42634

Table 2. Labour Share Contd.

Dependent Variable: D(LABOUR)				
Method: ARDL				
Included observations: 608				
Selected Model: ARDL (2, 2, 2, 2, 2, 2, 2, 2, 2, 2)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
Long Run Equation				
TAX	-8.31979	1.18588	-7.01573	0.0000
INFLATION	-0.69132	0.12618	-5.47907	0.0000
UNEMP	-1.03076	0.16938	-6.08562	0.0000
GDPG	-0.35499	0.22097	-1.60651	0.1092
TRADE	0.10859	0.04321	2.51300	0.0125
INTUSERS	-0.12004	0.01410	-8.51144	0.0000
DEPRAT	0.52325	0.11143	4.69597	0.0000
EDUEXP	1.59149	0.33557	4.74259	0.0000
UNIONDEN	0.08024	0.05237	1.53224	0.1265
Short Run Equation				
COINTEQ01	-0.18557	0.07501	-2.47409	0.0139
D(LABOUR(-1))	0.04946	0.09076	0.54497	0.5862
D(TAX)	1.00944	0.46384	2.17630	0.0303
D(TAX(-1))	0.59160	0.32170	1.83897	0.0669
D(INFLATION)	0.04730	0.06113	0.77385	0.4396
D(INFLATION(-1))	0.03714	0.04728	0.78555	0.4328
D(UNEMP)	-0.03090	0.12040	-0.25665	0.7976
D(UNEMP(-1))	-0.01190	0.09987	-0.11913	0.9053
D(GDPG)	-0.20447	0.03843	-5.32124	0.0000
D(GDPG(-1))	-0.04388	0.03429	-1.27963	0.2017
D(TRADE)	-0.01547	0.03691	-0.41917	0.6754
D(TRADE(-1))	-0.00931	0.02081	-0.44721	0.6551
D(INTUSERS)	-0.02396	0.02507	-0.95562	0.3400
D(INTUSERS(-1))	0.00268	0.02503	0.10725	0.9147
D(DEPRAT)	0.20812	0.96723	0.21517	0.8298
D(DEPRAT(-1))	-0.20732	0.78784	-0.26314	0.7926
D(EDUEXP)	0.45593	0.30786	1.48098	0.1397
D(EDUEXP(-1))	-0.04586	0.28498	-0.16091	0.8723
D(UNIONDEN)	0.23846	0.15376	1.55084	0.1220
D(UNIONDEN(-1))	-0.06561	0.17858	-0.36742	0.7136
C	9.0372	3.76206	2.40221	0.0169
Mean dependent var	-0.0582	S.D. dependent var		1.40434
S.E. of regression	0.8059	Akaike info criterion		2.52661
Sum squared resid	191.5978	Schwarz criterion		4.93162
Log likelihood	-463.5156	Hannan-Quinn criter.		3.46011

Table 3. TOP1 Income Share

Dependent Variable: D(TOP1)
Method: ARDL
Included observations: 608
Selected Model: ARDL (2, 1, 1, 1, 1, 1, 1, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
		Long Run Equation		
ADJSIZE	0.00026	0.00101	0.26057	0.7945
INFLATION	-0.00358	0.00062	-5.74187	0.0000
UNEMP	0.00119	0.00044	2.70064	0.0072
TRADE	-0.00025	0.00012	-2.06065	0.0399
GDPG	0.00668	0.00105	6.37531	0.0000
INTUSERS	0.00022	0.00006	3.68514	0.0003
DEPRAT	0.00044	0.00033	1.34412	0.1796
UNIONDEN	-0.00109	0.00019	-5.82243	0.0000
EDUEXP	0.00270	0.00111	2.43852	0.0151
		Short Run Equation		
COINTEQ01	-0.23555	0.04565	-5.16029	0.0000
D(TOP1(-1))	-0.15150	0.04477	-3.38437	0.0008
D(ADJSIZE)	-0.00130	0.00140	-0.92338	0.3563
D(INFLATION)	0.00068	0.00036	1.89277	0.0590
D(UNEMP)	0.00057	0.00055	1.03072	0.3032
D(TRADE)	-0.00007	0.00020	-0.37192	0.7101
D(GDPG)	-0.00006	0.00024	-0.26532	0.7909
D(INTUSERS)	-0.00003	0.00013	-0.19716	0.8438
D(DEPRAT)	-0.00265	0.00094	-2.83398	0.0048
D(UNIONDEN)	-0.00059	0.00094	-0.62716	0.5309
D(EDUEXP)	-0.00091	0.00152	-0.60016	0.5487
C	0.02148	0.00451	4.76765	0.0000
Mean dependent var	0.00088	S.D. dependent var		0.00756
S.E. of regression	0.00623	Akaike info criterion		-6.83007
Sum squared resid	0.01706	Schwarz criterion		-5.42889
Log likelihood	2386.62200	Hannan-Quinn criter.		-6.28620

Dependent Variable: D(TOP1)
Method: ARDL
Included observations: 608
Selected Model: ARDL (2, 2, 2, 2, 2, 2, 2, 2, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
		Long Run Equation		
SPEND	-0.00060	0.00084	-0.71519	0.4751
INFLATION	-0.00008	0.00024	-0.32530	0.7452
UNEMP	0.00152	0.00019	8.08983	0.0000
TRADE	0.00047	0.00012	3.99266	0.0001
GDPG	-0.00039	0.00044	-0.89632	0.3708
INTUSERS	-0.00013	0.00005	-2.67754	0.0078
DEPRAT	0.00040	0.00029	1.36793	0.1724
UNIONDEN	-0.00251	0.00020	-12.90734	0.0000
EDUEXP	0.00459	0.00180	2.54655	0.0114
		Short Run Equation		
COINTEQ01	-0.33913	0.08775	-3.86485	0.0001
D(TOP1(-1))	-0.13103	0.06775	-1.93418	0.0540
D(SPEND)	0.00002	0.00176	0.00987	0.9921
D(SPEND(-1))	0.00087	0.00151	0.57829	0.5635
D(INFLATION)	0.00054	0.00052	1.03583	0.3011
D(INFLATION(-1))	0.00030	0.00031	0.95948	0.3381
D(UNEMP)	-0.00024	0.00074	-0.32118	0.7483
D(UNEMP(-1))	-0.00084	0.00131	-0.64235	0.5211
D(TRADE)	-0.00022	0.00021	-1.04340	0.2976
D(TRADE(-1))	-0.00002	0.00010	-0.15689	0.8754
D(GDPG)	0.00114	0.00033	3.47812	0.0006
D(GDPG(-1))	0.00043	0.00016	2.65378	0.0084
D(INTUSERS)	0.00023	0.00015	1.60088	0.1105
D(INTUSERS(-1))	-0.00018	0.00012	-1.56530	0.1186
D(DEPRAT)	-0.00064	0.00374	-0.17121	0.8642
D(DEPRAT(-1))	-0.00288	0.00426	-0.67650	0.4993
D(UNIONDEN)	0.00059	0.00110	0.53236	0.5949
D(UNIONDEN(-1))	-0.00093	0.00091	-1.02082	0.3082
D(EDUEXP)	-0.00163	0.00231	-0.70343	0.4823
D(EDUEXP(-1))	-0.00064	0.00211	-0.30251	0.7625
C	0.03211	0.00827	3.88116	0.0001
Mean dependent var	0.00088	S.D. dependent var		0.00756
S.E. of regression	0.00626	Akaike info criterion		-6.82300
Sum squared resid	0.01154	Schwarz criterion		-4.41799
Log likelihood	2528.35900	Hannan-Quinn criter.		-5.88950

Table 3. TOP1 Income Share Contd.

Dependent Variable: D(TOP1)
Method: ARDL
Included observations: 608
Selected Model: ARDL (2, 1, 1, 1, 1, 1, 1, 1, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long Run Equation				
TAX	0.00394	0.00284	1.38603	0.1664
INFLATION	-0.00337	0.00069	-4.86555	0.0000
UNEMP	0.00187	0.00048	3.91838	0.0001
TRADE	-0.00012	0.00014	-0.87216	0.3836
GDPG	0.00607	0.00113	5.38309	0.0000
INTUSERS	0.00018	0.00007	2.47166	0.0138
DEPRAT	0.00052	0.00035	1.46260	0.1443
UNIONDEN	-0.00116	0.00025	-4.68490	0.0000
EDUEXP	0.00188	0.00127	1.48431	0.1384
Short Run Equation				
COINTEQ01	-0.23417	0.04047	-5.78622	0.0000
D(TOP1(-1))	-0.14783	0.04230	-3.49506	0.0005
D(TAX)	-0.00277	0.00239	-1.16005	0.2467
D(INFLATION)	0.00087	0.00040	2.15047	0.0321
D(UNEMP)	0.00018	0.00060	0.29572	0.7676
D(TRADE)	-0.00013	0.00021	-0.61665	0.5378
D(GDPG)	-0.00003	0.00022	-0.15070	0.8803
D(INTUSERS)	0.00003	0.00012	0.26251	0.7931
D(DEPRAT)	-0.00273	0.00089	-3.08024	0.0022
D(UNIONDEN)	-0.00052	0.00099	-0.51935	0.6038
D(EDUEXP)	-0.00048	0.00151	-0.31652	0.7518
C	0.01911	0.00382	5.00631	0.0000

Mean dependent var	0.00088	S.D. dependent var	0.00756
S.E. of regression	0.00616	Akaike info criterion	-6.81765
Sum squared resid	0.01664	Schwarz criterion	-5.41647
Log likelihood	2382.64800	Hannan-Quinn criter.	-6.27379

Table 4. Palma Ratio

Dependent Variable: D(PALMA)
Method: ARDL
Included observations: 532
Selected Model: ARDL (2, 1, 1, 1, 1, 1, 1, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
		Long Run Equation		
ADJSIZE	0.21407	0.04997	4.28435	0.0000
INFLATION	-0.03421	0.01310	-2.61194	0.0093
UNEMP	-0.04732	0.01866	-2.53639	0.0116
TRADE	0.00187	0.00536	0.34877	0.7274
INTUSERS	0.01155	0.00225	5.13498	0.0000
DEPRAT	0.02095	0.00935	2.24161	0.0255
UNIONDEN	0.033 45	0.00960	3.48458	0.0005
EDUEXP	-0.35194	0.04115	-8.55292	0.0000
		Short Run Equation		
COINTEQ01	-0.01715	0.01014	-1.69238	0.0914
D(PALMA(-1))	-0.07607	0.11253	-0.67599	0.4994
D(ADJSIZE)	-0.00213	0.00205	-1.03983	0.2990
D(INFLATION)	0.00017	0.00079	0.22179	0.8246
D(UNEMP)	0.00333	0.00205	1.62953	0.1040
D(TRADE)	-0.00002	0.00056	-0.04102	0.9673
D(INTUSERS)	-0.00051	0.00047	-1.06963	0.2854
D(DEPRAT)	-0.00159	0.00374	-0.42550	0.6707
D(UNIONDEN)	-0.00309	0.00120	-2.57118	0.0105
D(EDUEXP)	-0.00419	0.00847	-0.49451	0.6212
C	0.01943	0.01068	1.81922	0.0696
Mean dependent var	-0.00446	S.D. dependent var		0.04515
S.E. of regression	0.02212	Akaike info criterion		-4.76521
Sum squared resid	0.19579	Schwarz criterion		-3.51663
Log likelihood	1501.02500	Hannan-Quinn criter.		-4.27775

Dependent Variable: D(PALMA)
Method: ARDL
Included observations: 532
Selected Model: ARDL (2, 1, 1, 1, 1, 1, 1, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
		Long Run Equation		
SPEND	-0.04413	0.01264	-3.49182	0.0005
INFLATION	-0.01219	0.00397	-3.06743	0.0023
TRADE	0.00204	0.00127	1.60404	0.1095
UNEMP	0.02360	0.00538	4.38645	0.0000
INTUSERS	0.00138	0.00047	2.95427	0.0033
DEPRAT	0.02481	0.00258	9.62763	0.0000
UNIONDEN	0.01689	0.00265	6.37681	0.0000
EDUEXP	-0.18510	0.01120	-16.53183	0.0000
		Short Run Equation		
COINTEQ01	-0.07703	0.02497	-3.08465	0.0022
D(PALMA(-1))	-0.05848	0.12803	-0.45673	0.6481
D(SPEND)	0.00086	0.00371	0.23195	0.8167
D(INFLATION)	-0.00046	0.00088	-0.52346	0.6010
D(TRADE)	0.00038	0.00052	0.73271	0.4642
D(UNEMP)	0.00277	0.00204	1.35886	0.1750
D(INTUSERS)	-0.00045	0.00049	-0.92052	0.3579
D(DEPRAT)	-0.00378	0.00541	-0.69813	0.4855
D(UNIONDEN)	-0.00207	0.00124	-1.67452	0.0948
D(EDUEXP)	0.00467	0.00830	0.56218	0.5743
C	-0.01120	0.01905	-0.58798	0.5569
Mean dependent var	-0.00446	S.D. dependent var		0.04515
S.E. of regression	0.02187	Akaike info criterion		-4.84431
Sum squared resid	0.18456	Schwarz criterion		-3.48783
Log likelihood	1537.25200	Hannan-Quinn criter.		-4.31472

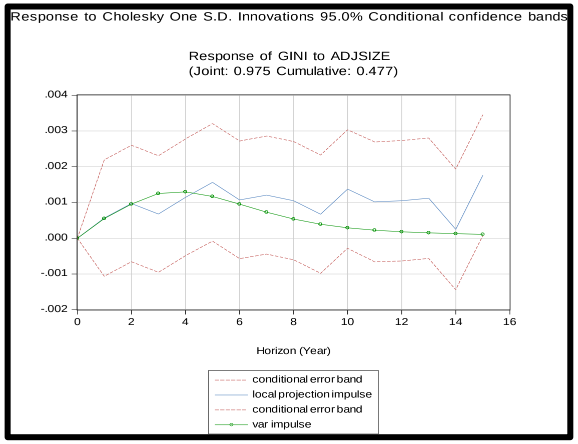
Table 4. Palma Ratio Contd.

Dependent Variable: D(PALMA)				
Method: ARDL				
Included observations: 532				
Selected Model: ARDL (2, 1, 1, 1, 1, 1, 1, 1, 1)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
	Long Run Equation			
TAX	0.00819	0.06149	0.13324	0.8941
INFLATION	-0.01737	0.01009	-1.72235	0.0858
TRADE	-0.01317	0.00379	-3.47099	0.0006
UNEMP	0.01520	0.00879	1.72831	0.0847
INTUSERS	0.00434	0.00130	3.33434	0.0009
DEPRAT	0.03299	0.00723	4.56655	0.0000
UNIONDEN	-0.00283	0.00593	-0.47748	0.6333
EDUEXP	-0.24334	0.02081	-11.69475	0.0000
	Short Run Equation			
COINTEQ01	-0.03335	0.00826	-4.03770	0.0001
D(PALMA(-1))	-0.04613	0.12160	-0.37938	0.7046
D(TAX)	-0.00588	0.00492	-1.19587	0.2325
D(INFLATION)	-0.00003	0.00069	-0.04458	0.9645
D(TRADE)	0.00041	0.00050	0.82388	0.4105
D(UNEMP)	0.00312	0.00207	1.50792	0.1324
D(INTUSERS)	-0.00058	0.00048	-1.21188	0.2263
D(DEPRAT)	-0.00600	0.00359	-1.66995	0.0957
D(UNIONDEN)	-0.00131	0.00114	-1.14756	0.2518
D(EDUEXP)	-0.00430	0.00836	-0.51349	0.6079
C	0.04855	0.01353	3.58782	0.0004
Mean dependent var	-0.00446	S.D. dependent var		0.04515
S.E. of regression	0.02211	Akaike info criterion		-4.83624
Sum squared resid	0.19553	Schwarz criterion		-3.58766
Log likelihood	1520.98300	Hannan-Quinn criter.		-4.34878

SECTION VI. Different Orderings – IRF from Local Projections

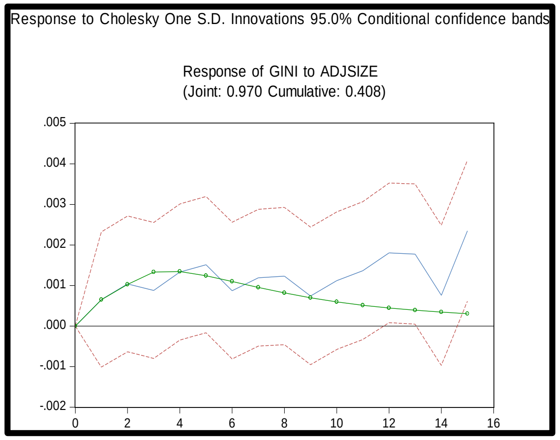
Ordering #1: Baseline (4 Control Variables)

GINIi ADJSIZE INFLATION UNEMP TRADE GDPG



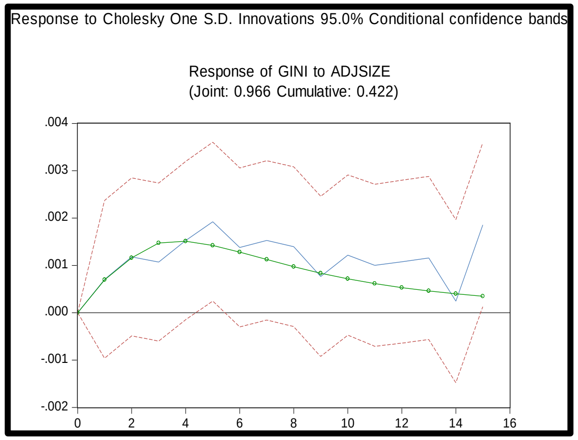
Ordering #2: Inequality First, Unemployment Next

GINI UNEMP TRADE INFLATION GDPG ADJSIZE



Ordering #3: Inequality First, Trade Next

GINI TRADE ADJSIZE GDPG UNEMP INFLATION



Ordering #4: Unemployment First, GDPG Next

UNEMP GDPG TRADE ADJSIZE INFLATION GINI