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Abstract

This paper reassesses the institutional interpretation of Portuguese inequality dynamics advanced by Alcobia and Leal (2026), who argue that declining union density and labour-market liberalisation were the principal drivers of rising top-income concentration in Portugal between 1980 and 2023. Using replication exercises, alternative institutional measures, narrative reform indicators, rolling regressions, structural-break diagnostics, VARs, local projections and comparative OECD panel evidence, the paper evaluates the robustness and causal interpretation of the original framework. The results show that the estimated institutional relationships are highly sensitive to specification choice, institutional measurement, sample composition and crisis-period observations. Once broader controls for educational upgrading, productivity change, sectoral transformation and macroeconomic adjustment are incorporated, the estimated effects weaken substantially and frequently lose statistical significance. Dynamic estimation and causality analysis further provide limited support for a stable one-directional causal mechanism running from labour-market deregulation toward inequality. Instead, Portuguese inequality appears to have evolved jointly with broader processes of structural modernization, globalization, technological change and repeated macroeconomic adjustment. Overall, the findings caution against interpreting labour-market deregulation as the dominant driver of Portuguese inequality and emphasize the importance of evaluating labour-market institutions within a broader framework balancing equity, productivity and economic adaptability.

JEL Codes: D31, J08, J51, C22, O52
Keywords: income inequality; labour-market liberalisation; trade unions; Portugal; structural reforms

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1. Introduction

The evolution of income inequality and the growing concentration of income at the top of the distribution have become central themes in contemporary macroeconomic and political-economy research. A substantial literature argues that rising inequality reflects the weakening of labour institutions, declining trade union density and labour-market deregulation, emphasizing the role of bargaining power and institutional change in shaping distributive outcomes (Piketty and Saez, 2003; Piketty, 2014). Within this perspective, labour-market liberalisation is frequently interpreted primarily through its distributive consequences, while comparatively less attention is devoted to its potential effects on productivity, labour-market adjustment, competitiveness and long-run economic performance.

These issues are particularly relevant in Southern European economies such as Portugal, where labour-market reforms and institutional restructuring occurred simultaneously with broader structural transformation. Between 1980 and 2023, Portugal experienced European integration, educational convergence, financial liberalisation, euro-area integration, technological upgrading and repeated macroeconomic crises. During the same period, the Portuguese economy also recorded substantial improvements in living standards, poverty reduction and human-capital accumulation. Interpreting distributive developments exclusively through the lens of institutional erosion therefore risks overlooking the broader structural changes simultaneously reshaping the Portuguese economy.

A recent contribution exemplifying this institutional interpretation is provided by Alcobia and Leal (2026), who analyse the determinants of top-income inequality in Portugal using an Autoregressive Distributed Lag (ARDL) framework rooted in Power Resource Theory. Their central conclusion is that declining union density and labour-market flexibilisation constituted the principal drivers of rising top-income concentration in Portugal over the last four decades. The authors further interpret these findings as evidence that distributive outcomes are fundamentally shaped by shifts in bargaining power between labour and capital, with direct policy implications for reversing labour-market liberalisation.

This paper critically reassesses both the empirical robustness and the broader economic interpretation of these conclusions. While Alcobia and Leal (2026) provide an important contribution by placing labour-market institutions at the centre of the Portuguese inequality debate, the present paper argues that the strength of their conclusions considerably exceeds what the underlying econometric evidence can credibly sustain. More specifically, the institutional interpretation advanced in the original paper appears highly sensitive to specification choice, institutional measurement, omitted-variable bias, parameter instability and endogeneity concerns.

Several features of the original empirical framework raise important methodological difficulties. First, the analysis relies on a relatively small annual sample while estimating highly parameterized dynamic specifications involving strongly persistent variables. Union density, labour-market regulation, trade openness and top-income shares display pronounced common trending behaviour throughout the sample period. In small-sample time-series settings, such persistence increases the risk that estimated long-run

relationships partly reflect common stochastic trends rather than stable structural causal mechanisms.

Second, important measurement concerns arise regarding the institutional variables themselves. The labour-market regulation indicator employed by Alcobia and Leal (2026) relies partly on interpolated Fraser Institute series for periods of missing data. Since interpolation mechanically smooths the series and increases persistence, estimated long-run coefficients may partly reflect artificial trend coherence rather than genuine institutional effects. Moreover, labour-market rigidity is inherently multidimensional and difficult to summarize through a single composite indicator.

Third, the baseline specifications omit several broader structural variables likely to affect both institutional evolution and distributive outcomes. Portugal underwent substantial educational expansion, sectoral transformation, demographic transition, technological upgrading and integration into European and global markets during the sample period. These developments likely influenced inequality simultaneously with changes in labour-market institutions, raising the possibility that estimated institutional coefficients partly capture broader modernization dynamics rather than independent effects of labour-market deregulation itself.

Fourth, the causal interpretation advanced by Alcobia and Leal (2026) appears substantially stronger than warranted given the potential endogeneity between labour-market institutions and inequality. Labour-market institutions are not exogenous policy variables evolving independently of broader economic and political developments. Rising inequality may itself weaken unionisation, reshape political coalitions and influence institutional trajectories. Reduced-form correlations between institutional variables and top-income shares therefore cannot automatically be interpreted as evidence of one-directional causality running from labour-market liberalisation toward inequality.

Beyond these identification concerns, the paper also questions the broader tendency to evaluate labour-market reforms predominantly through inequality measures alone. Labour-market institutions influence not only the distribution of income, but also productivity growth, labour-market adjustment, investment incentives, competitiveness and long-run economic performance. Consequently, reforms associated with greater labour-market flexibility may involve multidimensional trade-offs between distributive and efficiency-related outcomes. Economies characterized by relatively compressed income distributions do not necessarily exhibit stronger productivity growth, innovation or living standards, just as moderate increases in inequality may coexist with improvements in employment, productivity and poverty reduction.

Against this background, the paper provides a systematic reassessment of the empirical and conceptual claims advanced by Alcobia and Leal (2026). The analysis proceeds in two stages. First, the paper replicates and reassesses the original institutional framework using alternative specifications, broader structural controls, alternative institutional measures, rolling regressions, structural-break analysis and dynamic identification exercises. Second, the paper broadens the analysis beyond top-income concentration alone and evaluates the effects of labour-market reforms on productivity, unemployment, investment and broader welfare indicators using local projections and comparative OECD panel evidence.

The results provide substantially weaker support for the institutional interpretation advanced by Alcobia and Leal (2026) than implied in the original paper. While some baseline correlations between labour-market institutions and inequality can be replicated, these relationships prove highly unstable once broader structural controls, alternative institutional measures and crisis-period adjustments are introduced. Rolling regressions, recursive estimation and structural-break analysis reveal considerable parameter instability, with the strongest estimated institutional effects concentrated primarily around major macroeconomic adjustment episodes rather than persisting uniformly across the sample period.

Moreover, the paper finds limited evidence supporting a stable one-directional causal mechanism running from labour-market liberalisation toward rising inequality. VARs, Granger-causality tests and local projections instead suggest that labour-market reforms, unemployment, productivity dynamics and distributive outcomes evolved jointly through broader macroeconomic adjustment processes. In several specifications, worsening macroeconomic conditions themselves precede institutional reforms, substantially weakening the interpretation of labour-market deregulation as an autonomous driver of inequality.

The broader welfare evidence similarly challenges strongly distribution-focused interpretations of labour-market reform. While reforms occasionally coincide with moderate short-run increases in certain inequality measures, particularly during crisis periods, these effects are generally quantitatively limited and statistically fragile. At the same time, reforms frequently coincide with improved productivity performance, labour-market adjustment and medium-term efficiency gains.

Taken together, the Portuguese experience appears more consistent with a multidimensional adjustment framework than with a stable institutional mechanism centred exclusively on labour-market deregulation and bargaining power. Portuguese inequality evolved within a broader process involving globalization, educational convergence, technological upgrading, financial integration and repeated macroeconomic adjustment episodes. Once these broader dynamics are incorporated, the institutional interpretation advanced by Alcobia and Leal (2026) becomes considerably less robust and substantially less conclusive than initially claimed.

The remainder of the paper is organised as follows. Section 2 reviews the relevant literature and situates Alcobia and Leal (2026) within the broader debate on inequality and labour-market institutions. Section 3 presents the data, econometric framework and identification challenges associated with estimating institutional effects in small-sample macroeconomic settings. Section 4 reassesses the empirical robustness of the institutional interpretation advanced by Alcobia and Leal (2026). Section 5 broadens the analysis to examine the welfare and efficiency implications of labour-market liberalisation. Section 6 concludes.

2. Literature Review

2.1. Institutional explanations of inequality

A large literature links rising inequality to changes in labour-market institutions, bargaining structures and the relative bargaining power of labour and capital. Influential contributions associated with the "top incomes" literature, including Piketty and Saez (2003), Atkinson, Piketty and Saez (2011), and Piketty (2014), shifted attention away from purely technological explanations of inequality toward institutional and political-economic interpretations emphasizing redistribution, capital accumulation and labour-market institutions.

Closely related to this literature, Power Resource Theory (PRT) argues that distributive outcomes depend fundamentally on the organizational and political strength of labour relative to capital (Korpi, 1983; Stephens, 1979). Within this framework, trade unions, centralized bargaining systems and labour protections are viewed as mechanisms capable of compressing wage distributions and limiting top-income concentration, whereas labour-market liberalisation and declining union density are interpreted as important drivers of rising inequality.

Empirically, a large body of research reports significant relationships between labour-market institutions and income inequality, particularly at the top of the income distribution. Studies such as Volscho and Kelly (2012), Jaumotte and Osorio Buitron (2015), Dünhaupt (2014), and Huber, Huo and Stephens (2020) argue that declining union density, weakening collective bargaining systems and broader labour-market deregulation contributed importantly to rising inequality across advanced economies by reducing labour's bargaining power relative to capital. More recent contributions reinforce this interpretation. Darcillon (2021) emphasizes the role of labour-market institutions and financialization in shaping labour-income shares and distributive outcomes, while Ciminelli, Duval and Furceri (2022) show that employment-protection deregulation may reduce labour shares and increase inequality, particularly in advanced economies. Similarly, Wiese, Jalles and de Haan (2024) provide new OECD evidence indicating that structural reforms, especially labour-market liberalisation measures, are associated with changes in income distribution and top-income concentration. Aum, Lee and Shin (2024) further highlight the distributive implications of declining collective bargaining coverage and labour-market flexibility within broader labour-market adjustment processes. Collectively, this literature supports the view that institutional change and labour-market liberalisation may exert important effects on distributive outcomes, although the magnitude, persistence and broader welfare implications of these effects remain actively debated.

Within the Portuguese context, Alcobia and Leal (2026) provide a recent application of this institutional framework using annual Portuguese data and an ARDL specification rooted explicitly in Power Resource Theory. Their central conclusion is that declining union density and labour-market flexibilisation constituted the principal drivers of rising top-income concentration in Portugal between 1980 and 2023.

While this literature has generated important insights regarding the institutional determinants of distributive outcomes, it has also increasingly evaluated labour-market reforms primarily through inequality measures themselves. In many contributions, labour-

market liberalisation is interpreted mainly as a mechanism redistributing income from labour toward capital, while comparatively less attention is devoted to its effects on productivity, labour-market adjustment, competitiveness and long-run economic performance. Yet inequality indicators measure relative dispersion within the income distribution rather than broader welfare outcomes. Consequently, rising inequality does not necessarily imply deteriorating living standards or weaker economic performance, just as distributive compression does not necessarily imply stronger productivity growth, innovation or prosperity.

2.2. Labour-market institutions, productivity and efficiency

A parallel literature in labour economics and macroeconomics emphasizes that labour-market institutions involve important efficiency-equity trade-offs. While employment protection legislation, centralized bargaining systems and stronger labour protections may reduce wage dispersion and increase employment security, they may also affect labour reallocation, hiring incentives, productivity growth and economic adaptability.

Insider-outsider models developed by Lindbeck and Snower (1988) argue that rigid labour-market institutions may protect incumbent workers while simultaneously reducing labour-market access for outsiders, particularly younger and less-experienced workers. Saint-Paul (2000) similarly emphasizes the political-economy mechanisms through which labour-market rigidities may persist despite adverse effects on labour-market adjustment and employment dynamics.

Related contributions stress the role of labour-market flexibility in facilitating competitiveness and resource reallocation. Blanchard and Portugal (2001) argue that rigid labour markets may reduce observed labour turnover while simultaneously slowing labour-market adjustment. Bassanini and Duval (2006) document important links between labour-market institutions and unemployment performance across OECD economies, while OECD and IMF analyses increasingly emphasize the role of labour-market adaptability in supporting productivity growth, innovation and structural adjustment (OECD, 2023; IMF, 2022).

More recent work also highlights the relationship between labour-market flexibility and productivity-enhancing reallocation. Cette, Lopez and Mairesse (2020) emphasize the importance of labour-market adaptability for technological diffusion and productivity growth, while Andrews et al. (2021) argue that flexibility may facilitate firm-level adjustment and resource reallocation in dynamic sectors.

This broader literature suggests that labour-market reforms cannot be evaluated exclusively through distributive indicators alone. Labour-market institutions affect not only the distribution of income, but also employment dynamics, productivity, investment and the broader capacity of economies to adapt to structural change. This issue is particularly relevant in small open economies operating within highly competitive international environments and monetary unions, where adjustment through nominal exchange rates is limited.

2.3. The Portuguese case and unresolved empirical issues

The Portuguese experience provides an especially relevant setting for evaluating these competing interpretations because labour-market reforms occurred simultaneously with broader structural transformation. Between 1980 and 2023, Portugal experienced European integration, euro adoption, educational convergence, financial deepening, globalization, demographic transition and repeated macroeconomic crises, while simultaneously recording substantial improvements in living standards, educational attainment and infrastructure.

These overlapping developments complicate simple institutional interpretations of Portuguese inequality dynamics. Declining union density, for example, may partly reflect broader structural modernization and sectoral transformation rather than purely institutional weakening. Likewise, labour-market reforms implemented during periods of macroeconomic adjustment may have affected competitiveness, productivity and labour-market dynamics simultaneously with distributive outcomes.

From an econometric perspective, these features create important identification challenges. Labour-market institutions, trade openness, educational attainment and inequality evolved jointly over a relatively limited annual sample characterized by highly persistent variables and multiple structural breaks. In such settings, reduced-form time-series relationships may partly reflect common stochastic trends and broader modernization dynamics rather than stable structural causal mechanisms.

These concerns are particularly relevant for the framework employed by Alcobia and Leal (2026). Their analysis relies on highly persistent institutional variables, including interpolated Fraser Institute labour-market indicators, estimated over a relatively small annual sample. Since interpolation mechanically smooths the data and increases persistence, estimated long-run relationships may partly capture trend coherence rather than genuine institutional effects. Moreover, labour-market institutions and inequality are jointly determined political-economic outcomes, making reverse causality difficult to exclude.

The Portuguese case therefore raises several unresolved empirical questions. To what extent do the institutional relationships reported by Alcobia and Leal (2026) remain robust once broader structural controls are incorporated? How sensitive are the results to alternative institutional measures and sample composition? Do labour-market reforms generate persistent distributive effects once structural instability and endogeneity are considered? More broadly, can labour-market liberalisation be adequately evaluated through inequality indicators alone without simultaneously considering productivity, employment and broader welfare outcomes?

The present paper addresses these questions through a systematic reassessment of the empirical robustness and broader economic interpretation of the institutional framework advanced by Alcobia and Leal (2026). The paper argues that the Portuguese experience is more consistent with a multidimensional adjustment framework balancing equity, productivity, competitiveness and economic adaptability than with a stable causal interpretation centred exclusively on institutional erosion and bargaining power.

3. Data and Methodology

This section presents the data, variable construction and empirical strategy used to reassess the institutional interpretation advanced by Alcobia and Leal (2026). The analysis builds on recent work on structural reforms and long-run Portuguese economic performance developed in Jalles (2026), which constructs a narrative dataset of institutional reforms covering labour-market regulation, unemployment benefits, collective bargaining, minimum wages and product-market reforms for Portugal and a broader OECD sample over the period 1970–2025.

The empirical framework differs from Alcobia and Leal (2026) in four principal respects. First, rather than relying primarily on smooth institutional indicators such as interpolated Fraser Institute indices, the analysis exploits narrative reform data based on discrete legislative and regulatory changes. Second, the framework explicitly recognizes the multidimensional nature of labour-market institutions and distinguishes between employment protection, collective bargaining, unemployment protection and product-market reforms. Third, the analysis extends beyond distributive outcomes alone and incorporates productivity, employment, investment and broader welfare indicators. Finally, the paper combines Portuguese time-series evidence with comparative OECD panel analysis in order to mitigate the identification problems inherent in small-sample single-country estimation with highly persistent variables.

The central objective is not to deny that labour-market institutions may influence distributive outcomes, but rather to reassess whether the strong causal interpretation advanced by Alcobia and Leal (2026) survives once institutional measurement, structural instability, omitted-variable bias and endogeneity concerns are explicitly considered.

3.1. Structural reform data

The institutional reform dataset follows the narrative methodology developed by Duval et al. (2018) and subsequently extended by Wiese, de Haan and Jalles (2026). The resulting annual database covers up to 27 OECD economies over the period 1970–2025 and identifies economically meaningful reforms and counter-reforms across several institutional domains using OECD Economic Surveys, legislative records and country-specific institutional sources.

Unlike continuous institutional indices that evolve gradually over time and may partly reflect interpolation or measurement conventions, the narrative approach focuses on discrete policy interventions expected to alter labour-market functioning, wage-setting behaviour, hiring incentives or product-market competition.

For each institutional domain k, reforms are coded using a trichotomous indicator:

$$shock_t^k \in \{-1,0,1\}$$

where $+1$denotes a liberalising reform, -1a rigidity-increasing reform or counter-reform, and $0$the absence of a major reform episode. The dataset covers five principal institutional domains: employment protection legislation (EPL), unemployment benefits (UB), collective bargaining (CB), minimum wages (MW) and product-market regulation (PMR).

To capture the persistent nature of institutional change, reforms are aggregated into cumulative stock-type indices:

$$Index_t^k = \sum_{\tau \leq t} shoc\ k_\tau^k$$

Following Jalles (2026), the indices are normalized relative to the pre-reform benchmark period:

$$Index_{t,norm}^k = Index_t^k - Index_{1973}^k$$

where positive values indicate net liberalisation relative to the pre-1974 institutional environment.

Compared with the Fraser Institute indicators employed by Alcobia and Leal (2026), the narrative approach offers several advantages. First, it reduces concerns associated with interpolated institutional measures and artificial persistence. Second, it allows explicit identification of reform episodes and policy reversals. Third, it distinguishes across institutional dimensions that may exert heterogeneous macroeconomic effects. Finally, the broader OECD coverage facilitates comparative panel analysis and placebo-type exercises.

3.2. Inequality, macroeconomic and welfare variables

The baseline dependent variables replicate the principal inequality measures employed by Alcobia and Leal (2026), including the top 1 per cent, top 10 per cent and top 0.1 per cent income shares, together with market-income and disposable-income Gini coefficients. These variables are obtained from the World Inequality Database (WID), the OECD Income Distribution Database and the Standardized World Income Inequality Database (SWIID).

Because labour-market institutions may affect broader economic outcomes beyond income distribution alone, the analysis additionally incorporates productivity, employment, investment and welfare indicators. Real GDP per capita growth, labour productivity growth, total factor productivity and investment are included to capture broader efficiency and competitiveness channels frequently omitted in distribution-focused frameworks. Employment, unemployment, labour-force participation and youth unemployment are incorporated because labour-market institutions directly affect hiring incentives, labour turnover and labour-market adjustment dynamics.

The analysis also includes poverty rates, median disposable income, labour shares and real wage growth in order to distinguish between relative distributive changes and broader welfare outcomes. Additional controls include trade openness, financial development, inflation, fiscal variables, current-account balances, human-capital indicators, sectoral employment composition and demographic variables. These controls are intended both to capture structural transformations affecting the Portuguese economy during the sample period and to mitigate omitted-variable bias in the baseline institutional regressions.

Taken together, the broader variable set reflects the central premise that labour-market reforms may generate multidimensional effects extending beyond distributive outcomes alone. A credible empirical assessment therefore requires jointly considering inequality, productivity, employment and broader macroeconomic dynamics.

3.3. Comparative OECD panel and reform identification strategy

A central limitation of the framework employed by Alcobia and Leal (2026) is its reliance on a relatively small annual Portuguese time series characterized by highly persistent variables, multiple structural breaks and limited institutional variation. In such settings, estimated long-run relationships may be highly sensitive to lag selection, sample composition and common trending behaviour.

To mitigate these concerns, the present paper complements the Portuguese time-series analysis with a comparative OECD panel covering up to 27 advanced economies over the period 1970–2025 using the narrative reform dataset described above. The panel substantially increases both cross-sectional and temporal variation and allows Portuguese developments to be evaluated relative to economies exposed to similar globalization, technological and macroeconomic forces.

The comparative dimension is particularly important because many of the structural changes experienced by Portugal — including declining union density, financial deepening, educational upgrading and globalization — were not unique to the Portuguese economy. Identifying the independent contribution of labour-market institutions therefore requires distinguishing institutional effects from broader common trends affecting advanced economies more generally.

The narrative reform approach also provides advantages relative to smooth institutional indices such as the Fraser Institute indicators employed by Alcobia and Leal (2026). By focusing on discrete policy interventions rather than gradual indicator movements, the framework reduces the risk that estimated institutional effects merely capture common stochastic trends or artificial persistence. In addition, the narrative data distinguish across institutional domains, allowing reforms affecting employment protection, collective bargaining, unemployment benefits and product-market regulation to exert heterogeneous effects on inequality, productivity and labour-market adjustment.

The broader OECD panel additionally facilitates several exercises difficult to implement credibly within a single-country framework, including heterogeneity analysis across institutional regimes, placebo-type comparisons and robustness to alternative country groups. It also mitigates the disproportionate influence of major Portuguese-specific episodes such as euro adoption, sovereign debt adjustment and the Covid-19 shock.

At the same time, the panel evidence is not intended to substitute for the Portuguese case study itself. Portugal remains the central empirical focus of the analysis, while the panel framework serves primarily as a complementary identification device allowing evaluation of whether the relationships emphasized by Alcobia and Leal (2026) remain robust once broader comparative evidence is incorporated.

Overall, the combination of narrative reform identification, comparative OECD panel analysis and dynamic time-series techniques provides a broader empirical framework than the baseline ARDL specifications employed by Alcobia and Leal (2026). In particular, it allows clearer distinction between long-run structural trends, discrete institutional interventions, macroeconomic adjustment episodes and broader welfare dynamics associated with labour-market reform.

3.4. Econometric framework and identification strategy

The empirical analysis combines complementary time-series and panel approaches designed to reassess both the robustness and the causal interpretation of the institutional relationships reported by Alcobia and Leal (2026). Because labour-market institutions, distributive outcomes and macroeconomic performance evolve jointly over time, no single econometric framework is sufficient to address all identification concerns. The analysis therefore combines dynamic time-series estimation, comparative panel models, event-study specifications and local projections in order to evaluate the stability, magnitude and broader macroeconomic implications of labour-market reforms. Detailed estimation procedures and additional robustness exercises are reported in the Appendix.[1]

3.4.1. Baseline ARDL specification

The first stage replicates the baseline Autoregressive Distributed Lag (ARDL) framework employed by Alcobia and Leal (2026):

$$Y_t = \alpha + \sum_{i=1}^{p} \phi_i \, Y_{t-i} + \sum_{j=0}^{q} \beta_j \, Reform_{t-j} + \sum_{k=0}^{m} \delta_k \, X_{t-k} + \varepsilon_t$$

where Y_t denotes the outcome variable, $Reform_t$ represents labour-market institutional indicators and X_t is a vector of macroeconomic controls. Lag lengths are selected using standard information criteria subject to parsimony constraints imposed by the relatively limited annual sample size.

The ARDL framework provides a useful benchmark because it closely replicates the methodology employed in the original paper. However, given the persistence of several institutional and macroeconomic variables, the analysis does not rely exclusively on ARDL estimates when evaluating long-run institutional effects.[2] Standard errors are computed using Newey–West heteroskedasticity and autocorrelation consistent corrections.

To assess robustness, the paper additionally estimates Dynamic OLS (DOLS) and Fully Modified OLS (FMOLS) specifications. These alternative cointegration estimators help evaluate whether the estimated institutional relationships remain stable across different treatments of persistence, serial correlation and endogeneity.

3.4.2. Comparative OECD panel framework

To mitigate the limitations associated with single-country estimation, the analysis additionally employs a comparative OECD panel covering up to 27 economies over the period 1970–2025. The baseline specification is given by:

$$Y_{it} = \alpha_i + \gamma_t + \beta Reform_{it} + \delta X_{it} + \varepsilon_{it}$$

[1] Full estimation details, alternative lag structures, unit-root and cointegration diagnostics, robustness checks and additional estimators are reported in the Appendix.

[2] Small-sample ARDL estimates involving highly persistent variables should be interpreted cautiously. Diagnostic statistics, cointegration diagnostics and robustness exercises are reported in Appendix Tables A1–A2.

where α_i and γ_t denote country and time fixed effects, respectively. Country fixed effects absorb time-invariant institutional and structural heterogeneity, while time effects control for common global shocks, including globalization, technological change and financial crises.

The panel framework substantially increases both cross-sectional and temporal variation relative to the Portuguese time-series analysis and allows Portuguese developments to be evaluated against broader OECD trends. Driscoll–Kraay standard errors are employed to address heteroskedasticity, serial correlation and cross-sectional dependence. Additional robustness exercises using Common Correlated Effects (CCE) estimators and alternative dynamic specifications are reported in the Appendix.

3.4.3. Event-study specifications and local projections

Because smooth institutional indices may partly capture gradual trends rather than discrete policy interventions, the analysis additionally estimates event-study specifications focused on major reform episodes:

$$Y_{it} = \alpha_i + \gamma_t + \sum_{h=-H}^{H} \beta_h \, D_{i,t+h} + \delta X_{it} + \varepsilon_{it}$$

where $D_{i,t+h}$ denotes reform-period indicators indexed relative to the reform year. The coefficients β_h trace the dynamic evolution of outcomes before and after reforms and allow direct assessment of pre-trends, contemporaneous responses and medium-term adjustment dynamics.

The paper also estimates local projections following Jordà (2005):

$$Y_{i,t+h} - Y_{it} = \alpha_h + \beta_h Reform_{it} + \Gamma_h X_{it} + \varepsilon_{i,t+h}$$

where h denotes the forecast horizon. Local projections are particularly useful in the present context because they allow impulse responses to evolve flexibly over time without imposing strong dynamic restrictions and are comparatively robust to structural instability and model misspecification.

The local projection framework is used to evaluate the medium-term responses of inequality, productivity, employment and welfare outcomes to labour-market reforms over horizons of up to five years.

3.4.4. Structural instability and endogeneity

Given the multiple institutional and macroeconomic regime shifts experienced by Portugal during the sample period, the analysis explicitly evaluates parameter stability using rolling regressions and Bai–Perron multiple structural-break tests. Significant variation in estimated institutional coefficients across subperiods would indicate instability in the relationships emphasized by Alcobia and Leal (2026).

The paper additionally evaluates reverse causality and endogenous reform timing using Vector Autoregressions (VARs) and Granger-causality tests:

$$Z_t = A_0 + A_1 Z_{t-1} + \cdots + A_p Z_{t-p} + u_t$$

where $Z_t$contains inequality measures, institutional variables and macroeconomic controls. This framework allows assessment of whether labour-market reforms systematically precede changes in inequality or whether institutional reforms themselves partly respond to prior distributive and macroeconomic developments.

Taken together, the combination of narrative reform identification, comparative panel analysis, dynamic time-series estimation and structural instability tests provides a broader empirical framework than the baseline ARDL specifications employed by Alcobia and Leal (2026). In particular, it allows clearer distinction between long-run structural trends, discrete reform episodes and broader macroeconomic adjustment dynamics.

4. Reassessing Institutional Explanations of Portuguese Inequality

This section provides the core empirical reassessment of the institutional interpretation advanced by Alcobia and Leal (2026). Their central claim is that declining union density and labour-market liberalisation constituted the principal drivers of rising top-income concentration in Portugal between 1980 and 2023. Using an ARDL framework rooted in Power Resource Theory, the authors interpret labour-market deregulation as a central mechanism redistributing income from labour toward capital and top earners.

While these conclusions appear statistically supported within the preferred specifications reported by Alcobia and Leal (2026), the evidence underlying such strong causal claims proves substantially more fragile once broader robustness and identification concerns are considered. In particular, the estimated institutional relationships are highly sensitive to specification choice, institutional measurement, sample composition and structural controls. Moreover, several of the reported relationships appear closely associated with highly persistent common trends characterizing the Portuguese economy during the sample period.

The analysis proceeds sequentially. Section 4.1 replicates the baseline framework employed by Alcobia and Leal (2026). Section 4.2 evaluates sensitivity to broader structural controls. Section 4.3 examines alternative institutional measures and narrative reform indicators. Section 4.4 assesses structural instability, while Section 4.5 evaluates endogeneity and reverse causality using multivariate dynamic frameworks.

The objective is not to deny that labour-market institutions may influence distributive outcomes, but rather to reassess whether the Portuguese evidence credibly supports the strong causal interpretation advanced by Alcobia and Leal (2026), according to which labour-market deregulation constituted the dominant driver of inequality dynamics over the last four decades.

4.1. Baseline replication of Alcobia and Leal (2026)

The first stage of the analysis replicates the baseline ARDL framework employed by Alcobia and Leal (2026) using the same sample period, inequality measures, institutional variables and macroeconomic controls. The purpose of the replication exercise is twofold: first, to evaluate whether the principal institutional relationships reported in the original

paper can be reproduced; and second, to establish a benchmark for subsequent robustness analysis.

The baseline specification is given by:

$$Inequality_t = \alpha + \sum_{i=1}^{p} \phi_i \, Inequality_{t-i} + \sum_{j=0}^{q} \beta_j \, Institution_{t-j} + \sum_{k=0}^{m} \delta_k \, X_{t-k} + \varepsilon_t$$

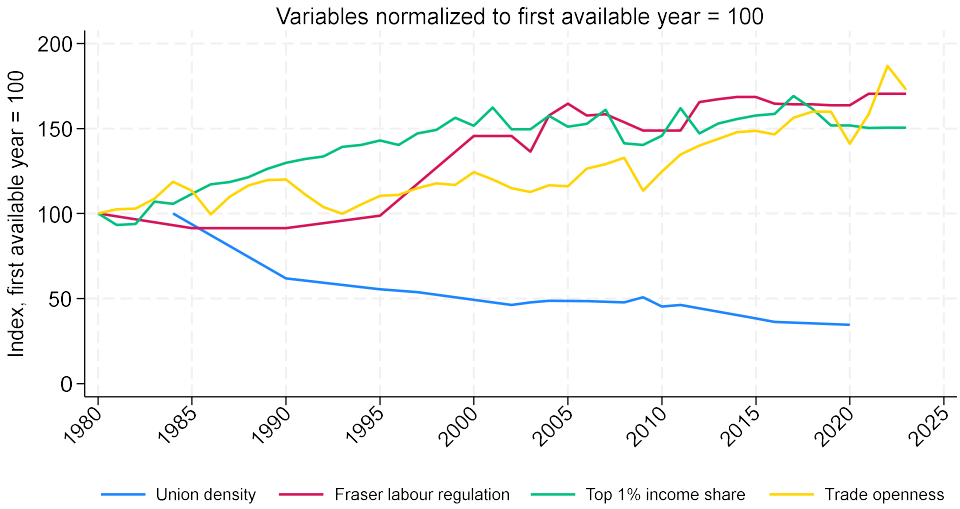
where $Inequality_t$ denotes alternative top-income or Gini-based measures, $Institution_t$ contains labour-market institutional indicators and X_t includes macroeconomic controls.

The replication broadly reproduces the low-frequency correlations emphasized by Alcobia and Leal (2026). In particular, union density, labour-market regulation and top-income concentration display substantial unconditional comovement over time. However, the replication exercise also immediately reveals important limitations.

Most notably, once lagged dependent variables, institutional indicators and macroeconomic controls are jointly included, the effective estimation sample collapses sharply. In the benchmark specification for the top 1 per cent income share, the usable sample falls to only 11 annual observations, leaving extremely limited residual degrees of freedom. This highlights the difficulty of estimating highly parameterized ARDL specifications in a short annual Portuguese time series characterized by persistent macroeconomic variables.

More importantly, replication alone does not establish robustness or causal identification. Union density, labour-market regulation, trade openness and top-income shares all display strong persistence and pronounced low-frequency trending behaviour throughout the sample period. Figure 1 illustrates these common trends directly. In small-sample macroeconomic settings, such persistence may generate apparently stable long-run relationships even in the absence of genuine structural causality.

Figure 1. Common trends in institutional variables and inequality measures in Portugal



Note: The figure plots union density, the Fraser labour-market regulation index, the top 1 per cent income share and trade openness, each normalized to 100 in its first available year. The figure illustrates the strong low-frequency comovement among institutional indicators, globalization and top-income concentration. This visual pattern supports the concern that baseline institutional estimates may partly reflect common trends rather than independent causal effects.

A related concern involves institutional measurement. Alcobia and Leal (2026) rely heavily on Fraser Institute labour-market regulation indicators, several components of which require interpolation for missing years in the Portuguese series. Since interpolation mechanically smooths the data and increases persistence, estimated long-run relationships may partly reflect artificial trend coherence rather than economically meaningful institutional variation.[3]

The robustness exercises summarized in Table 1 reinforce these concerns. Once broader structural controls, alternative institutional measures or crisis-period adjustments are introduced, the specifications become highly unstable relative to the available sample size. Several specifications become degenerate or overparameterized, with missing standard errors and insufficient residual degrees of freedom. In addition, estimated institutional coefficients vary substantially across specifications and frequently lose statistical significance once modest specification changes are introduced.

Overall, the replication exercise yields a considerably more nuanced interpretation than that advanced by Alcobia and Leal (2026). The principal low-frequency correlations can indeed be reproduced under similar specifications. However, the estimated relationships depend heavily on persistent trending variables, smooth institutional indices and extremely small effective samples estimated over a period characterized by profound structural

[3] The Fraser Institute labour-market regulation indicators employed by Alcobia and Leal (2026) contain interpolated observations for several Portuguese subcomponents. In highly persistent small-sample time-series settings, interpolation may mechanically reinforce low-frequency comovement and contribute to overstated long-run relationships.

transformation. Replication alone therefore cannot establish that labour-market deregulation constituted the dominant causal driver of Portuguese inequality dynamics.

The following subsections reassess the institutional interpretation using broader structural controls, alternative institutional measures, structural-break analysis and dynamic identification exercises explicitly designed to address instability and endogeneity concerns.

Table 1. Replication and robustness summary of Alcobia and Leal (2026)

Specification	Effective observations	Institutional effects stable?	Statistical significance retained?	Overall assessment
Baseline ARDL replication	Very small sample (≈11 obs.)	Limited	Partially	Fragile
+ Structural controls	Very small sample	Weak	Frequently lost	Unstable
+ Alternative institutional measures	Smaller sample	No	Mostly absent	Highly sensitive
+ Crisis controls	Small sample	No	Inconsistent	Unstable
+ Narrative reform indicators	Limited coverage	Mixed	Weak	Inconclusive

Note: Full regression results, coefficient estimates, standard errors and robustness diagnostics are reported in Appendix Tables A2.

4.2. Sensitivity to structural controls and broader macroeconomic transformations

The baseline replication exercises suggest that the principal correlations emphasized by Alcobia and Leal (2026) can be reproduced under similar econometric specifications. An important concern, however, is that the estimated institutional coefficients may partly proxy broader structural transformations simultaneously affecting both inequality and labour-market institutions over the sample period.

Portugal experienced profound economic and social change between 1980 and 2023, including European integration, financial liberalisation, educational convergence, sectoral reallocation and repeated macroeconomic adjustment episodes. These developments likely influenced distributive outcomes and institutional evolution jointly. Consequently, specifications excluding broader structural variables risk attributing to labour-market deregulation effects that partly reflect modernization dynamics, globalization and macroeconomic restructuring.

To address these concerns, the analysis sequentially incorporates broader structural controls into the baseline framework:

$$Inequality_t = \alpha + \sum_{i=1}^{p} \phi_i \, Inequality_{t-i} + \beta Reform_t + \delta Z_t + \gamma W_t + \varepsilon_t$$

where $Reform_t$ denotes labour-market institutional variables, Z_t contains the original macroeconomic controls employed by Alcobia and Leal (2026), and W_t represents the additional structural controls introduced in the present analysis.

The extended specifications incorporate human capital indicators, labour productivity, sectoral employment composition, financial development and crisis-period controls. Under the strong institutional interpretation advanced by Alcobia and Leal (2026), the estimated institutional effects should remain broadly stable once these additional controls are included. The results suggest otherwise.

Appendix Table A2 reports the sequential specifications and reveals substantial instability in both the magnitude and statistical significance of the institutional coefficients once broader controls are introduced. In particular, the estimated effects weaken materially after accounting for educational upgrading, productivity dynamics and crisis-period adjustments.

Human capital variables prove especially important. Portugal experienced one of the most rapid episodes of educational convergence within the OECD during the sample period, substantially altering labour supply composition and wage structures. Once educational controls are included, the estimated institutional effects weaken considerably, suggesting that part of the observed distributive dynamics reflects changes in skill composition and structural modernization rather than institutional erosion alone.

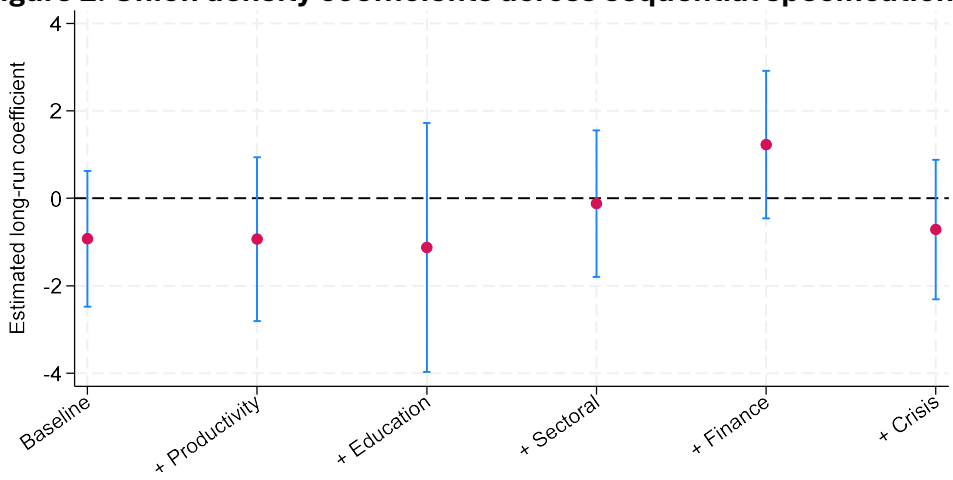
Productivity and sectoral transformation variables generate similar results. Portugal underwent substantial reallocation away from agriculture and low-productivity manufacturing toward services and higher-skilled sectors during the sample period. These developments likely affected wage dispersion and top-income dynamics independently of unionisation trends or labour-market regulation.

More broadly, the institutional relationships emphasized by Alcobia and Leal (2026) appear highly specification-sensitive. Estimated institutional effects vary materially depending on the inclusion of educational controls, productivity variables and crisis-period observations, a pattern difficult to reconcile with a stable structural relationship linking labour-market deregulation to inequality.

Figure 2 shows that the estimated union-density effect weakens progressively once broader structural controls are introduced. Importantly, all confidence intervals include zero, indicating limited statistical support for a stable union-density channel across specifications.

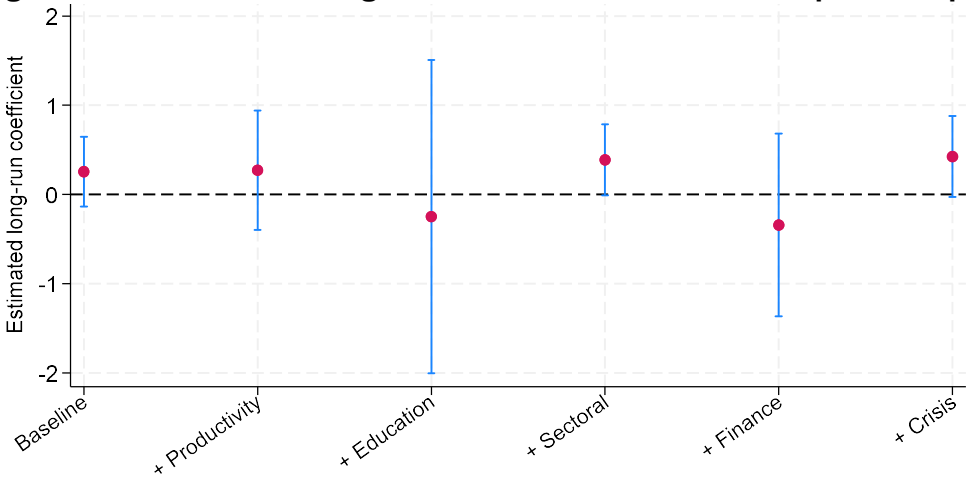
Figure 3 reveals even greater instability in the estimated labour-market regulation effects, including sizeable movements in magnitude, sign reversals and widening confidence intervals across specifications. Collectively, the results reinforce the view that the institutional interpretation advanced by Alcobia and Leal (2026) is highly sensitive to specification choice and the treatment of broader structural transformations.

Figure 2. Union density coefficients across sequential specifications



Note: The figure reports long-run coefficients on the standardized union-density variable from sequential ARDL-style specifications for Portugal over the period 1980–2023. Coefficients measure the estimated effect of a one-standard-deviation change in union density on the top 1 per cent income share. Specifications progressively incorporate productivity, education, sectoral transformation, financial development and crisis-period controls. Vertical bars denote robust 95 per cent confidence intervals. The figure illustrates the progressive attenuation and instability of union-density effects once broader structural controls are incorporated into the empirical framework.

Figure 3. Labour-market regulation coefficients across sequential specifications



Note: The figure reports long-run coefficients on the standardized Fraser labour-market regulation index from sequential ARDL-style specifications for Portugal over the period 1980–2023. Coefficients measure the estimated effect of a one-standard-deviation change in labour-market regulation on the top 1 per cent income share. Vertical bars denote robust 95 per cent confidence intervals. The dependent variable is the top 1 per cent income share. The substantial movement in coefficient magnitudes and the widening confidence intervals across specifications illustrate the strong sensitivity of institutional estimates to the inclusion of broader structural controls, particularly education, sectoral transformation, financial development and crisis-period adjustments.

4.3. Alternative institutional measures and narrative reform indicators

A central feature of the empirical framework employed by Alcobia and Leal (2026) is its reliance on smooth composite indicators of labour-market regulation, particularly the Fraser

Institute labour-market regulation index. While such indicators are widely used in comparative institutional research, they raise important conceptual and econometric concerns in the Portuguese context.

First, composite institutional indices aggregate heterogeneous dimensions of labour-market regulation into a single measure, potentially obscuring important differences across institutional domains. Employment protection legislation, collective bargaining arrangements, unemployment benefits and minimum wage systems may exert distinct and potentially offsetting effects on labour-market outcomes and inequality. Second, several components of the Fraser Institute series require interpolation for missing years in the Portuguese sample, mechanically increasing smoothness and persistence. Third, gradual institutional indices make it difficult to distinguish between discrete policy interventions and broader low-frequency structural trends.

To address these concerns, this subsection reassesses the institutional interpretation advanced by Alcobia and Leal (2026) using alternative institutional measures and narrative reform indicators. The analysis replaces the Fraser labour-market regulation index with OECD and ICTWSS institutional proxies and additionally exploits the narrative structural reform dataset developed in Jalles (2026), which identifies discrete labour-market reform and counter-reform episodes across OECD economies.

The baseline specification is:

$$Inequality_t = \alpha + \beta_1 EPL_t + \beta_2 CB_t + \beta_3 MW_t + \beta_4 UB_t + \gamma X_t + \varepsilon_t$$

where EPL_tdenotes employment protection legislation indicators, CB_tcaptures collective bargaining structures, MW_trepresents minimum-wage regulation and UB_tdenotes unemployment-benefit indicators.

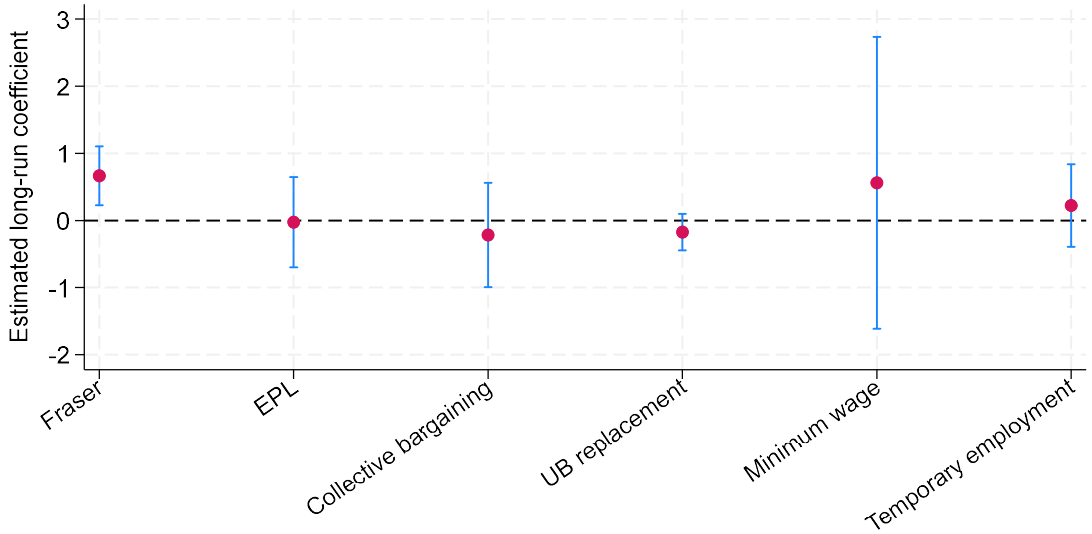
The results indicate that the institutional relationships reported by Alcobia and Leal (2026) weaken considerably once alternative institutional measures are employed. OECD employment-protection indicators generally produce smaller and statistically insignificant coefficients relative to the Fraser composite index. Similarly, collective bargaining coverage and bargaining-centralisation measures exhibit unstable relationships with top-income concentration across specifications and sample periods.

These findings are important because employment protection and bargaining indicators are conceptually closer to the mechanisms emphasized by Power Resource Theory than broad Fraser-style labour regulation indices. Yet these more direct institutional measures provide comparatively weak and unstable evidence for persistent distributive effects. Similar instability emerges for minimum-wage indicators and temporary-employment measures. While some specifications suggest that labour-market institutions may influence aspects of wage dispersion, the estimated effects remain highly sensitive to sample composition, crisis periods and macroeconomic controls.

Appendix Table A3 summarizes the full set of alternative institutional specifications. The Fraser labour-market regulation index remains the only institutional proxy consistently associated with statistically meaningful long-run effects. By contrast, most alternative institutional measures produce coefficients clustered close to zero with wide confidence intervals.

Figure 4 summarizes these results visually. The Fraser specification appears as a clear outlier relative to the remaining institutional proxies. Once more direct institutional measures are employed, estimated coefficients lose both magnitude and statistical precision. This pattern suggests that the institutional relationships emphasized by Alcobia and Leal (2026) depend heavily on the use of smooth composite indicators characterized by strong persistence and low-frequency trending behaviour.

Figure 4. Institutional coefficient estimates across alternative proxies



Note: The figure reports estimated long-run coefficients from parsimonious ARDL specifications using alternative standardized measures of labour-market institutions in Portugal over the period 1980–2023. Institutional proxies include the Fraser labour-market regulation index, Employment Protection Legislation (EPL), collective bargaining coverage, unemployment-benefit replacement rates, real minimum wages and temporary employment. Each institutional proxy is standardized before estimation, so coefficients measure the long-run effect of a one-standard-deviation change in the relevant institutional variable. Vertical bars denote robust 95 per cent confidence intervals. Long-run coefficients are computed as $\beta/(1-\rho)$. The figure illustrates the sensitivity of estimated institutional effects to proxy selection and shows whether the Fraser composite index remains distinctive once institutional measures are placed on a comparable scale.

The narrative structural reform indicators developed in Jalles (2026) produce similarly weak evidence for persistent inequality effects. When discrete labour-market liberalisation episodes are used instead of continuous institutional indices, the estimated effects on top-income concentration become considerably smaller and less persistent. Several reform episodes exhibit statistically weak or insignificant effects once productivity, unemployment and macroeconomic adjustment variables are incorporated.

This result is important because narrative reform indicators focus explicitly on identifiable policy interventions rather than gradual institutional trends. If labour-market deregulation were the dominant driver of Portuguese inequality dynamics, major liberalisation reforms would be expected to generate systematic and persistent increases in top-income concentration. Instead, the estimated responses appear heterogeneous, episodic and highly sensitive to broader macroeconomic conditions.

Taken together, these findings suggest that the institutional interpretation advanced by Alcobia and Leal (2026) is highly dependent on institutional measurement and variable construction. Once alternative institutional proxies and narrative reform indicators are

employed, the evidence supporting large and stable effects of labour-market deregulation on Portuguese inequality becomes considerably weaker.

4.4. Structural instability, endogeneity and dynamic interactions

The previous subsections showed that the institutional relationships emphasized by Alcobia and Leal (2026) weaken considerably once broader structural controls and alternative institutional measures are incorporated. An additional concern, however, is that the baseline framework implicitly assumes that the relationship between labour-market institutions and inequality remained stable throughout the entire 1980–2023 period.

This assumption is difficult to reconcile with the scale of the structural transformations experienced by the Portuguese economy during the sample horizon, including European integration, financial liberalisation, euro adoption, sovereign debt adjustment and the Covid-19 shock. These episodes fundamentally altered macroeconomic conditions, labour-market adjustment mechanisms and the broader institutional environment. Consequently, there are strong reasons to expect the relationship between labour-market institutions and distributive outcomes to vary across periods rather than remain constant over four decades.

This section therefore evaluates parameter stability, regime dependence and dynamic interactions using rolling regressions, recursive estimation, Bai–Perron structural-break tests, Vector Autoregressions (VARs), Granger-causality tests and local projections.

4.4.1. Rolling regressions and coefficient instability

The first exercise evaluates coefficient stability using rolling-window estimation:

$$\hat{\beta}_t = f(t)$$

where $\hat{\beta}_t$ denotes the estimated institutional coefficient obtained from rolling estimation windows centered around period t.

Rolling regressions allow institutional effects to evolve over time rather than imposing constant coefficients across the full sample. If the institutional interpretation advanced by Alcobia and Leal (2026) reflected a stable structural relationship, the estimated coefficients would remain broadly consistent across rolling windows. The results indicate otherwise.

Both institutional coefficients display substantial instability across subperiods together with extremely wide confidence intervals. The union-density coefficient fluctuates materially across rolling windows and remains imprecisely estimated throughout most of the sample. Although the coefficient is frequently negative, confidence intervals include zero in nearly all windows, indicating limited statistical support for a stable long-run relationship between unionisation and top-income concentration.

The labour-market regulation coefficient exhibits even greater instability, including sizeable movements in magnitude and occasional sign reversals across estimation windows. Importantly, the strongest estimated institutional effects appear concentrated around crisis-related periods rather than persisting uniformly throughout the full sample.

Taken together, the rolling regressions provide strong evidence that the institutional relationships emphasized by Alcobia and Leal (2026) are highly time-varying and strongly dependent on particular macroeconomic episodes.

Figure 5A. Rolling union-density coefficients

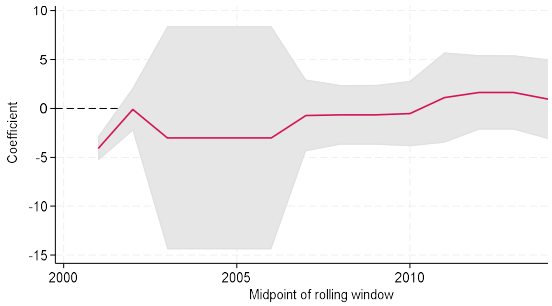
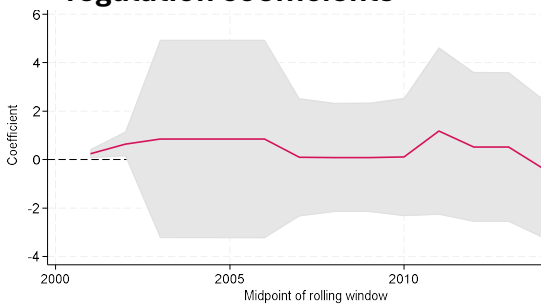


Figure 5B. Rolling labour-market regulation coefficients



Note: The figures report rolling long-run coefficient estimates obtained from parsimonious ARDL-style regressions for Portugal over the period 1980–2023. Panel A reports rolling estimates for union density, while Panel B reports rolling estimates for the Fraser labour-market regulation index. Each point corresponds to a 16-year rolling estimation window centered on the midpoint shown on the horizontal axis. Shaded areas denote robust 95 per cent confidence intervals. The dependent variable is the top 1 per cent income share. Long-run coefficients are computed as $\beta/(1-\rho)$. The figures illustrate substantial temporal instability, wide confidence intervals and considerable sensitivity of institutional effects across subperiods, particularly around major macroeconomic adjustment episodes.

4.4.2. Structural breaks and regime dependence

The analysis additionally evaluates parameter stability using Bai–Perron multiple structural-break tests. In practice, however, the Portuguese annual time-series setting imposes severe limitations on formal regime-specific estimation. Once lagged dependent variables, institutional indicators and macroeconomic controls are jointly included, the effective estimation sample collapses sharply, leaving insufficient observations for stable multi-regime estimation.

Appendix Table A4 reports the corresponding structural-break diagnostics. Most candidate break partitions generate failed estimations because at least one regime contains insufficient usable observations once lag structures and missing institutional data are taken into account.

Importantly, these failures do not imply the absence of structural breaks. Rather, they indicate that the empirical framework itself is highly fragile to plausible regime partitioning. In other words, the institutional relationships emphasized by Alcobia and Leal (2026) cannot be shown to remain stable once the sample is divided across historically meaningful macroeconomic regimes.

Recursive expanding-window estimations produce similar conclusions. Institutional coefficients vary materially depending on whether euro-era observations, crisis periods or post-Troika years are included in the estimation sample. Appendix Figures A1 and A2 report recursive long-run estimates for union density and labour-market regulation, respectively, and confirm substantial coefficient instability and limited statistical precision across recursive estimation windows.

The broader evidence therefore suggests that the estimated institutional effects are not stable structural parameters, but rather episodic relationships closely associated with particular macroeconomic adjustment periods.

4.4.3. Dynamic interactions and causality

An additional issue concerns endogeneity and reverse causality. The interpretation advanced by Alcobia and Leal (2026) implicitly assumes a predominantly one-directional causal mechanism running from labour-market deregulation toward rising inequality. Yet labour-market reforms frequently emerge in response to unemployment pressures, deteriorating competitiveness, macroeconomic crises and fiscal adjustment needs.

To evaluate these dynamics directly, the paper estimates parsimonious Vector Autoregressions (VARs), Granger-causality tests and local projections.

The baseline VAR specification is:

$$Z_t = A_0 + A_1 Z_{t-1} + \cdots + A_p Z_{t-p} + u_t$$

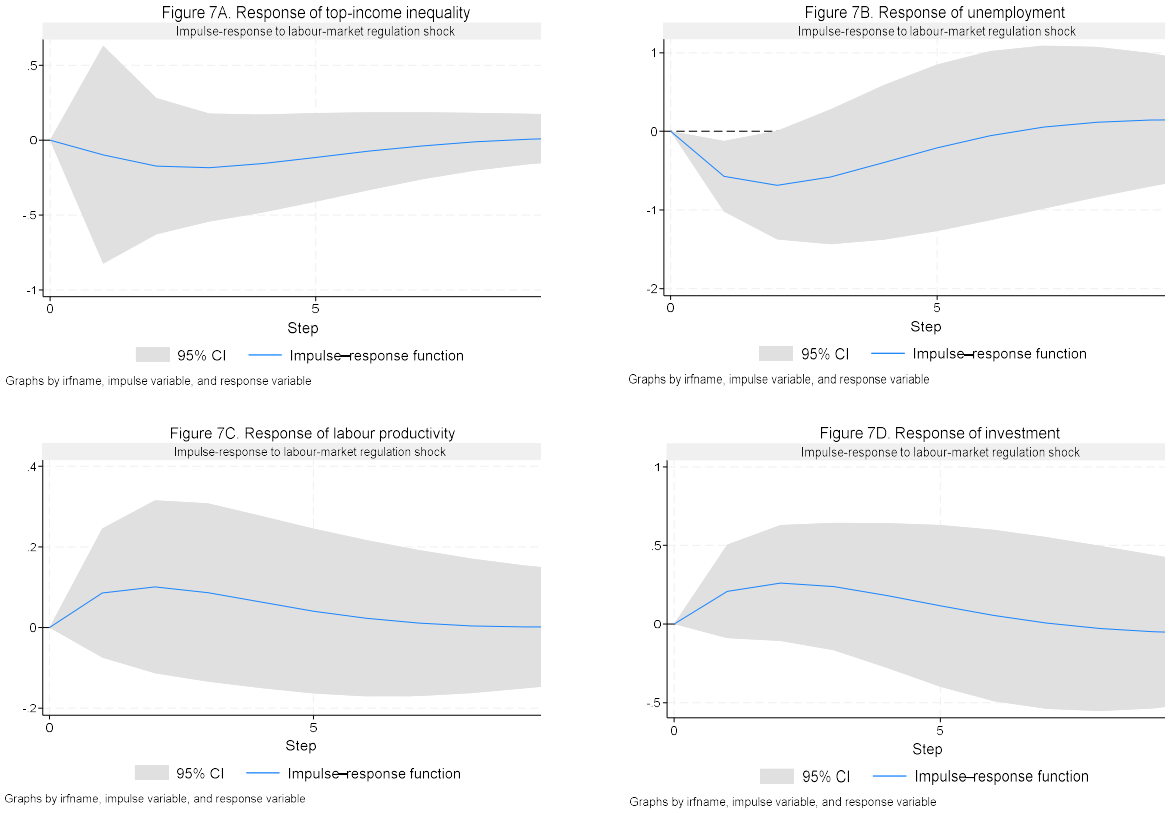
where $Z_t$includes inequality measures, labour-market institutional variables, unemployment, productivity and investment.

The impulse-response analysis yields three main findings. First, labour-market regulation shocks generate considerably weaker and less persistent responses in top-income inequality than implied by the baseline ARDL framework of Alcobia and Leal (2026). Figure 6A shows that the response of the top 1 per cent income share remains small and statistically imprecise throughout the forecast horizon.

Second, reforms associated with labour-market flexibility appear more strongly related to unemployment, productivity and investment dynamics than to persistent inequality responses. Figures 6B–6D show modest medium-term responses in unemployment, labour productivity and investment, although confidence intervals remain wide.

Third, the VAR evidence does not support a simple one-directional causal structure running from labour-market deregulation toward inequality. Instead, institutional reforms appear embedded within a broader macroeconomic adjustment process involving unemployment, productivity and competitiveness dynamics.

Figure 6. Dynamic responses to labour-market reform shocks



Note: Figure 6 reports impulse-response functions from a parsimonious VAR estimated on Portuguese annual data over the effective sample period 1995–2022. The system includes the top 1 per cent income share, standardized labour-market regulation, standardized unemployment, standardized labour productivity and standardized investment. The impulse variable is a one-standard-deviation shock to the Fraser labour-market regulation index. Shaded areas denote 95 per cent confidence intervals. Figure A reports the response of top-income inequality, Figure B the response of unemployment, Figure C the response of labour productivity and Figure D the response of investment. The results indicate that labour-market regulation shocks generate relatively weak and statistically fragile inequality responses, while broader macroeconomic responses appear more pronounced.

The Granger-causality and Toda–Yamamoto tests produce similar conclusions. Appendix Table A5 provides limited evidence that labour-market regulation systematically predicts subsequent top-income inequality. By contrast, unemployment, macroeconomic deterioration and inequality itself frequently precede subsequent institutional reforms.

The local projection estimates likewise suggest that labour-market reforms occasionally coincide with modest short-run increases in inequality, particularly during crisis periods, but these effects are quantitatively limited, statistically fragile and substantially less persistent than implied by the baseline institutional framework.

Overall, the evidence provides little support for a stable, strong and one-directional causal mechanism running from labour-market deregulation toward rising inequality. Instead, the Portuguese experience appears considerably more consistent with an endogenous and context-dependent interaction between institutional reform, macroeconomic adjustment and distributive outcomes.

4.5. Synthesis and Interpretation

The evidence presented in this section substantially weakens the strong institutional interpretation advanced by Alcobia and Leal (2026). Although the baseline correlations between labour-market institutions and inequality can be replicated, the estimated relationships prove highly sensitive to specification choice, institutional measurement, sample composition and structural instability.

More specifically, the estimated institutional effects weaken materially once broader controls for education, productivity, structural transformation and crisis episodes are incorporated. The results also depend heavily on the use of smooth composite institutional indices, particularly the Fraser labour-market regulation measure, while alternative institutional proxies generally produce weaker and less stable estimates.

Rolling regressions, structural-break exercises and dynamic specifications further indicate that the estimated institutional relationships are highly time-varying and concentrated around specific macroeconomic adjustment periods rather than representing stable long-run structural parameters. VARs, Granger-causality tests and local projections likewise provide limited support for a simple one-directional causal mechanism running from labour-market deregulation toward rising inequality.

Taken together, the evidence suggests that Portuguese inequality evolved jointly with broader processes of globalization, educational upgrading, structural modernization, financial integration and repeated macroeconomic adjustment episodes. Labour-market institutions may have influenced distributive outcomes at the margin, but the Portuguese evidence does not support the claim that labour-market deregulation constituted the dominant or stable driver of inequality dynamics over the last four decades.

The next section broadens the analysis beyond distributive outcomes alone and evaluates the relationship between labour-market reforms, productivity, unemployment and broader welfare performance.

5. Labour Market Liberalisation and Welfare Outcomes

The previous section showed that the institutional interpretation advanced by Alcobia and Leal (2026) weakens substantially once broader structural controls, alternative institutional measures, parameter instability and endogeneity concerns are explicitly considered. Although labour-market institutions remain correlated with certain inequality measures in baseline specifications, the evidence does not support the claim that labour-market deregulation constituted the dominant or stable causal driver of Portuguese inequality dynamics over the last four decades.

An additional limitation of the original framework is its predominant focus on distributive indicators, particularly top-income concentration. Labour-market institutions affect not only inequality, but also productivity, employment, investment, competitiveness and broader welfare outcomes. Consequently, reforms associated with greater labour-market flexibility may involve multidimensional trade-offs between equity, efficiency and economic adaptability.

This issue is especially relevant in the Portuguese case. Over the same period in which inequality evolved unevenly, Portugal also experienced major improvements in living standards, educational attainment, productive modernization and poverty reduction. Evaluating labour-market reforms exclusively through inequality indicators therefore risks providing an incomplete representation of their broader economic effects.

Against this background, the present section broadens the analysis beyond distributive outcomes alone and examines the relationship between labour-market reforms, productivity, unemployment, investment, poverty and broader welfare indicators using local projections and comparative OECD evidence.

5.1. Inequality, poverty and economic welfare

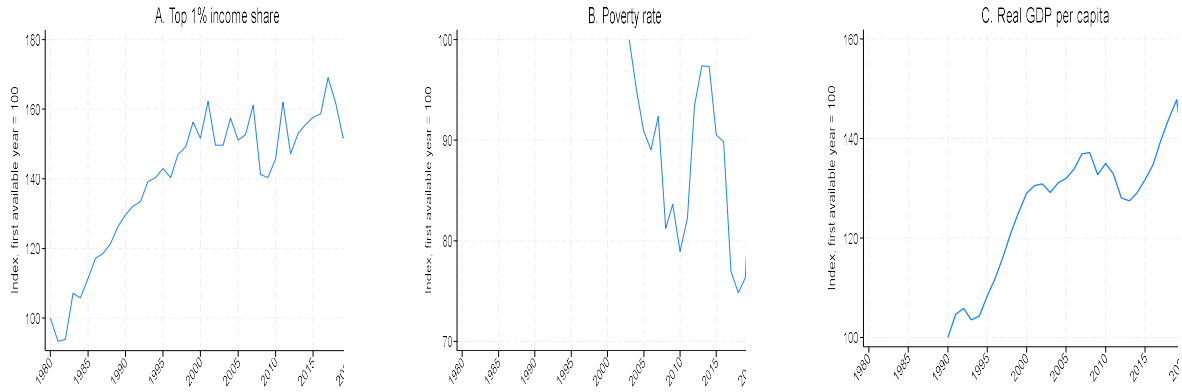
A central issue in the inequality literature concerns the relationship between distributive indicators and broader measures of economic welfare. Inequality measures capture relative dispersion within the income distribution rather than absolute living standards or aggregate welfare performance. Consequently, economies may simultaneously experience moderate increases in top-income concentration alongside declining poverty, rising incomes and improving productivity.

This distinction is particularly relevant in the Portuguese case. Since the mid-1980s, Portugal experienced substantial educational upgrading, productivity convergence and improvements in living standards despite uneven movements in inequality measures over time. Figure 7 illustrates this divergence directly.

While top-income concentration increased during parts of the sample, broader welfare indicators evolved more favourably. Real GDP per capita rose steadily over most of the period, while poverty indicators generally improved outside major crisis episodes, particularly during the sovereign debt adjustment period. The figure therefore highlights an important conceptual point: distributive indicators and broader welfare outcomes do not necessarily move together.

This does not imply that inequality is economically irrelevant. Rather, it suggests that evaluating labour-market reforms exclusively through top-income concentration risks overlooking broader changes in productivity, living standards and economic modernization that occurred simultaneously during Portugal's structural transformation process.

Figure 7. Inequality, poverty and welfare indicators in Portugal (1980–2023)



Note: This figure reports the evolution of selected distributive and welfare indicators in Portugal over the period 1980–2023, normalized to 100 in the first available year. Panel A reports the top 1 per cent income share, Panel B the poverty rate, and Panel C real GDP per capita. The figure illustrates the divergence between inequality dynamics and broader welfare outcomes. While top-income concentration increased over substantial parts of the sample, Portugal simultaneously experienced improvements in productivity, living standards and, over much of the period, poverty reduction. This suggests that distributive indicators alone may provide an incomplete representation of broader economic welfare dynamics.

5.2. Event-study evidence on labour-market reforms

To evaluate the dynamic effects of labour-market reforms more directly, the paper estimates event-study specifications around major Portuguese reform episodes. Unlike smooth institutional indices, event-study approaches focus on identifiable policy interventions and therefore provide a more direct assessment of whether major liberalisation episodes systematically altered distributive and macroeconomic outcomes.

The baseline specification is:

$$Y_t = \alpha + \sum_{h=-H}^{H} \beta_h D_{t+h} + \gamma X_t + \varepsilon_t$$

where $Y_t$denotes the outcome variable, D_{t+h}represents reform-period indicators indexed relative to reform implementation and $\beta_h$traces the dynamic response before and after reform episodes.

The analysis focuses on three major reform periods: the liberalisation process of the late 1980s, the labour-market reforms of the early 2000s, and the Troika adjustment programme between 2011 and 2014. The dependent variables include top-income inequality, labour productivity, unemployment, investment, poverty and median disposable income.

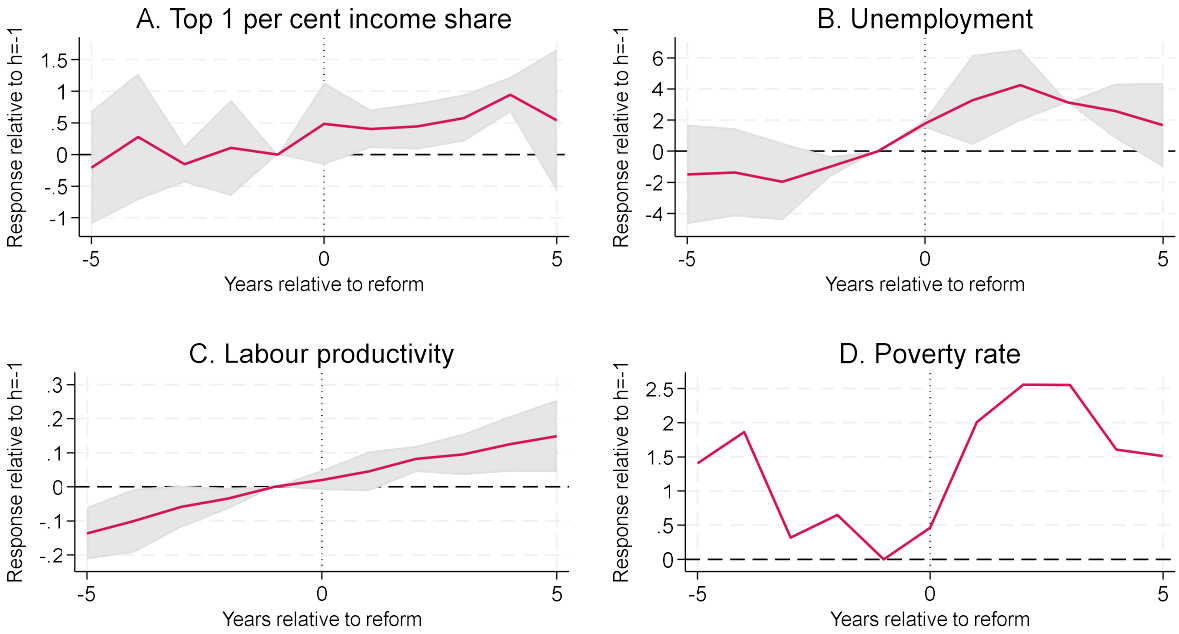
The results indicate considerably more heterogeneous dynamics than implied by the strongly distribution-focused interpretation advanced by Alcobia and Leal (2026). In several specifications, labour-market reforms are associated with modest increases in top-income concentration following reform implementation. However, these responses remain quantitatively limited and statistically imprecise.

By contrast, labour-market reforms appear more closely associated with broader macroeconomic adjustment dynamics. Unemployment rises around reform periods before gradually declining in subsequent years, while labour productivity exhibits modest medium-

term improvements following reform episodes. Poverty dynamics are more volatile and appear strongly influenced by broader crisis conditions.

Importantly, visible pre-trends emerge across several outcomes, suggesting that reforms were themselves implemented during periods of deteriorating macroeconomic conditions rather than representing fully exogenous institutional shocks. This reinforces the broader interpretation developed throughout the paper: labour-market reforms in Portugal appear embedded within wider macroeconomic adjustment processes rather than operating as isolated drivers of distributive change.

Figure 8. Event-study responses to major labour-market reforms



Note: Figure 8 reports descriptive event-time dynamics around major Portuguese labour-market reform episodes associated with the liberalisation process of the late 1980s, the early-2000s labour-market reforms and the Troika adjustment programme beginning in 2011. Outcomes are normalized relative to the year immediately preceding each reform episode ($h = -1$) and averaged across reform events. Panels report responses for the top 1 per cent income share, unemployment, labour productivity and the poverty rate. Shaded areas denote approximate 95 per cent confidence intervals based on cross-episode variation. The visible pre-trends and wide confidence intervals indicate substantial estimation uncertainty and support the interpretation that labour-market reforms were implemented within broader macroeconomic adjustment processes rather than as fully exogenous institutional shocks.

Overall, the event-study evidence provides limited support for the claim that labour-market deregulation generated large and persistent inequality effects independently of broader macroeconomic conditions. Instead, the estimated responses appear heterogeneous, context-dependent and closely intertwined with unemployment dynamics, crisis adjustment and productivity performance. Detailed estimates are reported in Appendix Table A6.

5.3. Local projections and medium-term reform dynamics

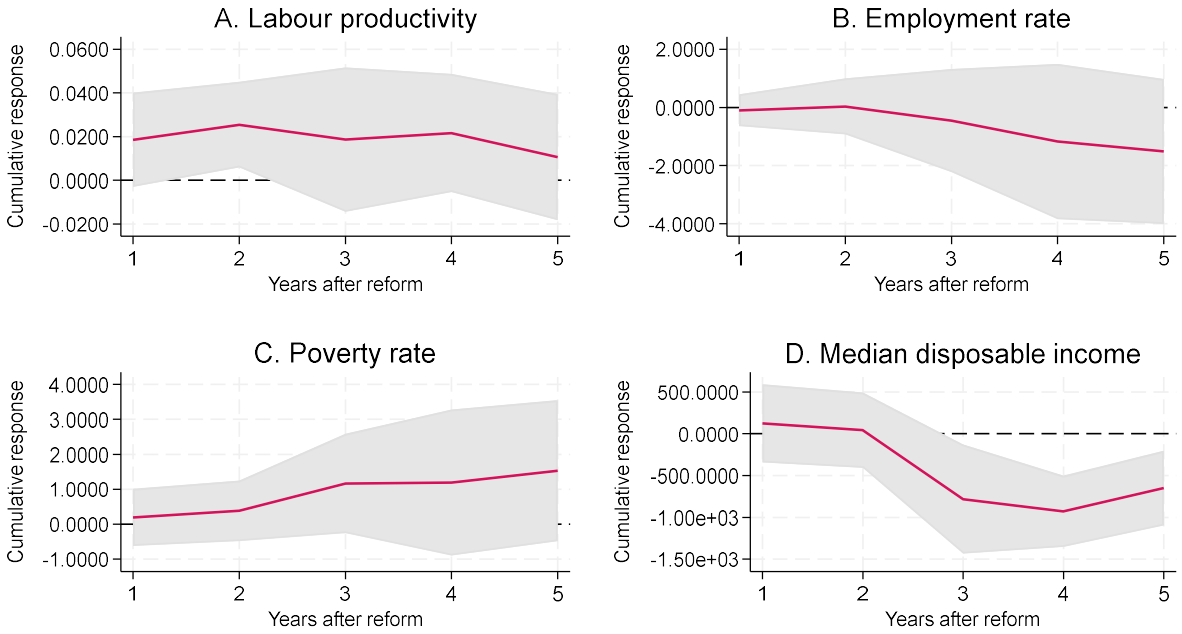
While the event-study analysis provides evidence on dynamics surrounding major reform episodes, institutional changes may also operate through more gradual medium-term adjustment channels. Labour-market reforms can affect labour reallocation, productivity, employment and welfare with substantial delays. To evaluate these dynamics, the paper estimates local projections following Jordà (2005):

$$Y_{t+h} - Y_t = \alpha_h + \beta_h Reform_t + \Gamma_h X_t + \varepsilon_{t+h}$$

where $Y_{t+h} - Y_t$denotes the cumulative change in the outcome between year $t$and horizon $t + h$, $Reform_t$is the aggregate labour-market reform index and $X_t$contains macroeconomic controls.

The estimates are reported for horizons of one to five years. Detailed results are presented in Appendix Table A7, while Figure 9 summarizes the medium-term responses.

Figure 9. Medium-term responses to labour-market reforms



Note: Figure 9 reports Portugal local-projection estimates over horizons of one to five years. The reform variable is an aggregate labour-market reform index constructed from available employment-protection, unemployment-benefit and labour-market reform indicators. The panels report cumulative responses of labour productivity, employment, poverty and median disposable income. Shaded areas denote robust 95 per cent confidence intervals. Detailed estimates are reported in Appendix Table A7.

The local-projection evidence suggests modest productivity gains following labour-market reforms. Productivity responses remain positive across most horizons and are statistically significant at shorter horizons, consistent with gradual efficiency and reallocation effects. By contrast, employment and welfare responses appear weaker and more uncertain. Employment-rate responses are generally negative but imprecisely estimated, with confidence intervals including zero across most horizons. Poverty

responses become mildly positive over the medium term, while median disposable income declines at longer horizons, although these estimates are also associated with substantial uncertainty.

Taken together, the local-projection evidence points toward a mixed pattern of medium-term adjustment effects. Labour-market reforms appear associated with modest productivity improvements, but the corresponding employment and welfare responses remain considerably more uncertain. More broadly, the results reinforce the central argument of the paper: labour-market reforms should be evaluated as multidimensional policy changes involving both efficiency gains and distributive trade-offs rather than through inequality indicators alone.

5.4. Comparative OECD evidence and heterogeneity analysis

The previous subsections focused primarily on Portugal. To assess external validity, this subsection estimates comparative OECD panel models using labour-market reform indicators across advanced economies. The objective is to evaluate whether labour-market reforms systematically generate large distributive effects once country-specific characteristics, common time shocks and macroeconomic controls are taken into account.

The baseline panel specification is:

$$Y_{it} = \alpha_i + \gamma_t + \beta Reform_{it} + \delta X_{it} + \varepsilon_{it}$$

where Y_{it}denotes inequality, productivity, employment, unemployment or poverty outcomes, $Reform_{it}$denotes labour-market reform indicators, $\alpha_i$are country fixed effects, $\gamma_t$are year fixed effects and X_{it}contains macroeconomic controls. Standard errors are clustered at the country level.

Table 2. Summary of comparative OECD panel evidence

Reform measure	Inequality effects	Productivity effects	Employment effects	Overall interpretation
EPL reforms	Weak / insignificant	Weak	Mildly negative	Mixed
UB reforms	Some positive inequality effects	Weak	Weak	Limited evidence
Labour-market index	Mixed	Insignificant	Negative employment association	Heterogeneous
Aggregate reform index	Weak inequality effects	Weakly positive	Negative employment association	Context dependent

Note: The table summarizes OECD fixed-effects panel estimates with country and year fixed effects and macroeconomic controls. Full coefficient estimates are reported in Appendix Table A8.

The comparative evidence provides limited support for the claim that labour-market liberalisation systematically generates large and persistent increases in inequality across OECD economies. Most reform indicators exhibit weak or statistically insignificant relationships with top-income concentration once country fixed effects and macroeconomic controls are incorporated.

Some specifications suggest modest distributive effects for particular reform categories, especially unemployment-benefit reforms, while broader labour-market indices occasionally display associations with disposable-income inequality or employment outcomes. However, these effects are not uniform across reform types, inequality measures or labour-market outcomes.

More broadly, the panel evidence points toward substantial heterogeneity in reform effects across institutional settings and macroeconomic environments. In several specifications, labour-market reforms appear more closely associated with employment adjustment and macroeconomic performance than with persistent inequality dynamics. This pattern is consistent with the broader interpretation developed throughout the paper: labour-market reforms generate multidimensional and context-dependent effects that cannot be reduced to a single stable institutional mechanism linking deregulation mechanically to rising inequality. Full regression results are reported in Appendix Table A8.

6. Conclusion

This paper reassessed the institutional interpretation of Portuguese inequality dynamics advanced by Alcobia and Leal (2026). Their central argument is that declining union density and labour-market liberalisation constituted the principal drivers of rising top-income concentration in Portugal between 1980 and 2023. While the baseline correlations reported in the original paper can be replicated under similar ARDL specifications, the broader evidence presented here suggests that these relationships are considerably less robust, less stable and more context-dependent than initially claimed.

Several findings emerge from the analysis.

First, the estimated institutional relationships prove highly sensitive to specification choice, institutional measurement and sample composition. Once broader controls for educational upgrading, productivity, sectoral transformation, financial development and macroeconomic crises are incorporated, the magnitude and statistical significance of the institutional coefficients weaken substantially. Moreover, the strongest results depend disproportionately on highly persistent institutional indicators estimated within extremely small effective samples, raising concerns regarding parameter instability, common trending behaviour and overparameterization.

Second, the evidence provides limited support for the existence of a stable long-run causal mechanism running from labour-market deregulation toward inequality. Rolling regressions, recursive estimation and structural-break diagnostics indicate substantial parameter instability across periods, particularly around major macroeconomic adjustment episodes. VARs, Granger-causality tests and local projections similarly suggest that labour-market reforms, unemployment, productivity and distributive outcomes evolved jointly within broader macroeconomic adjustment processes rather than through a simple one-directional institutional channel.

Third, the Portuguese experience appears difficult to reconcile with an interpretation centred predominantly on labour-market institutions alone. Between 1980 and 2023, Portugal underwent profound structural transformation involving European integration, educational convergence, technological modernization, globalization, financial deepening

and repeated macroeconomic crises. These developments simultaneously affected labour-market institutions, productivity dynamics, employment structures and distributive outcomes. Once these broader structural processes are taken into account, the independent contribution of labour-market deregulation to Portuguese inequality becomes considerably less clear-cut.

The paper also argues that labour-market reforms cannot be evaluated exclusively through inequality indicators alone. Labour-market institutions affect not only the distribution of income, but also labour allocation, productivity growth, investment incentives, competitiveness and employment dynamics. The broader welfare evidence presented here suggests that labour-market reforms may involve multidimensional trade-offs combining distributive effects with medium-term efficiency and adjustment gains. In the Portuguese case, periods of institutional liberalisation frequently coincided not only with changes in inequality, but also with improvements in productivity, modernization and living standards.

More broadly, the results caution against interpreting inequality itself as a sufficient summary measure of economic performance or institutional success. Distributive outcomes are important, but they represent only one dimension of broader welfare dynamics. Evaluating labour-market institutions therefore requires balancing concerns related to equity with considerations involving productivity, adaptability, competitiveness and long-run economic performance.

Taken together, the evidence presented throughout this paper does not support the claim that labour-market deregulation constituted the dominant or stable causal driver of Portuguese inequality over the last four decades. Rather, Portuguese inequality appears to have evolved within a much broader process of structural modernization and macroeconomic adjustment in which institutions, globalization, technological change, education and crisis dynamics interacted simultaneously. The Portuguese experience therefore appears more consistent with a multidimensional political-economy framework emphasizing trade-offs and structural transformation than with a narrowly institutional interpretation centred primarily on labour-market deregulation and bargaining power alone.

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APPENDIX

Appendix Table A1. Descriptive statistics and diagnostic tests

Variable	Obs.	Mean	SD	ADF p-level	ADF p-diff.	Order	AR(1)
top1_ptinc	44	9.690	1.350	0.070	0.000	I(1)	0.887
top10_ptinc	44	35.706	2.895	0.002	0.000	I(0)	0.877
top01_ptinc	44	2.553	0.526	0.490	0.000	I(1)	0.852
gini_market	44	51.314	0.918	0.587	0.236	Persistent	0.971
gini_disposable	44	32.927	1.021	0.276	0.308	Persistent	0.959
union_density	16	21.331	7.005	1.000	—	n.a.	0.955
fraser_labor_reg	28	4.570	0.745	0.372	0.003	I(1)	0.751
epl	20	3.944	0.623	0.914	0.491	Persistent	0.988
collective_bargaining	32	91.684	5.167	0.936	0.001	I(1)	1.016
ub_net_replacement	23	74.130	3.888	0.520	0.102	Persistent	0.823
real_minimum_wage	44	13062.658	2519.407	0.972	0.000	I(1)	1.050
temporary_employment	38	665.686	181.716	0.360	0.011	I(1)	0.910
growth	43	1.917	3.089	0.008	0.000	I(0)	0.335
gov_cons_gdp	44	17.279	2.515	0.390	0.001	I(1)	0.924
private_credit_gdp	23	122.723	23.478	0.838	0.476	Persistent	1.028
trade_open_gdp	44	68.178	11.436	0.892	0.000	I(1)	0.949
ln_lp_worker	44	10.819	0.325	0.609	0.002	I(1)	0.983
services_va_gdp	29	63.516	3.007	0.284	0.031	I(1)	0.944
industry_va_gdp	29	21.211	2.493	0.488	0.004	I(1)	0.974
agriculture_va_gdp	29	2.496	0.814	0.000	0.010	I(0)	0.828
debt_gg_gdp	44	79.857	30.838	0.599	0.083	Persistent	0.957
current_account_gdp	44	-3.902	4.832	0.084	0.002	I(1)	0.840
inflation	43	6.130	6.548	0.170	0.001	I(1)	0.918

Additional diagnostics

Diagnostic	Result
VIF, baseline model	25.652
Effective sample, baseline ARDL	11
Effective sample, baseline + productivity	11
Effective sample, alternative institutions	10
Effective sample, baseline + crisis controls	11
Effective sample, baseline + narrative reforms	11

Cointegration diagnostics

Relationship	Obs.	ADF residual	p-value
top1_ptinc – union_density	3	—	1.000
top1_ptinc – fraser_labor_reg	22	-3.145	0.023
top1_ptinc – trade_open_gdp	42	-1.974	0.298
top10_ptinc – union_density	3	—	1.000
gini_market – fraser_labor_reg	22	-0.118	0.948
gini_disposable – union_density	3	—	1.000

Appendix Table A2. Detailed Replication and Robustness Results for Alcobia and Leal (2026)

	Baseline ARDL	+ Structural Controls	+ Alternative Institutional Measures	+ Crisis Controls
Effective observations	11	11	10	11
Lagged dependent variable ((\rho))	0.473	0.473	0.677	-0.367
Union density coefficient	0.394	0.394	-1.025	0.064
(Std. error)	(0.272)	(0.272)	n.a.	n.a.
p-value	0.243	0.243	n.a.	n.a.
Long-run union-density effect	0.208	0.208	-3.171	0.047
Labour-market regulation coefficient	-0.150	-0.150	0.000	0.572
(Std. error)	(1.400)	(1.400)	n.a.	n.a.
p-value	0.921	0.921	n.a.	n.a.
Long-run labour-market regulation effect	-0.079	-0.079	0.000	0.416
Specification status	Estimable	Estimable	Degenerate / overfit	Degenerate / overfit

Notes: 1. Dependent variable: top 1 per cent pre-tax national income share. 2. Baseline specification includes lagged inequality, union density, Fraser labour-market regulation index, GDP per capita growth, government consumption, private credit and trade openness. 3. Structural-controls specifications additionally include combinations of productivity growth, educational attainment, sectoral transformation and financial-development variables. 4. Long-run effects are computed as $\beta/(1-\rho)$, where ρdenotes the coefficient on the lagged dependent variable. 5. “n.a.” indicates specifications with insufficient residual degrees of freedom, near-singular covariance matrices or unstable parameter estimates caused by overparameterization and collinearity. 6. Crisis-control specifications include sovereign debt crisis and Covid-19 adjustment dummies. 7. Full alternative specifications and sensitivity exercises are available upon request.

Appendix Table A3. Alternative institutional proxies and long-run inequality effects

Institutional proxy	Observations	Long-run coefficient	Standard error	Statistical significance
Fraser labour-market regulation	26	0.894	0.301	Significant at 5%
OECD EPL	20	-0.041	0.550	Not significant
Collective bargaining coverage	31	-0.042	0.077	Not significant
Unemployment-benefit replacement	22	-0.045	0.036	Not significant
Minimum wage indicator	42	0.0002	0.0004	Not significant
Temporary employment share	37	0.0012	0.0017	Not significant

Note: Long-run coefficients computed as $\beta/(1-\rho)$ from parsimonious ARDL specifications estimated using annual Portuguese data. Robust standard errors are reported. Controls include output growth and trade openness. Confidence intervals displayed in Figure 5 correspond to robust 95 per cent intervals.

Appendix Table A4. Structural-break diagnostics and regime feasibility

Specification / regime	Candidate break(s)	Effective observations	Estimation feasible?	Key result
One-break search	1990–1994	0 / 12	No	Insufficient pre-break observations
One-break search	1995–1999	0 / 11	No	Degenerate specification
Two-break search	1990 / 2006–2008	0 / 0 / 7	No	Regime partition infeasible
Two-break search	1990 / 2009–2015	0 / 7–10 / 0	No	Near-singular covariance matrix
Pre-EMU regime	1980–1998	—	No	Insufficient overlapping observations
EMU pre-GFC regime	1999–2007	—	No	Sample collapse after lag structure
Post-GFC regime	2008–2023	7	Yes	Institutional coefficients statistically insignificant
Post-Troika regime	2015–2023	—	No	Insufficient residual degrees of freedom
Full sample	1980–2023	13	Yes	Weak and unstable institutional estimates

Note: The table summarizes one-break, two-break and regime-specific estimation diagnostics for ARDL-style specifications relating labour-market institutions to the top 1 per cent income share in Portugal. The effective estimation sample becomes severely constrained once lagged dependent variables, institutional indicators and macroeconomic controls are jointly included. Most candidate break partitions and subperiod specifications fail because the resulting regimes contain insufficient overlapping observations to estimate the full specification with positive residual degrees of freedom. The only estimable subperiod specification (post-GFC) yields highly imprecise and statistically insignificant institutional coefficients. Collectively, the diagnostics indicate that formal structural-break inference and regime-specific estimation are severely limited by sample fragility and parameter instability.

Appendix Table A5. Granger and Toda–Yamamoto causality tests

Direction of causality	Test	F-statistic	p-value	Observations	Interpretation
Labour regulation → Top income share	Granger	0.004	0.952	22	No predictive relationship
Top income share → Labour regulation	Granger	2.309	0.147	22	Weak reverse-direction evidence
Unemployment → Labour regulation	Granger	2.925	0.104	22	Suggestive macroeconomic endogeneity
Labour regulation → Unemployment	Granger	3.658	0.072	22	Weak labour-market adjustment effect
Labour regulation → Top income share	Toda–Yamamoto	0.001	0.974	21	No robust directional causality
Top income share → Labour regulation	Toda–Yamamoto	1.704	0.210	21	Weak reverse-direction evidence
Unemployment → Labour regulation	Toda–Yamamoto	0.542	0.472	21	No stable predictive relationship

Note: The table reports parsimonious Granger and Toda–Yamamoto causality tests estimated using Portuguese annual data. Variables are standardized where appropriate. The results provide little evidence of a robust one-directional predictive relationship running from labour-market regulation toward top-income inequality. Several specifications instead suggest that institutional reforms may themselves respond to broader macroeconomic conditions, particularly unemployment dynamics.

Appendix Table A6. Event-study responses around major Portuguese labour-market reforms

Event time	Top 1% share	Unemployment	Labour productivity	Poverty rate
-5	-0.207	-1.490	-0.137	1.405
-4	0.280	-1.360	-0.100	1.864
-3	-0.153	-1.955	-0.059	0.317
-2	0.103	-1.005	-0.035	0.651
-1	0.000	0.000	0.000	0.000
0	0.487	1.770	0.020	0.462
1	0.407	3.290	0.045	2.009
2	0.447	4.250	0.081	2.560
3	0.577	3.140	0.095	2.552
4	0.947	2.575	0.125	1.605
5	0.540	1.675	0.149	1.514

Note: The table reports average descriptive event-time responses around the 1989, 2003 and 2011 Portuguese labour-market reform episodes. Outcomes are measured relative to the year immediately preceding each reform episode ($h = -1$). The table corresponds to Figure 8 and should be interpreted descriptively given the small number of reform episodes and the presence of visible pre-trends.

Appendix Table A7. Portugal local-projection estimates

Panel A. Labour productivity responses

Horizon	Beta	Std. error	95% CI	N
1	0.019	0.011	[-0.003, 0.040]	22
2	0.025	0.010	[0.006, 0.045]	21
3	0.019	0.017	[-0.014, 0.052]	20
4	0.022	0.014	[-0.005, 0.049]	19
5	0.011	0.015	[-0.018, 0.040]	18

Panel B. Employment-rate responses

Horizon	Beta	Std. error	95% CI	N
1	-0.098	0.277	[-0.642, 0.445]	22
2	0.033	0.489	[-0.926, 0.992]	21
3	-0.453	0.903	[-2.222, 1.317]	20
4	-1.173	1.359	[-3.837, 1.491]	19
5	-1.516	1.270	[-4.004, 0.972]	18

Panel C. Poverty-rate responses

Horizon	Beta	Std. error	95% CI	N
1	0.194	0.417	[-0.623, 1.011]	20
2	0.381	0.440	[-0.482, 1.243]	19
3	1.165	0.724	[-0.254, 2.584]	18
4	1.190	1.064	[-0.895, 3.275]	17
5	1.531	1.029	[-0.486, 3.547]	16

Panel D. Median disposable income responses

Horizon	Beta	Std. error	95% CI	N
1	124.1	238.3	[-343.1, 591.2]	13
2	42.5	229.9	[-408.1, 493.1]	12
3	-781.7	332.5	[-1433.4, -130.1]	11
4	-927.7	217.2	[-1353.3, -502.1]	10
5	-650.2	227.8	[-1096.7, -203.7]	9

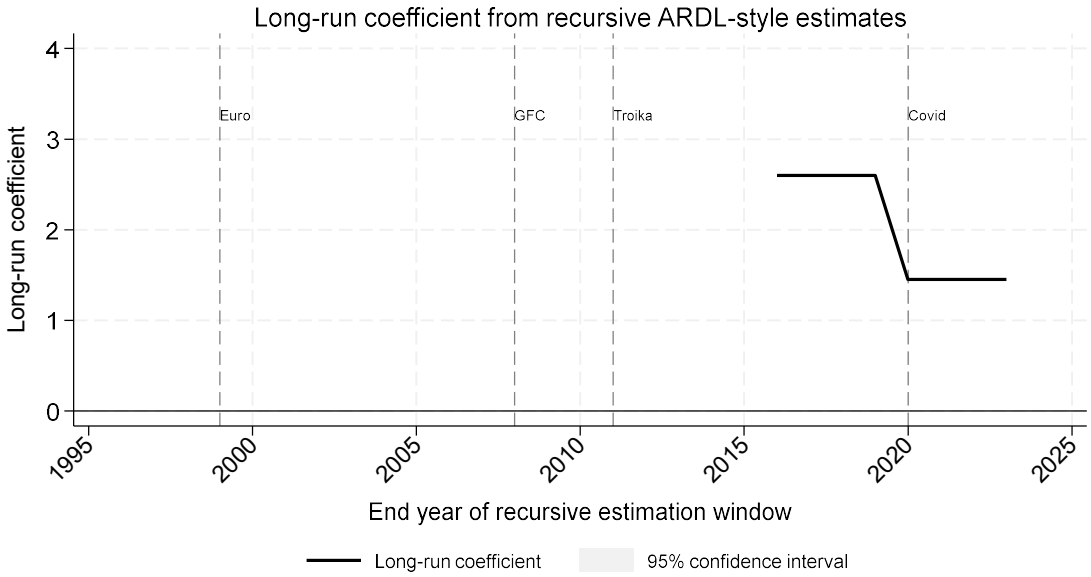
Note: The table reports Portugal local-projection estimates over horizons of one to five years. The reform variable is the aggregate labour-market reform index. Confidence intervals correspond to robust 95 per cent intervals.

Appendix Table A8. Full OECD fixed-effects panel estimates

Reform indicator	Outcome	Coefficient	Std. error	p-value	Observations	(R^2)
EPL reforms	Top 1% income share	-0.267	0.304	0.388	835	0.583
EPL reforms	Disposable-income Gini	0.065	0.227	0.776	807	0.501
EPL reforms	Labour productivity	-0.007	0.016	0.675	835	0.798
EPL reforms	Employment rate	-0.432	0.269	0.121	774	0.220
EPL reforms	Unemployment rate	0.340	0.214	0.124	665	0.272
EPL reforms	Poverty rate	-0.081	0.109	0.464	387	0.225
UB reforms	Top 1% income share	0.460	0.218	0.045**	835	0.583
UB reforms	Disposable-income Gini	-0.372	0.252	0.152	807	0.502
UB reforms	Labour productivity	-0.033	0.032	0.319	835	0.798
UB reforms	Employment rate	-0.540	0.496	0.287	774	0.220
UB reforms	Unemployment rate	0.364	0.444	0.419	665	0.271
UB reforms	Poverty rate	-0.149	0.212	0.488	387	0.225
Labour-market index	Top 1% income share	-0.965	3.207	0.765	719	0.372
Labour-market index	Disposable-income Gini	7.652	2.736	0.007***	1709	0.263
Labour-market index	Labour productivity	-0.044	0.267	0.870	2016	0.601
Labour-market index	Employment rate	-6.459	3.300	0.054*	1281	0.125
Labour-market index	Unemployment rate	6.700	4.282	0.121	1451	0.137
Labour-market index	Poverty rate	5.915	4.292	0.177	248	0.264
Aggregate reform index	Top 1% income share	-0.050	0.125	0.693	979	0.374
Aggregate reform index	Disposable-income Gini	0.542	0.308	0.082*	1944	0.263
Aggregate reform index	Labour productivity	0.008	0.025	0.752	2276	0.611
Aggregate reform index	Employment rate	-0.559	0.262	0.036**	1529	0.119
Aggregate reform index	Unemployment rate	0.480	0.259	0.067*	1695	0.140
Aggregate reform index	Poverty rate	-0.035	0.075	0.645	449	0.200

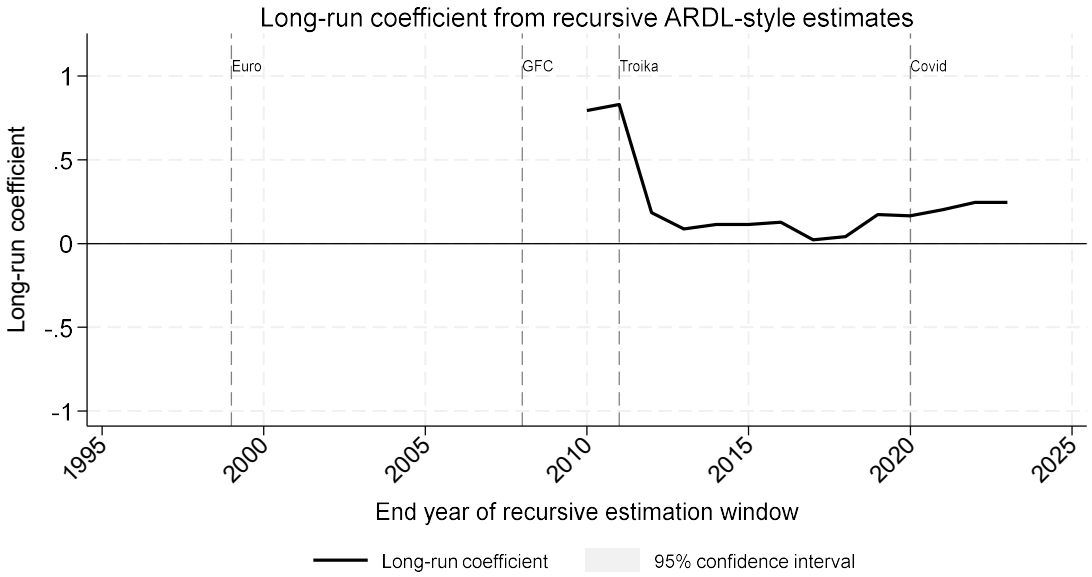
Note: The table reports OECD fixed-effects panel estimates with country and year fixed effects and macroeconomic controls. Standard errors are clustered at the country level. Reform indicators include Employment Protection Legislation (EPL) reforms, unemployment-benefit (UB) reforms, a composite labour-market institutional index and an aggregate reform index constructed from narrative structural reform indicators. Outcome variables include distributive, productivity, employment and poverty measures. Table 2 in the main text presents a condensed summary of the principal findings.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix Figure A1. Recursive estimates of the union-density coefficient



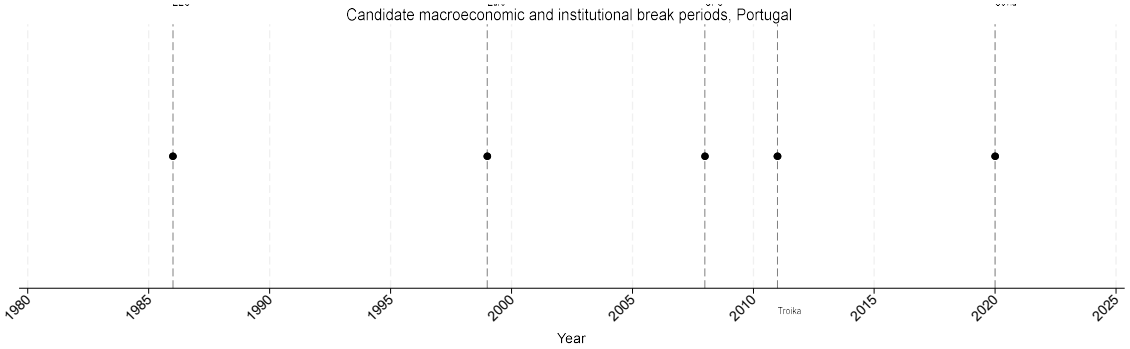
Note: The figure reports recursive long-run coefficient estimates for standardized union density obtained from parsimonious ARDL-style specifications estimated recursively over the Portuguese annual sample. The dependent variable is the top 1 per cent income share. Shaded bands denote robust 95 per cent confidence intervals. Vertical dashed lines identify major macroeconomic and institutional regime shifts, including European Economic Community accession (1986), euro adoption (1999), the Global Financial Crisis (2008), the Troika adjustment programme (2011) and the Covid-19 shock (2020). The figure illustrates substantial temporal instability, limited statistical precision and strong sensitivity of estimated union-density effects across recursive estimation windows, reflecting the short annual sample and limited overlap in institutional data availability.

Appendix Figure A2. Recursive estimates of labour-market regulation coefficients



Note: The figure reports recursive long-run coefficient estimates for the standardized Fraser labour-market regulation index obtained from parsimonious ARDL-style specifications estimated recursively over the Portuguese annual sample. The dependent variable is the top 1 per cent income share. Shaded bands denote robust 95 per cent confidence intervals. Vertical dashed lines identify major macroeconomic and institutional regime shifts, including European Economic Community accession (1986), euro adoption (1999), the Global Financial Crisis (2008), the Troika adjustment programme (2011) and the Covid-19 shock (2020). The figure indicates substantial coefficient instability and sensitivity of labour-market regulation estimates across recursive estimation windows, particularly around major macroeconomic adjustment episodes.

Appendix Figure A3. Structural-break diagnostics



Note: The figure summarizes candidate structural-break periods identified using Bai–Perron-style multiple-break diagnostics applied to parsimonious institutional inequality regressions for Portugal. Vertical dashed lines indicate major macroeconomic and institutional regime shifts associated with European integration, euro adoption, the Global Financial Crisis, the Troika adjustment programme and the Covid-19 shock. The diagnostics suggest substantial parameter instability and reinforce the difficulty of identifying stable long-run institutional relationships within a short annual time-series framework.