Trade unions and income inequality: Evidence from a panel of European countries

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Abstract. *This article examines the relationship between trade unions and rising income inequality observed in advanced economies in recent decades. The role of trade unions in addressing increasing income inequality has been overlooked in empirical studies, despite its theoretical ambiguity. The baseline empirical model, estimated for 26 European countries from 2005 to 2018, specifies income inequality as a function of the trade union density rate, its squared value, and a set of control variables. Labour market institutions, other than unions, are incorporated into the model to assess the distributional effects of union density within the entire institutional framework. The authors find that union density has a statistically significant and persistent inverted U-shaped relationship with income inequality.*

Keywords: *income inequality, trade unions, labour market institutions, Europe.*

1. Introduction

Over the past few decades, different measures of income inequality have indicated a heightened inequity across most developed economies, after years of moderation (Hoffmann, Lee and Lemieux 2020; OECD 2011; OECD 2015). Increasing inequality and the associated adverse social and economic effects have given rise to an extensive debate on the causes of such inequality, which has been facilitated by the advancement of data availability (Stiglitz 2012; Wilkinson and Pickett 2010). Much of the related research has largely focused on the role of globalization and technological changes in the increase in income inequalities, while the possibility that this development may be due to differences in trade union membership and, more generally, to differences in labour market institutions, has been relatively overlooked (Checchi and García-Peñalosa 2008).

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Nevertheless, exogenous movements in the relative demand for labour skills due to shifting trade patterns or skill-biased technical change is expected to be fairly similar across developed countries, provided that they form part of a common global environment in which uniform access to technology and integrated trade are present (Koeniger, Leonardi and Nunziata 2007). Thus, inter-country and intra-country variations in features which are more country-specific, such as trade union membership, could potentially provide a better explanation of differences in the developments of income inequality across countries that are at a similar stage of economic development. Inequalities are deeply rooted in the economic and social structure of a country, and therefore it is crucial to take into account the institutional context in which skill-biased technological change and globalization occur (Atkinson 2015). Assessing the redistributional role of trade unions, which are key players in the labour market, is also imperative, since inequalities in labour earnings have predominantly contributed to rising overall income inequality (Hoeller, Joumard and Koske 2014).

In this article, we examine the empirical relationship between trade unions and income inequality in developed countries. Motivated by the conflicting empirical findings, we assess whether the union–inequality relationship is non-linear in nature. We use a sample of 26 European countries for the period 2005–18 to ascertain how much of the variation in income inequality can be attributed to inter-country and intra-country differences in relative union membership. In light of marked heterogeneity in income disparities and trade union membership across Europe, as well as the drastic institutional[1] and distributional changes in recent years, there is a sound prima facie basis for exploring the link between trade unions and income inequality in Europe. The article is structured as follows: the second section provides the background of the article and indicates its contribution to the relevant literature, while the third section describes the method applied. The fourth section contains the empirical results, the fifth section presents a discussion on the literature and findings, and the sixth section concludes.

2. Background and contribution

From a theoretical viewpoint, wage inequality, unemployment and the labour income share are the primary channels through which trade unions and other labour market institutions affect the distribution of income (Checchi and García-Peñalosa 2008). Empirical studies have generally concluded that falling union membership rates have been associated with increasing wage inequality (Card, Lemieux and Riddell 2004; Koeniger, Leonardi and Nunziata 2007; Kristal and Cohen 2017; Western and Rosenfeld 2011). This evidence adheres to the theoretical notion that unions help to raise the outside option for unskilled workers, more so than for skilled workers, thereby helping to strengthen their bargaining position and reducing wage disparities emanating from skill differentials (for

[1] Institutional changes in this article refer to developments across a wide variety of labour market institutions or policies, including minimum wages, employment protection legislation and unemployment benefits.

example, Koeniger, Leonardi and Nunziata 2007). Nonetheless, at least from a theoretical perspective, it is conventionally considered that, while increased trade union density results in higher bargaining power, it also pushes wages above the competitive labour market equilibrium level, thus reducing employment, potentially creating unemployment and augmenting income inequality (Herzer 2014). In a similar vein, some studies (for example, Rueda 2007) have argued that increased unionization creates an insider–outsider dichotomy within the labour market, which has contributed to the increased levels of precarious employment and temporary contracts that have proliferated in recent years, and which may also contribute to higher levels of inequality. However, some authors (for example, Grimshaw et al. 2017) maintain that decreased trade union membership has contributed to the increase in precarious work, reflecting broader changes in industrial relations.

In this article, we combine both sides of this theoretical debate by postulating an inverted U-shaped relationship between trade unionization and income inequality, measured through the Gini coefficient. Estimating this relatively underexplored correlation with income inequality, which is a relatively broader measure of inequality, captures the effect of unions not only on wage inequality but also on other factors, particularly unemployment, which is also influenced by union activity (Nickell 1997). This enables us to assess the overall distributional outcomes of unions. Thus, as union density increases initially, it results in higher inequality due to higher wages and resultant falling employment; however, as unionization rises further, the increase in bargaining power for workers outflanks any unemployment pressures, resulting in a downturn in income inequality.

From an empirical perspective, although several studies report that increased trade union membership reduces wage inequality, a few studies show that increasing unionization causes unemployment to rise (Nickell 1997; Nickell, Nunziata and Ochel 2005). Furthermore, Bentolila and Saint-Paul (2003) postulate that increasing union power can lead to a higher or a lower wage share, which in turn has an indeterminate effect on income inequality (Checchi and García-Peñalosa 2010). These studies suggest that the overall impact of increased bargaining power of trade unions on income inequality is ambiguous.

Despite the ambiguity regarding the overall distribution of income, relatively few studies have been conducted to assess the net effect of relative union membership on income distribution, and conflicting results have been reported across those studies. The studies by Herzer (2016) and Hu and Hanink (2018) on the United States of America, Herzer (2014) on Ireland, and Alderson and Nielsen (2002) on a sample of OECD countries, confirm the deunionization argument that a substantial part of the increasing trend in income inequality across developed countries can be attributed to declining unionization. In contrast, Checchi and García-Peñalosa (2010) find that unionization leads to greater income inequality, given that increased unemployment is only partially offset by decreased wage inequality, whereas Partridge, Rickman and Levernier (1996) and Checchi and García-Peñalosa (2008) find the impact of union density on the income distribution to be statistically insignificant.

This article extends the scant literature examining the relationship between trade unions and income inequality in various directions. Firstly, we specify income inequality as a function of a measure for union presence, the net trade union density rate and its squared value, as well as macroeconomic variables and population characteristics, which have been commonly identified as correlates of income inequality. Through the inclusion of union density and its squared value in this estimation, we allow for non-linearity in the union–inequality relationship. The latter addition has not been empirically tested within this field of literature and could account for the conflicting results reported in prior research. This article also sheds light on the theoretical basis behind the presence of such a curvilinear relationship.

This baseline model is then extended to include measures for other labour market institutions, namely minimum wages, an employment protection legislation proxy, unemployment benefit replacement rates and the tax wedge. This approach will serve to assess the empirical robustness of the union–inequality curvilinear relationship identified in the baseline model, particularly given that, aside from the level of unionization, the effectiveness of trade unions also depends on the institutional framework that supports labour market policies. In other words, the relationship between trade unions and the income distribution may depend on the existing institutional framework, since labour market institutions tend to be clustered (Koeniger, Leonardi and Nunziata 2007; Bassanini and Duval 2009; O'Higgins and Pica 2020). Additionally, the distributional effect of this institutional framework is not strongly evidenced by the literature and the results are often conflicting (Checchi and García-Peñalosa 2008). In fact, even fewer studies have sought to explain the somewhat ambiguous distributional impact of a set of labour market institutions. For instance, Atkinson et al. (2017) argue that the minimum wage is negatively associated with income inequality. However, Checchi and García-Peñalosa (2010) find that the negative effects of minimum wages on employment offset the reduction in wage inequality, resulting in increased income inequality.

Besides the inclusion of other labour market institutions and a comprehensive set of control variables, the panel structure of the data in this article has the advantage of capturing time-invariant unobservable factors specific to each country which may also impact the relationship between trade unions and income inequality. In contrast to earlier studies in this field, we use a balanced panel with a broader geographical coverage consisting of 26 European countries and a more recent time period, from 2005 to 2018. This period was characterized by significant labour market reforms, which distinguishes our research from previous works in the literature.

3. Method

3.1. Geographical and time coverage

We empirically estimate the hypothesized union–income inequality relationship using a balanced panel of 26 European countries over the period 2005–18, gathering a sample of 364 observations. The countries include 22 European

Union (EU) Member States, the United Kingdom, Norway, Switzerland and Iceland.[2]

The choice of starting year for the panel dataset is limited, since the data source for the income inequality variable, the EU Statistics on Income and Living Conditions (EU-SILC) survey, is relatively recent. Nevertheless, as the 2004 enlargement of the EU resulted in agreements that affect the labour market and its related institutions, using an earlier starting year would have led to comparability issues. Therefore, the time period selected examines the relationship between trade unions and income inequality in the early stages and peak of, and the subsequent recovery from, the 2008 financial crisis. Previous empirical studies did not examine the union–inequality relationship during this recent period in which a number of austerity-driven labour market reforms were implemented in many European countries. These reforms consisted of various interventions such as minimum wage cuts and freezes (Schulten and Müller 2015) and an application of a stricter criterion for the extension of collective agreements, which reinforced the trend of decentralized collective bargaining, resulting in a further shift towards the enterprise level from the national or sector level (Eurofound 2014; Keune 2015).

The geographical coverage of the sample chosen aligns with the objective of this article, which is to explain the role of labour market institutions in the resurgence of income inequality in advanced countries. It is also relatively extensive compared with the geographical coverage of other empirical studies on this relationship, which use data for a smaller number of countries, typically around 16 OECD countries (Alderson and Nielsen 2002; Checchi and García-Peñalosa 2008; Checchi and García-Peñalosa 2010) or individual countries (Herzer 2014 and 2016).

3.2. Empirical models

Initially, a baseline model is estimated to analyse the hypothesized relationship between trade unions and income inequality. In this model, the Gini coefficient, the measure for income inequality, is regressed on the net trade union density rate and several control variables that are generally accepted to be correlates of income inequality in the literature. This is specified in equation (1). Squared values of the union density independent variable are included, allowing for a non-linear correlation.

The baseline model is then augmented to incorporate other labour market institutions so as to reduce the possibility of obtaining biased coefficients in view of institutional clustering (O'Higgins and Pica 2020). The impact of other labour market institutions on income inequality is also relatively underexplored (Checchi and García-Peñalosa 2008) and can further explain variations in income inequality across countries and over time. Thus, the inclusion of other labour market institutions will allow us not only to reaffirm the impact of trade unions on income inequality, but also to analyse the distributional effects of other labour

[2] Five EU Member States, Bulgaria, Croatia, Cyprus, Malta and Romania, were excluded from the sample due to data omissions.

market institutions. As reflected in equation (2), measures for the minimum wage, unemployment benefits, an employment protection legislation proxy and the tax wedge have been added to the initial set-up.

$$Gini_{it} = \beta_0 + \beta_1 TUD_{it} + \beta_2 (TUD_{it})^2 + \beta_3 Trade_{it} + \beta_4 SocialExp_{it} + \beta_5 Edu_{it} + \beta_6 Female_{it} + \beta_7 Pop_{it} + \alpha_i + u_{it} \quad (1)$$

$$Gini_{it} = \beta_0 + \beta_1 TUD_{it} + \beta_2 (TUD_{it})^2 + \beta_3 Kaitz_{it} + \beta_4 Benefit_{it} + \beta_5 LFI_{it} + \beta_6 Tax_{it} + \beta_7 Trade_{it} + \beta_8 SocialExp_{it} + \beta_9 Edu_{it} + \beta_{10} Female_{it} + \beta_{11} Pop_{it} + \alpha_i + \in_{it} \quad (2)$$

where:

i = Country (where i = 1, 2 …, 26)

t = Year (where t = 2005, 2006 …, 2018)

$Gini_{it}$ = Gini coefficient in country i for year t

TUD_{it} = Trade union density rate in country i for year t

$Kaitz_{it}$ = Kaitz index in country i for year t

$Benefit_{it}$ = Net replacement rate in unemployment in country i for year t

LFI_{it} = Labour freedom index in country i for year t

Tax_{it} = Tax wedge in country i for year t

$Trade_{it}$ = Trade openness in country i for year t

$SocialExp_{it}$ = Expenditure on social protection as a share of GDP in country i for year t

Edu_{it} = Tertiary education attainment as a share of the population in country i for year t

$Female_{it}$ = Female labour force participation rate in country i for year t

Pop_{it} = Share of population aged 65 or over in country i for year t

α_i = Unobserved country-specific heterogeneity

u_{it}, $\in_{it}$ = Random disturbance terms

3.2.1. Description of variables

A description of the variables, their sources and descriptive statistics are provided in table 1. The dependent variable in this article is measured by the Gini coefficient of the equivalized household disposable income after social transfers, in line with the voluminous literature on income distribution (for example, Alderson and Nielsen 2002). To explain variation in income inequality, particularly cross-country variances, the preferred measure for income inequality would be the post-government transfers income distribution, rather than market income inequality. The primary reason for this is that governments have different preferences regarding the policy tools required to reach a more egalitarian income distribution (Mahler 2004). While policies on market income, such as structural policies relating to education or the labour market, are the

preferred tool for some governments to address income inequality, other governments rely more heavily on tax and transfer systems to influence distributional outcomes (Hoeller, Joumard and Koske 2014).[3] Data for the Gini coefficient for the full population has been obtained from the EU-SILC survey owing to its high degree of standardization, which makes the data consistent across countries and over time.

Trade union strength, the key independent variable, is captured through the inclusion of the net trade union density variable – the share of employed wage and salary earners who are union members – which is the most-used measure of unionization (Herzer 2014). Given its inherently comparative nature, the union density rate constitutes a more accurate measure of the actual representation and influence of unions in the workforce than solely union membership level values. Union coverage data would have been a more extensive measure of union strength given the possibility that collective agreement coverage may also extend to non-unionized workers in certain countries or sectors. Nevertheless, union coverage data is limited (Koeniger, Leonardi and Nunziata 2007). Country-fixed effects should mitigate the difference in these trade union strength measures, particularly with the inclusion of time-fixed effects and other controls.

As mentioned earlier, empirical studies have reported mixed results regarding the impact of trade unions on income dispersion. Therefore, it is possible that trade union activities can initially increase income inequality but, beyond a certain point, may reduce income inequality, or vice versa. Moreover, the same institutions can have dissimilar effects in different countries or at different times, further increasing the possibility of a curvilinear relationship (Fialová and Schneider 2009). To empirically test the hypothesized non-linear relationship, squared values of the net trade union density rate have been included within the model. The inclusion of squared values of the key explanatory variables is a novel aspect in this field of literature and may account for the conflicting results reported in previous studies.

Several explanatory variables are added to the baseline model as control variables to reflect the wider debate on the determinants of income inequality, namely: trade openness; social spending; educational levels; female activity rates; and population ageing. There is growing evidence of the link between income inequality measures and trade openness (Gourdon, Maystre and de Melo 2008) and redistributive social spending (Afonso, Schuknecht and Tanzi 2010). Empirical studies also assess the role of education (De Gregorio and Lee 2002), female labour participation rates (Alderson and Nielsen 2002) and an ageing population (Peichl, Pestel and Schneider 2012) in the dispersion of household income. Although the model includes the main variables postulated in the literature, the list of controls is invariably non-exhaustive.

[3] Nevertheless, the estimated union–inequality relationship is also present when replacing the dependent variable to income inequality pre-social transfers sourced from the EU-SILC survey (Eurostat, "Activity Rates by Sex, Age and Citizenship (%)" (data file), https://data.europa.eu/data/datasets/xq2lvhylu6tw9ckau7ka?locale=en) and this relationship also remains intact when time-specific fixed effects are included.

Table 1. Description of variables

Variable name	Description	Mean (std. dev.)	Minimum	Maximum	Source
Gini coefficient	Gini coefficient of equivalized household disposable income post-social transfers (0 = perfect income equality, 100 = perfect income inequality)	29.173 (3.899)	20.900	38.900	Eurostat[1]
Net trade union density rate	Net union members as a share of wage and salary earners in employment	30.203 (21.942)	4.254	91.578	Visser (2019)[2]
Kaitz index	Minimum wage as a share of the median wage of full-time employees	48.211 (6.632)	35.780	67.020	OECD.Stat[3]
Unemployment benefit net replacement rate	Net household income during unemployment as a share of net household income prior to unemployment	68.722 (16.132)	31.000	147.000	OECD.Stat[4]
Labour Freedom Index	Employment protection legislation proxy, considering various aspects of a country's labour market regulatory framework	60.829 (13.726)	31.000	100.000	Heritage Foundation (2019)[5]
Tax wedge	Wedge between the total labour cost to the employer and the employees' take-home pay, expressed as a percentage of total labour costs	30.124 (8.695)	9.046	44.030	OECD.Stat[6]
Trade openness	Imports and exports expressed as a share of GDP	115.689 (61.953)	45.419	408.362	Eurostat[7]
Social protection expenditure	Expenditure on social protection (deducting administration costs and other expenditure) as a share of GDP	21.974 (4.736)	11.077	32.213	OECD.Stat[8]
Tertiary education attainment	Share of the population (15–64 years) who have successfully completed International Standard Classification of Education 2011 levels 5–8	25.986 (7.178)	10.800	40.500	Eurostat[9]
Female activity rate	Female labour force as a share of the female working-age population (15–64 years)	68.195 (7.318)	50.500	86.300	Eurostat[10]
Population 65+	Share of the population aged 65 years or over.	16.949 (2.482)	10.800	22.600	Eurostat[11]

Notes: [1] Eurostat. 2019. "Gini Coefficient of Equivalised Disposable Income – EU-SILC Survey" (data file). https://ec.europa.eu/eurostat/databrowser/view/tessi190/default/table?lang=en [2] Jelle Visser, "ICTWSS: Database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts in 55 countries between 1960 and 2018", Version 6.1, November 2019, http://uva-aias.net/en/ictwss. [3] OECD.Stat. 2019. "Minimum Relative to Average Wages of Full-Time Workers" (data file). https://stats.oecd.org/Index.aspx?DataSetCode=MIN2AVE [4] OECD.Stat. 2019. "Net Replacement Rate in Unemployment" (data file). https://stats.oecd.org/Index.aspx?DataSetCode=NRR [5] https://www.heritage.org/index/labor-freedom. [6] OECD.Stat. 2019. "Taxing Wages – Comparative Tables" (data file). https://stats.oecd.org/Index.aspx?DataSetCode=AWCOMP [7] Eurostat. 2019. "GDP and Main Aggregates – Selected International Annual Data" (data file). https://ec.europa.eu/eurostat/databrowser/view/NAIDA_10_GDP/default/table?lang=en&category=na10.naid_10.naida_10 [8] OECD.Stat. 2019. "Social Expenditure – Aggregated Data" (data file). https://stats.oecd.org/Index.aspx?DataSetCode=SOCX_AGG [9] Eurostat. 2019. "Population by Educational Attainment Level, Sex, Age and Citizenship (%)" (data file). https://ec.europa.eu/eurostat/web/products-datasets/-/edat_lfs_9911 [10] Eurostat. 2019. "Activity Rates by Sex, Age and Citizenship (%)" (data file). https://data.europa.eu/data/datasets/xq2lvhylu6tw9ckau7ka?locale=en [11] Eurostat. 2019. "Population: Structure indicators" (data file). https://ec.europa.eu/eurostat/web/products-datasets/-/demo_pjanind

As mentioned above, other labour market institutions are added into the estimation through an extended model. However, labour market institutions can often be ad hoc in nature which makes it "difficult to define precisely what we mean by labor market institutions" (Nickell and Layard 1999, 3037). Nonetheless, other labour market institutions are included in the model without being presumed to be exhaustive.

3.3. Estimation techniques

A cluster-robust Hausman test[4] rejects the null hypothesis that the fixed-effects and the random-effects estimators do not differ substantially. In addition, the assumption that the cross-sectional units are drawn randomly from a larger population, the cornerstone of the random-effects model, is untenable, since the sample principally consists of EU Member States. Fixed-effects estimates are therefore shown throughout this article. Cluster-robust standard errors are used in each regression to correct for serial correlation within each country, as well as cross-country heteroscedasticity.

The fixed-effects model allows us to capture time-invariant unobservable factors specific to each country, which may impact the union–inequality correlation. Nevertheless, the following econometric issues and data limitations need to be kept in mind when interpreting the results. Firstly, there is the possibility of endogeneity between income inequality and trade union density. Nevertheless, factors that influence labour union membership other than changes in economic conditions, namely normative and cultural-cognitive elements (Kelly and Kelly 1994; Posthuma 2009), are subsumed within the fixed effects, since these factors are country-specific and comparatively time-invariant. In this regard, it is important to bear in mind that the 14-year time span of the data set is a relatively short time period in which to observe material changes in such long-term country-specific features. Secondly, the inclusion of a comprehensive set of control variables seeks to mitigate this possible endogeneity issue. Nonetheless, any causal inference should still be interpreted cautiously.

It is worth nothing that, despite the addition of control variables to the models, there is still a possibility of omitted variable bias, given that several driving factors of income inequality are identified within the literature. As indicated above, this problem is mitigated through the fixed-effects specification which controls for other potential correlates of income inequality, provided that they are constant over the time frame, as well as the inclusion of other labour market institutions, which might influence the union–inequality relationship.

The minimum income in eight countries from the sample considered in this article is set solely through collective agreements, as there is no statutory minimum wage. Most empirical studies on the minimum wage choose to overlook these countries, with the exception of the study by Garnero, Kampelmann and Rycx (2015), given the infeasibility of data collection from several sectoral

[4] Boris Kaiser, "RHAUSMAN: Stata Module to Perform Robust Hausman Specification Test", 6 June 2014 (revised 7 November 2015). *EconPapers* https://econpapers.repec.org/software/bocbocode/s457909.htm.

agreements over a number of years. To maintain the sample size, the missing observations relating to these countries are replaced with a unitary value in the extended model and cleared away with country-fixed effects, consistent with the approach adopted in Checchi and García-Peñalosa (2008 and 2010). In line with Checchi and García-Peñalosa (2010), for the years where the minimum wage is absent, a country sample average is included to ensure that the estimated coefficient will be relatively undistorted.

4. Empirical results

4.1. Baseline model results

We will now discuss the empirical results for the baseline model as specified in equation (1). In this regard, the Gini coefficient of equivalized household disposable income post social transfers is regressed on the union density variable and its respective squared value, together with a set of control variables relating to population characteristics and macroeconomic variables. The results are reported in table 2, column (1).

The results indicate that, for this sample of developed countries, income inequality follows an inverted U-shaped trajectory with the net trade union density rate. This is attested by the positive sign obtained on the union density coefficient and the negative sign on the union density squared coefficient, with both coefficients being statistically significant. The results imply that, initially, income inequality rises as more individuals in hired employment become unionized, reaches a peak level when trade union density is around 39 per cent and then declines as union density continues to increase.

Nonetheless, it is important to highlight that unionization interacts with the rest of the institutional framework in determining the extent to which income inequality is impacted. The absence of other institutional explanatory variables in the baseline model might lead to omitted variable bias and thus, at this point, the coefficients of the baseline model should be interpreted with caution.

4.2. Extended model results

Consequently, the baseline model is then augmented, as set out in equation (2), to incorporate other labour market institutions which may impact the trade union–inequality relationship. The other institutional explanatory variables consist of the Kaitz index, a proxy for employment protection legislation (EPL), the unemployment benefit replacement rate and the tax wedge. This approach is useful to assess the empirical robustness of the concave curvilinear relationship established earlier. The results are shown in table 2, column (2) below.

The inverted U-shaped relationship between union density and income inequality is still intact after accounting for the institutional set-up through the inclusion of other labour market institutions in the baseline specification. This is seen through the statistical significance of the positive coefficient on union density and the negative coefficient on union density squared. Moreover, the coefficients have almost identical magnitudes to those obtained in the baseline

Table 2. Results for the core models

Explanatory variables	(1)	(2)	(3)
Constant	13.610**	15.885**	27.847**
	(6.374)	(6.486)	(10.606)
Union density	0.315***	0.296**	0.266**
	(0.120)	(0.105)	(0.103)
Union density squared	–0.004***	–0.004***	–0.004***
	(0.001)	(0.001)	(0.001)
Kaitz index	–	–0.026	–0.022
	–	(0.050)	(0.049)
Net unemployment benefit replacement	–	–0.028**	–0.029***
	–	(0.010)	(0.010)
Labour Freedom Index	–	0.000	0.002
	–	(0.016)	(0.015)
Tax wedge	–	0.017	0.015
	–	(0.053)	(0.053)
Trade openness	–0.002	–0.002	–0.002
	(0.011)	(0.010)	(0.009)
Social protection expenditure	–0.066	–0.026	0.003
	(0.047)	(0.052)	(0.072)
Tertiary education	–0.047	–0.0556	–0.152**
	(0.049)	(0.051)	(0.071)
Female labour participation	0.249**	0.259**	0.222*
	(0.115)	(0.115)	(0.117)
Population 65+	–0.140	–0.153	–0.570
	(0.299)	(0.302)	(0.351)
Observations	364	364	364
Adjusted R-squared	0.895	0.898	0.902
F-statistic	98.103 ***	89.390 ***	68.960 ***
Time-fixed effects	No	No	Yes

Notes: (i) *p < 0.1, **p < 0.05, ***p < 0.01. (ii) The dependent variable is the Gini coefficient of equivalized household disposable income post-social transfers. (iii) Cluster-robust standard errors are reported in parentheses.

Source: Authors' own compilation.

model, further underscoring the persistence of this association. Therefore, the finding of a non-linear relationship between income inequality and unionization reconciles the two sides of this literature in which, on the one hand, a negative correlation between the two variables was identified (for example, Herzer 2014), while on the other, it was concluded by Checchi and García-Peñalosa (2010) that unionization has an inegalitarian effect.

In line with the findings of Checchi and García-Peñalosa (2008), the results indicate that the unemployment benefit replacement rate is negatively correlated with income inequality, albeit having relatively limited distributional effects. Both the baseline and the extended model show that the female labour force participation rate is a strong correlate of income inequality for this sample. Consistent with the findings of Alderson and Nielsen (2002), female labour force participation is positively correlated with income inequality, implying that rising female activity rates have an inegalitarian effect for the sample used, possibly due to assortative matching, which tends to augment the existing disparities across the household income distribution (Greenwood et al. 2014).

However, the coefficients on the EPL and Kaitz index, the measures used to assess the distributional effects of minimum wages, are statistically insignificant. These findings are also consistent with the results of Checchi and García-Peñalosa (2008). When interpreting the latter result, it is pertinent to note that this correlation does not necessarily hold for the eight countries included in the sample, which have collectively agreed minimum incomes and no statutory minimum wage, since the fixed-effects model is unable to estimate the impact of time-invariant variables. The tax wedge is not found to have a significant correlation with income inequality.

4.3. Robustness tests

Although the empirical evidence is scant, the results on the relationship between trade union density and income inequality are inconclusive. Thus far, the core models suggest that there is a significant inverted U-shaped relationship between union density and income inequality, even after the inclusion of other labour market institutions and control variables. Thus, the finding of a consistent curvilinear relationship may account for the seemingly conflicting results reported in earlier studies. The following robustness tests further affirm that the identified correlation is robust by considering possible limitations and other omitted factors in the central regressions estimated previously.

The estimated union–inequality relationship can also be impacted by time-variant characteristics that are common to all the countries included within the sample. Since the sample principally consists of EU Member States, there are many common targets or joint commitments across the national governments of these countries, thus enhancing the relevance of this robustness test. To account for this potential shortcoming, the extended model is re-estimated to include both country-specific and time-specific fixed effects, thus also controlling for common factors that varied over time. Hence, 13 dummy variables for the 14 years within the sample are included within this specification of equation (2), with 2018 as the baseline year. The result of this estimation is

shown in table 2, column (3). The results show that, even when time-specific fixed effects are included, the inverted U-shaped relationship between union density and income inequality is still present, despite altering the statistical significance of some other parameters, namely tertiary education. Furthermore, the coefficients on the explanatory variables are of similar magnitude to the extended model.

From a macro perspective, the link between trade unions and centralization of wage-bargaining influences the potential inequality-reducing effects associated with unions. As wage-bargaining becomes more centralized, unions have more insight into the adverse employment effects of their wage demands. Thus, unions are likely to moderate their wage demands as the degree of centralization widens, which reduces the inequality-increasing effect of increased unemployment levels associated with stronger unions (Nickell 1997). To take this link into consideration in the model, data on wage-bargaining centralization for the sampled countries is obtained from Visser.[5] Table 3, column (1) shows the results of the extended model following the inclusion of an explanatory variable for wage-bargaining centralization, while also controlling for time-fixed effects. An inverted U-shaped relationship between trade unions and income inequality is observed even once the level at which wage-bargaining takes place is taken into consideration, as attested by the statistically significant coefficient on the union density variable and its squared value. Consequently, the findings of this specification further confirm the validity of the results.

Apart from the centralization of wage-bargaining, the mandatory extension of collective agreements to non-unionized workers also influences the extent to which trade unions compress the distribution of income. Irrespective of the degree of bargaining centralization, extending collective agreements to non-unionized workers might result in higher unemployment, since trade unions represent the interests of their members and may not incorporate the macroeconomic impact of their wage demands. However, as is well documented, the data for union coverage rates is limited (Koeniger, Leonardi and Nunziata 2007). Furthermore, using a categorical variable relating to the mandatory extension of collective agreements to non-organized employers poses its own challenges, the most significant of which is that the fixed-effects estimation relies on within-country variation over the established time frame. Nevertheless, categorical variable data for union coverage obtained from Visser[6] show that the level of collective agreements extensions remained unchanged between 2005 and 2018 for several countries within the sample. Therefore, country fixed-effects within the previous estimations partially capture the difference of the effect of union density and coverage on the income distribution. Furthermore, union coverage is correlated with the centralization of wage-bargaining (Koeniger, Leonardi and Nunziata 2007), which was controlled for in the latter robustness test. This correlation is especially relevant given that the time frame considered includes

[5] Jelle Visser, "ICTWSS: Database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts in 55 countries between 1960 and 2018", Version 6.1, November 2019, http://uva-aias.net/en/ictwss.

[6] See note 5.

Table 3. Results of the robustness tests

Explanatory variables	
Constant	27.338***
	(6.274)
Union density	0.281***
	(0.074)
Union density squared	–0.004***
	(0.001)
Wage-bargaining centralization	0.290**
	(0.142)
Kaitz index	–0.016
	(0.032)
Net unemployment benefit replacement	–0.027***
	(0.009)
Labour Freedom Index	0.004
	(0.013)
Tax wedge	0.019
	(0.033)
Trade openness	–0.002
	(0.008)
Social protection expenditure	0.006
	(0.059)
Tertiary education	–0.166***
	(0.051)
Female labour participation	0.230***
	(0.057)
Population 65+	–0.633***
	(0.172)
Observations	364
Adjusted R-squared	0.903
F-statistic	68.348***
Time-fixed effects	Yes

Notes: (i) *p < 0.1, **p < 0.05, ***p < 0.01. (ii) The dependent variable is the Gini coefficient of equivalized household disposable income post-social transfers. (iii) Cluster-robust standard errors are reported in parentheses.
Source: Authors' own compilation.

the global financial crisis, which reinforced the long-term decentralization of collective bargaining in various ways, which in turn led to a sharp decline in the coverage of collective agreements in some countries (Keune 2015).

5. Discussion

The results of the central regressions and robustness tests have consistently shown that, ceteris paribus, income inequality initially increases but eventually decreases as the net trade union density rate rises. The classic view on the economic impact of trade unions is that, as wage bargaining becomes more

centralized, unemployment first increases before decreasing as further centralization takes place (Calmfors and Driffill 1988), with large trade unions keen to balance out increased wages with macroeconomic concerns due to their market power. The findings of this article are aligned with this view, since initially higher trade union density would be associated with higher wages for unionized employed workers and low earnings for an increasingly larger proportion of unemployed workers, and thus higher income inequality, before levelling off and declining as wage demands subside and unemployment falls. Furthermore, the initial inegalitarian effects of rising unemployment are somewhat dampened by falling wage disparities. Falling wage inequality may occur since the reduction of wage inequality amongst unionized workers offsets increasing wage disparities between union and non-union members or, if extension mechanisms extend collective agreements broadly beyond unionized workers, the latter offsetting effect is greatly reduced.

From a search-and-matching perspective, Krusell and Rudanko (2016) derive a model in which trade unions are assumed to be governed by a desire for egalitarian wages and solidarity across members, and which is rational in terms of its wage demands, taking into account both improved wages and job creation. They argue that higher union coverage leads to higher unemployment, since union wages tend to be above non-union wages. However, as coverage increases, unions increasingly start to take into account job creation and hiring concerns, which dampens wage demands and leads to lower unemployment. This is in line with other theoretical findings in this literature (for example, Delacroix 2006). Therefore, these results once again provide a rationale for the existence of an inverted U-shaped relationship between trade union density and inequality, as observed in this article. Moreover, these findings also confirm that a curvilinear union–inequality relationship is also present when the extension of collective agreements to non-unionized workers is taken into account. Aside from shedding light on the channels through which unions impact the income distribution, the existence and persistence of this inverted U-shaped relationship observed between trade union density and income inequality may also serve to reconcile the seemingly contradictory results observed in the literature in this regard.

In this light, trade unions, in their role of representing workers in the negotiation of collective agreements, can significantly contribute to a reduction in the divisions between the different strata of the income distribution. The estimated coefficients of the core regressions and robustness tests suggest that the turning point level of trade union density rate occurs at around 35–39 per cent for this sample, over the specified time frame. As shown in the country plots in Appendix 1, union density figures for countries such as Italy and Luxembourg lie towards this identified turning point.

Nevertheless, in 2018, 20 of the 26 European countries in the sample had a union density rate below the estimated peak trade union density level, which is the level identified by this article as required to curb income inequality and balance economic power. The country plots illustrate that this finding particularly concerns Central and Eastern European countries, as they have the lowest unionization rates in Europe and have also experienced the sharpest fall in this measure in recent years. For example, union data for Slovakia, Czechia

and Hungary is well below the identified turning point over the entire sample period, which places these countries on the left tail of the inverted inequality–union U-shaped relationship with low union density and inequality figures.

Furthermore, union density rates across most countries have continued to dwindle, conforming to the well-documented long-term deunionization trend, which has been taking place since the 1980s in the majority of European countries (Waddington 2014). Thus, further declines for countries above the turning point union density rate will initially result in increasing income inequality and a rising imbalance of economic power. To alleviate income inequalities and the associated economic and social repercussions, and to implement the principles of fair working conditions established in the European Pillar of Social Rights,[7] it is becoming increasingly important for trade unions to strengthen their recruitment and retention efforts and to be well represented in economic decision-making processes.

6. Conclusion

There is robust evidence that trade unions are associated with a compressed wage distribution in developed economies. Nevertheless, empirical evidence regarding the correlation between income inequality and unions is scant, despite its theoretical ambiguity. This article has therefore sought to examine the empirical relationship between income inequality and trade unions in developed economies. Assessing the impact of trade unions on this relatively broader measure of inequality also captures the effect of unions on unemployment and the wage share, allowing us to draw conclusions regarding the overall distributional consequences of such institutions. In turn, the variation in income, rather than wage inequality, can better capture variation in living standards. Additionally, this article further contributes to the growing debate on the causes of rising income inequality in advanced economies by assessing the distributional impact of a country-specific factor. The effect of trade unions on the mechanisms through which they impact income inequality, namely wage inequality, unemployment and the labour share, are country-specific, as well as the contribution of these channels to the income distribution.

The first core empirical model, estimated for a panel of 26 European countries for the period 2005–18, specifies income inequality as a function of the net trade union density rate, together with its squared value, as well as a set of control variables consisting of macroeconomic factors and population characteristics such as trade openness, educational attainment and female participation rates. One of the novel aspects of this article is the inclusion of a squared unionization variable to assess the possibility that the relationship is non-linear, thus shedding light on the conflicting findings across similar studies. Subsequently, this baseline model is extended to include other labour market institutions, to assess the distributional effects of unions within the entire framework of labour market institutions. Taking into account the possible endogeneity issues for the sample

[7] See https://europe-solidarity.eu/documents/social-pillar-goteborg.pdf. Accessed 14 June 2022.

of developed countries used, trade unions are found to play a significant role in the variations in income inequality across countries and over time. Unionization measured through the trade union density rate is found to have a persistent inverted U-shaped relationship with income inequality. Aside from being present in both core regressions, this quadratic relationship remains intact following the inclusion of time-fixed effects, as well as the wage-bargaining centralization explanatory variable, further underscoring the persistence of these associations.

In light of these findings, a number of salient policy conclusions can be drawn. Strong labour market institutions and, more specifically, strong trade unions and comprehensive collective bargaining, one of the objectives of the European Pillar of Social Rights, provide the foundation of the European social model and are a necessary precondition for improvements from a social perspective (Visser 2013). Indeed, the results of this article provide empirical evidence on the contribution of unions towards societal improvements through their role in counteracting income division between different strata. Hence, collective bargaining can be viewed as a complementary tool to other classic measures that countervail increasingly unequal incomes, which have traditionally been related to fiscal redistribution in the form of social protection and progressive taxation, and education policies. Trade unions are pivotal in reducing the divisions between different strata of the income distribution not only through their role of representing workers in the negotiation of collective agreements, but also in the positions that they take in broader discussions relating to economic, employment and social policies. This is imperative to ensure that principles established in the European Pillar of Social Rights, particularly those relating to fair wages and adequate minimum wages and working conditions, are implemented and maintained. Finally, the role of trade unions in a post-COVID-19 scenario will also be crucial not only in the much-needed consultation process, but also in shaping policies and programmes aimed at the recovery and restructuring of EU economies.

Future research can expand on various implications emerging from this article. In particular, there is significant scope for further studies on unpacking the underlying theoretical mechanisms through which collective bargaining may impact labour market outcomes, particularly in light of the cross-country differences in both coverage and the extent to which non-unionized workers are also covered by such agreements. There is also room for further research into the relationship between income inequality and minimum wages in countries with no universal minimum wages, both in terms of sectoral and occupational minima, particularly in light of the ongoing debate on the European wage floor and living wage.

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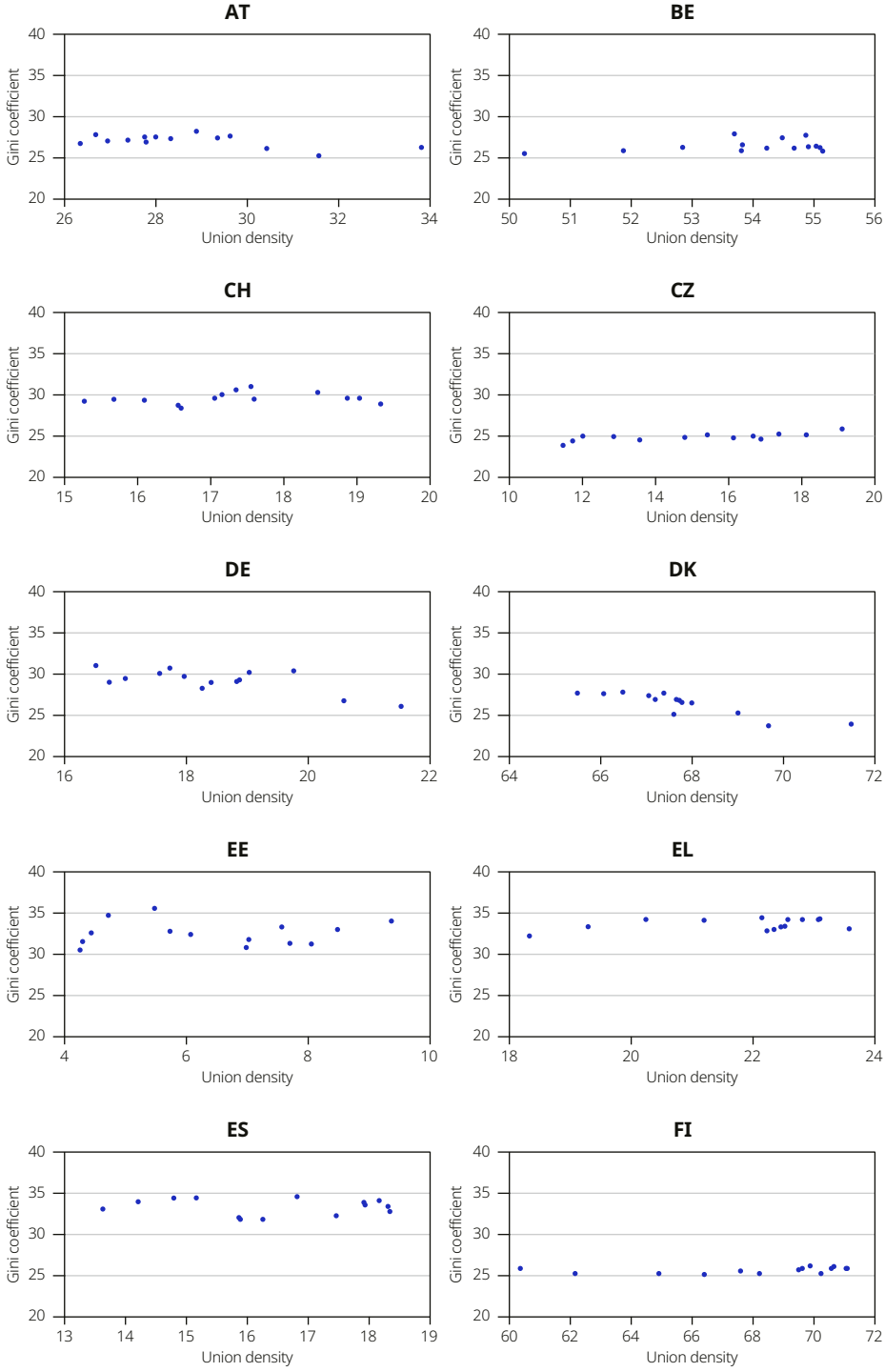
Appendix 1.

Figure A1. Gini coefficient and union density country plots



(continued overleaf)

Figure A1. ***(cont'd)***

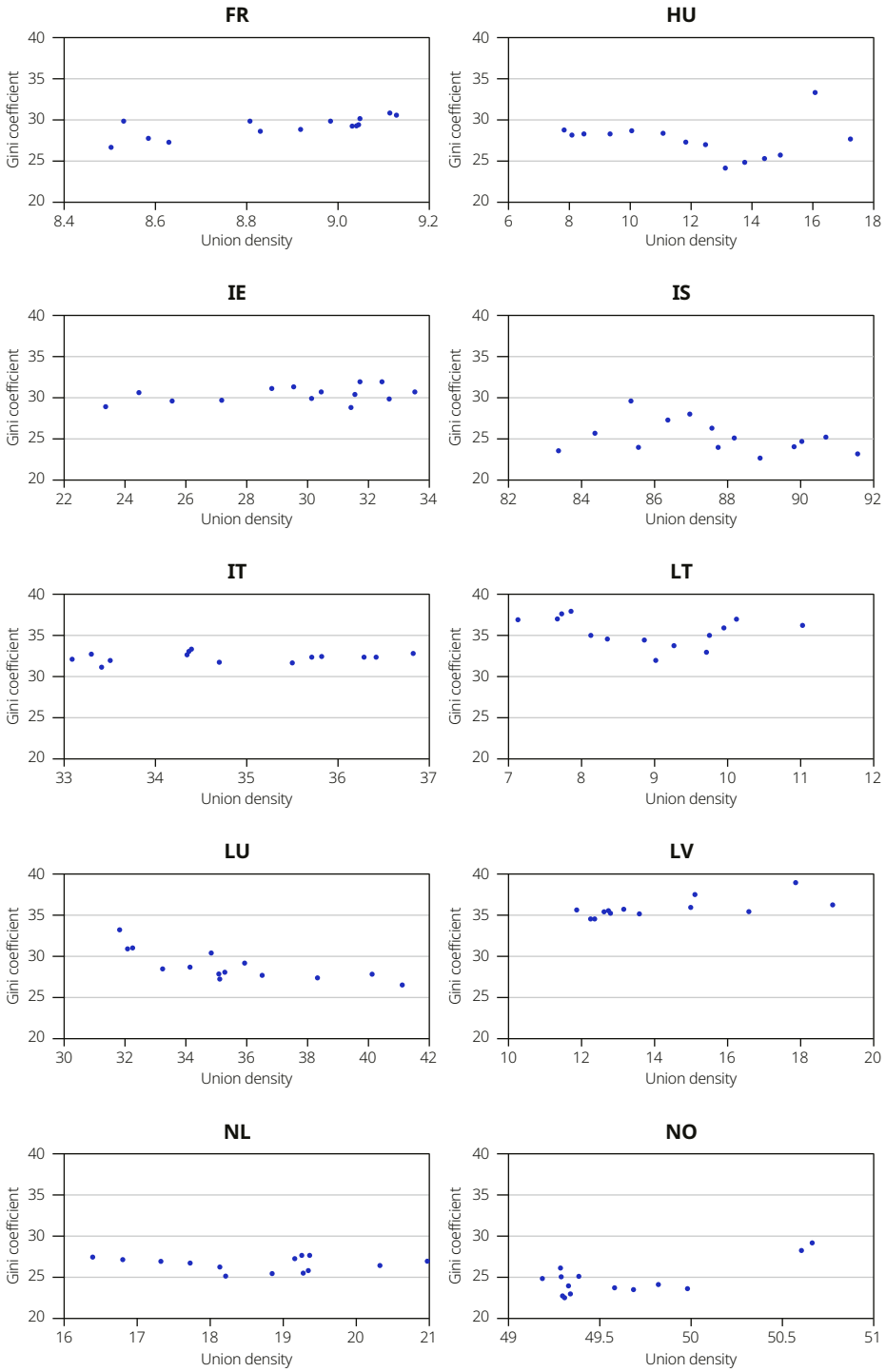
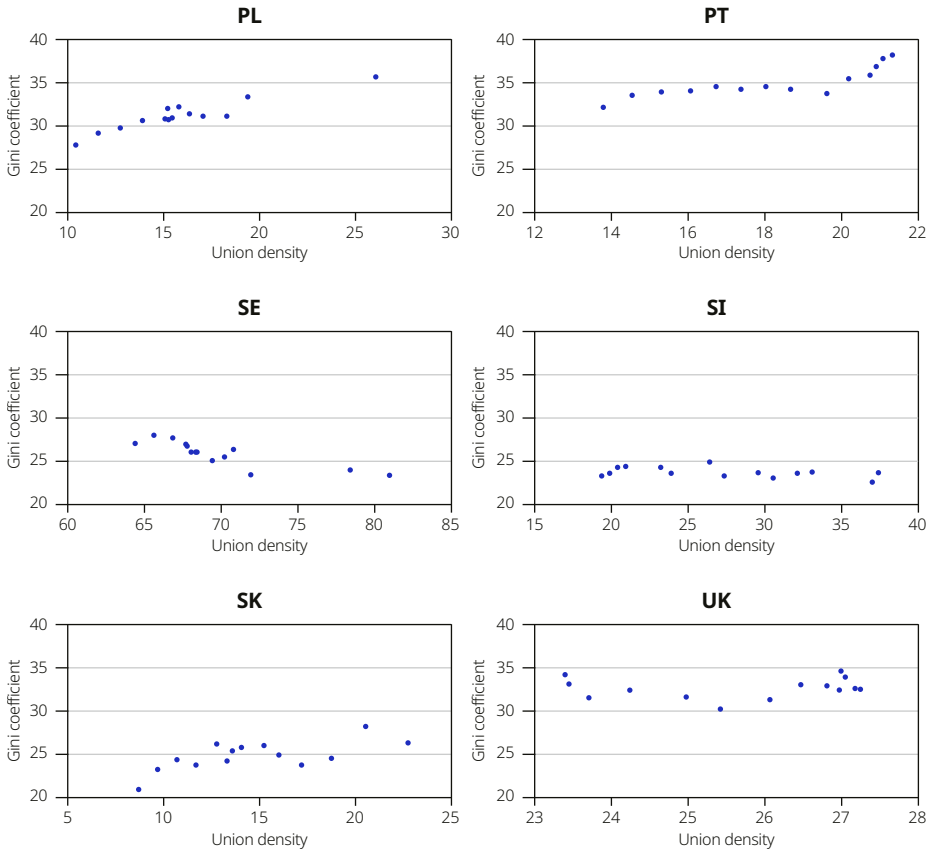


Figure A1. ***(cont'd)***



Source: Authors' own compilation.